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Master Thesis

How Sustainable is Chinese Urbanisation? A Study on Guangdong Province Based on the ESPON SUPER Project

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Table of Contents

List of Figures

List of Tables

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In this journey, I have deeply felt my own ignorance and realised that I may never glimpse more than a fraction of the universe's boundless truth. This is a regret, yet also a blessing, for the courage to explore will accompany me throughout my life.

Abstract

Applying knowledge from the ESPON SUPER project, this study explores the sustainability of urbanisation and land use in China and provides recommendations for achieving sustainable urbanisation. The study finds that China's land use dynamics show distinct regional characteristics, with high urbanisation rates and urban land concentration in the eastern coastal regions, and lower levels of urbanisation in the western regions, which are mainly driven by the level of economic development and population migration. In terms of spatial planning, China has shifted from scattered planning to ‘multi–planning integration’, improving the efficiency of the decision–making process. In addition, with the establishment of a territorial spatial planning system, sustainable land use objectives and guidelines have been set, which have facilitated sustainable land use practices in China. Finally, through a case study of Guangdong Province, this study analyses China's land use practices and policy orientations in detail, and in response to the identified challenges, a series of interventions were selected from the SUPER project’s land use intervention database.

Key Words: ESPON SUPER Project, Sustainable Urbanisation, Land Use Dynamics, Spatial Planning, Policy Transfer

Chapter 1
INTRODUCTION

1.1 Research Background

As one of the most significant changes and challenges in global human settlements, rapid urbanisation has been happening in many parts of the world, leading to worldwide impacts (Zhang, 2016). In this context, the project of 'SUPER – Sustainable urbanisation and land use practices in European Regions' was conducted to make urbanisation and land use practices more sustainable. To address relevant urbanisation and land use challenges in China, this research aims to apply the principles and methodologies elaborate in ESPON SUPER project to evaluate and further promote the country's sustainable development. Since the SUPER project was carried out based on the European context, it is necessary to consider all aspects of China's territorial and institutional context when integrating the SUPER project into practice.

The substantial economic development in post–reform China has resulted in an accelerating expansion of urban areas, and according to G. Li and F. Li, the majority of cities in China have experienced significant urban growth throughout the past decades (G. Li and F. Li, 2019). The level of urbanisation in China first crossed over the 50% threshold in 2011 (Zhang and Lin, 2012), and the urbanisation rate has increased to 64.72% in 2021 (NBSC, 2021). The scale of rural–to–urban migrants in China has also increased rapidly, leading to a rise in urban population from 191 million in 1980 to 914.25 million in 2021 (NBSC, 2021).

Furthermore, the level of urbanisation in China varies by region and province, which is higher in the wealthier coastal regions of East and South China, succeeded by the central and western regions (Yeh, Xu and Liu, 2011). Thus, megaregions have emerged mostly in East and South China, including Central–Southern Liaoning, Jing (Beijing) Jin (Tianjin) and Tangshan, the Pearl River Delta, and the Yangtze River Delta. Notably, among these major megaregions, the Pearl River Delta exhibited the highest level of urbanisation, with an urbanisation rate of 82% in 2010, and has undergone a significant growth trajectory (Tan, 2017).

Accordingly, economic centres can drive regional growth by promoting the economic growth of surrounding cities (Friedmann and Wolff, 1982). As the economic centre of Guangdong Province, the Pearl River Delta region has significantly influenced the economic development of Guangdong Province through facilitating trade, manufacturing, and access to global market. Nevertheless, this also

implies that, in line with China's overall development trend, Guangdong Province has been facing the challenge of imbalanced economic and urbanisation development among different cities.

In general, sustainable urbanisation and land use development holds great importance in China. Although many cities have attempted to promote sustainable urbanisation (Tan, Xu and Zhang, 2016), China still needs to find more innovative solutions to evaluate and improve the sustainability of urbanisation. Apart from uneven development, unordered urban growth in China has also given rise to many social issues, including loss of agricultural lands, fragmentation of land patterns, imbalanced urban–rural development, and increasing pollution and hazards during the urban construction process (Wang, Shi and Zhou, 2020). To cope with such issues, the ESPON SUPER project highlighted that spatial planning, and territorial governance can play an important role in achieving more sustainable use of land by assessing the quality and characteristics of different sites (ESPON, 2020a).

1.2 Research Objectives and Research Questions

The core objective of this thesis is to investigate the status and challenges of urbanisation and land use in China. The study aims to apply the ESPON SUPER project as a guiding framework, taking the territorial and institutional context of China into consideration, to evaluate the sustainability of Chinese urbanisation and land use.

Moreover, the study specifically presents Guangdong province as a case study for detailed examination and provides a series of recommendations to promote sustainable urbanisation in Guangdong province based on evaluation within the framework of the SUPER project. Guangdong is presented as a case study because it is respectively highly urbanised, while the land use patterns are heterogeneous, which reflects the significant trends of land use change in China.

To sum up, the study is constructed in the following research questions:

- What are the fundamental concepts of sustainable urbanisation and land use?
- What does the current urbanisation and land use look like in China? What are the main driving forces and land use change trends?

- What are the main characteristics and challenges of urbanisation and land use in Guangdong province?
- How can ESPON SUPER project be applied efficiently to promote sustainable urbanisation and land use in Guangdong province?
- How can conflicting policies be managed?

1.3 Thesis Structure

The main contents of this thesis are organised in eight chapters. The first chapter is the general introduction, presenting the general topic and research background, highlighting the significance of applying the SUPER project as a guideline to investigate urbanisation and land use situation in China. Besides, this chapter also states the objectives and questions of the study, and the expected research outcomes.

The second chapter 'Setting the Research Context' frames the research context and elaborates on the theoretical framework. This chapter serves to clarify the general definitions of the relevant critical terms and demonstrate the potential challenges needed to be avoided as well as provide an in–depth exploration of the insights embedded with the ESPON SUPER project that can be applied to the research.

The third chapter 'Research Methodology' focuses on the research steps and the methodology adopted from the ESPON SUPER Spin–offs methodology by the study, which combines qualitative and quantitative methods for a comprehensive understanding of the complex situations of the research site.

In the fourth chapter 'Territorial Context in China', an introduction to the territorial context in China and the specific conditions in Guangdong Province is presented. It also specifies the land use changes and their main driving forces, using the land use classifications and driving factors identified by the SUPER project.

In the fifth chapter 'Spatial Planning in China', spatial planning structure and systems and current land use practices in China are presented, stating the institutional context for applying the SUPER project.

The sixth chapter 'Case Study: Evaluate the Urbanisation Sustainability in Guangdong Province' consists of the analysis and evaluation of urbanisation and land use sustainability in Guangdong province. Based on the evaluation results, a series of

relevant interventions from the SUPER project are selected.

The Seventh chapter 'Recommendations on Promoting Sustainable Urbanisation' proposes solutions and recommendations for promoting sustainable urbanisation and land use practices in China. The eighth chapter 'Conclusion' summarises the study and provides the research limitations and perspectives for future research, and the final part of the thesis lists the bibliography referred by the research.

1.4 Expected Outcomes

This study intends to provide an alternative perspective for understanding the current state of urbanisation and land use in China and the practices of sustainable urbanisation through this perspective of evaluation methods. The purpose is not to fully affirm or deny the efforts made by certain Chinese cities in sustainable urbanisation development, but rather to present constructive policy and strategic recommendations based on the existing shortcomings. However, given that different regions and cities nationwide face varying challenges, recommendations based on the evaluation of a specific region are only able to address common challenges and may not encompass all issues.

Chapter 2

SETTING THE RESEARCH CONTEXT

2.1 Introduction

This chapter presents the theoretical framework of the research in four sections. The process of urbanisation and land use change are dynamic, which is inevitably influenced by various factors. Consequently, when conducting research on the sustainability of urbanisation and land use, it is crucial to clarify the relevant theories of potential driving factors and examine the relationships between them.

The first section introduces the definition and current situation of urbanisation, dynamic elements leading to rapid urbanisation, and various impacts and challenges as a consequence of rapid urbanisation. Further, this section explains that making urbanisation and land conversion more sustainable is the solution to face those challenges. According to the current research, this mainly refers to the balance between the economy, society, and environment. Correspondingly, sustainable practices have been implemented worldwide, including in Europe and China.

The second section introduces the common concept of spatial planning and analyses the role and significance of spatial planning in promoting sustainable urbanisation, as well as the potential limitations. These limitations are reflected in the fact that spatial planning is often restricted because it is a product of specific territorial and institutional contexts, even though there are good practices in other political systems that can be transferred.

The third section explores the research objectives, contents, and the conceptual framework of the ESPON SUPER project. The SUPER project has developed an inclusive framework based on good practices from diverse territorial contexts, aiming to fill the theoretical and practical gaps and guide decision–making to achieve sustainable urbanisation and land use.

The aforementioned potential limitations and risks in the transfer of good practices are explained in more detail in the final section, outlining the constraining factors that need to be avoided or addressed in subsequent research.

2.2 The Sustainability of Urbanisation Dynamics

1) Urbanisation

Rapid urbanisation has been happening across the world over the past decades

and becoming one of the major global concerns, as stated by World Bank, the proportion of urban population has exceeded 50% in 2006 (World Bank, 2018), and it has been predicted that 70% population will be living in cities by 2050, with most of the growth expected in the developing world (UN–Habitat, 2009; Montgomery, 2008).

The most common definition of urbanisation is the expansion of urban population, along with physical growth in size and density of built–up space, as well as rural depopulation in rural areas. Plus, other subsequent factors such as population mobility, segregation, and industrialisation are frequently associated with the process of urbanisation (Marsella, 1998; Leviton, Snell and McGinnis, 2000). Urbanisation is also described by United Nations as the movement of people from rural to urban areas with population growth equating to urban migration (United Nations, 2010). Moreover, urbanisation is a dynamic process that changes physical forms, politics, and culture of cities while meeting the needs of an expanded urban population (Pivo, 1996). In this research, following the concept framed by the ESPON SUPER Guide (ESPON, 2020a), urbanisation is not merely defined as the rural–to–urban migration of population or simply the growth of urban areas, but all physical developments that have impacts on land patterns as well as the ways how they are influenced by land use policies and regulations.

In general terms, many cities have experienced substantial growth due to the rapid population growth and the transformation of world's economy (Cohen, 2005). On many occasions, urbanisation is associated with economic growth such as increasing share of GDP and income per capita (Tacoli, McGranahan and Satterthwaite, 2015; Gollin, Jedwab and Vollrath, 2016), and it has been acknowledged that urbanisation is one of the most significant strategies of economic development in the 21st century by producing numerous benefits such as job opportunities and infrastructure services (Shen and Zhou, 2014; Vlahov and Galea, 2002).

Notably, in the past 5 decades, developing countries or less–wealthy areas, such as countries in Africa and Asia, have undergone the process of dramatic urbanisation with the most rapid pace, bearing many resemblances to the development history of urbanised process in developed countries but with higher rates and less pivotal industry (Gollin, Jedwab and Vollrath, 2016; Vlahov and Galea, 2002). Except for the shared concerns brought by rapid urbanisation throughout the world such as

climate change, environmental degradation, and social inequality, developing countries are also facing the problems of insufficient urban capacity for providing adequate basic service, expansion of informal settlements, urban congestion, and so forth (Cohen, 2006).

2) Urbanisation Sustainability

In the background of cities continuing to attract more population along with increasing competition for land resources among human activities, and the accompanying challenges are becoming more and more urgent, awareness of the importance and necessity of sustainable urbanisation and the corresponding attempts have increased significantly. In 1972, The United Conference on the Human Environment started to make environment a major concerning issue and firstly introduced the concept of "sustainable development" (United Nations, 1972). And this concept has been extensively accepted and studied on urban area development after the agenda 21 was approved in the United Nation Conference on Environment and Development held in Rio De Janeiro, which aimed to promote the development of sustainable human settlement (United Nations, 1992). In this context, sustainable urbanisation is characterised by the urbanisation process that meets the principles of sustainable development (Roy, 2009).

The term 'sustainability' commonly refers to the ability to meet the needs of people now without compromising the availability for future generations to meet their own needs (WCED, 1987), and to maintain the balance between environment, economy, and society, or between people, planet, and profit, which indicates "the exploitation of resources, the direction of investments, the orientation of technological development, and the institutional change are all in harmony and enhance both current and future potential to meet human needs and aspiration" (WCED, 1987). This is also specified by Banister as the way of consuming resources efficiently while improving people's quality of life (Banister, 1998).

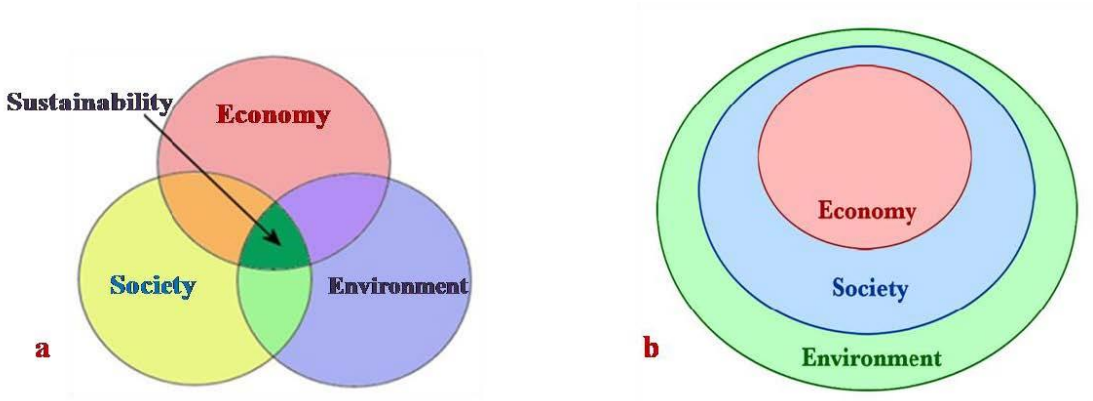

Figure 1 – The elements of sustainability: (a) The three overlapping elements of sustainability; (b) economy and society being constrained by environment limits.

Source: Liu, 2009

When it comes to the various recognitions of sustainable urbanisation, after comparing the definitions introduced by different organisations, such as United Nations and European Environment Agency, Lu, Wu, and Yan notes that "most of the definitions are derivations from those of sustainability, focusing on the improvement of long–term human wellbeing by balancing the three dimensions of sustainability, minimizing resource consumption and environmental damage, maximizing resource use efficiency, and ensuring equity and democracy" (Lu, Wu and Yan, 2015). More specifically, in the field of urban development, sustainable urbanisation is defined as "design of future urban development as well as the re–development of existing ones in an environmentally friendly and resource efficient manner" for promoting economic development and human well–being, as well as adapt to climate change (Ali–Toudert et al., 2020). Thus, sustainable urbanisation is a comprehensive process considering all factors related to sustainability within the context of global urbanisation (Ochoa et al., 2018), and it is essential to combine all aspects of sustainability components that may shape urbanisation development when conducting research and making decisions for cities.

It is widely accepted that sustainable urbanisation is regarded as a key to face the existing urban problems accompanied by the enlarging urbanised areas (Malkina–Pykh, 2002). In recent years, there have been increasing practices and programmes targeting at promoting urbanisation sustainability conducted by governments and non–governmental organisations, attempting to address the main challenges of achieving sustainability as reported by UN–Habitat/DFID (2002), which include

potential conflicts between economic growth and environmental sustainability, social inequity, insufficient governing competences, and imbalanced urban–rural development. From global perspective, many programmes have intended to integrate sustainable practices into urbanisation to face the challenges, for example, the prevailing implementation and promotion of Sustainable Development Goals (SDGs) developed from the United Nations Millennium Declaration. In Europe, the recognition of land as a finite resource has also resulted in more and more sustainable land use practices in European regions (Solly, Berisha and Cotella, 2021). In China, various sustainable development policies and practices have also been implemented (Tan, Xu and Zhang, 2016), since sustainable urbanisation has been approved as an effective way to cope with the unprecedented trend in urban growth. All these attempts have led to many successful experiences considered as best practices that can be transferred among different countries to guide the sustainable development (Shen et al., 2013).

2.3 Urbanisation and Spatial Planning

The concept of spatial planning was firstly approved in "European Regional/Spatial Planning Charter – Torremolinos Charter" implemented by the Council of Europe Conference of Ministers responsible for Spatial/Regional Planning (CEMAT) in 1983 as a management technique with interdisciplinary and comprehensive approaches that is mainly used by public sector aimed at organising spatial patterns of future activities. In 1999, the concept was officially defined by European Spatial Development Perspective (ESDP) and was clarified that the purpose of spatial planning is to promote the harmony between economy and society, sustainable development, and the balance of competitiveness among different regions (European Commission, 1999). Later, various concepts and contents of spatial planning have begun to expand and encompass different social and cultural aspects over time to deal with more complicated social issues, such as enhancing economic integration in view of environmental sustainability.

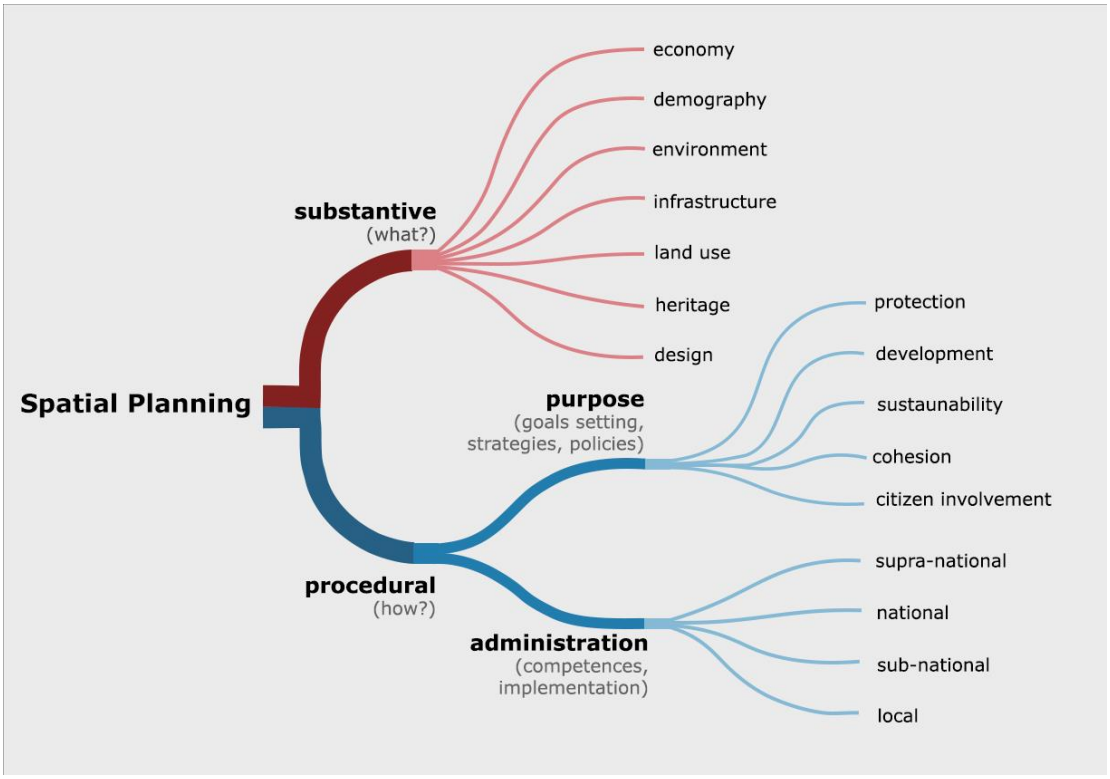

Figure 2 – The scope of spatial planning in legal and professional terms

Source: ESPON, 2018

Apart from the general concepts and practices of urban planning, spatial planning seeks to steer practices and policies involving spatial development at larger scales through a more inclusive approach, and these practices are carried out with a focus on the coordination of institutional capacity among relevant stakeholders and policy sectors (Allmendinger and Haughton, 2007; Schout and Jordan, 2007; Davoudi and Strange, 2009; Vigar, 2009). Spatial planning is considered as the product of the specific institutional context of each country and state with strong contextualised and temporal characteristics, and there are greatly varying forms of organisations at the regional level. As mentioned by Nadin and Stead (2008), spatial planning can be explained as "the form and operation of planning systems are embedded in their historical context, the socio–economic, political and cultural patterns that have given rise to particular forms of government and law".

Spatial planning is frequently employed to manage land resources and has increasingly been perceived as playing a significant role in achieving sustainable urbanisation as the urban population has substantially increased. It is acknowledged that spatial planning systems, including project planning, master planning, land use

planning, and strategic planning, have an influence in land use cover and change (Couclelis, 2005), since the products of spatial planning process such as plans, policies, and programmes can determine land use patterns and the process of urbanisation development. The case of the 1947 United Kingdom planning system successfully achieving its twin goals of curbing spatial sprawl and protecting high–quality agricultural land also demonstrates that proper spatial planning can effectively manage urbanisation (Pacione, 2009). Furthermore, planning systems can provide a holistic approach to promote sustainable development by targeting at improving "the economic and social lives of the people on an equitable basis as well as judicious management and preservation of the environmental resources for their long–term productivity" (Fuseini and Kemp, 2015).

Spatial planners and governments have been striving for developing sustainable cities and regions by governing urbanisation processes (Albrechts, Balducci and Hillier, 2017; Collier et al., 2013). In terms of managing urbanisation and use of land, spatial planning is often classified as a political role–player (Geist and Lambin, 2006), and the design of planning systems mainly depends on "the general attitude in the society to public involvement and steering" (Larsson, 2006). Besides, successful planning practices usually rely on various aspects, including public, political, and financial support, as well as a clear legal framework (Bengston and Youn, 2006; Van Rij, Dekkers and Koomen, 2008), which are of importance to fulfil the wide–ranging requirements of sustainable development that are concluded by Obeng–Odoom (2013) as decentralisation, entrepreneurship, and democratisation.

However, it is still a challenging issue to integrate spatial planning into practices towards the implementation and development of sustainable urbanisation. Considering that each country's spatial planning is the outcome of its specific context, the functions, authorities, scope and objectives, and other aspects of the planning systems are also bound to the context. In this case, it is only feasible to focus on specific policies and regulations within the institutional and governmental contexts when conducting the practice of steering urbanisation processes. Additionally, it is worth noting that the current implementation of spatial planning in land management practices primarily depends on roughly estimated planning instruments and policies (Hersperger et al., 2018). Therefore, due to diverse possible obstructions such as contextualised political restrictions, limited knowledge, and lack of quantitative land

assessments, etc., each country faces evidently different challenges and potential contradictions in translating the multifaceted principles of sustainable development into specific spatial planning systems. In addition, despite that there are various available good practices that might stimulate sustainable development utilising spatial planning as a tool, Bulkeley (2006) mentioned that "little is known about the ways in which best practice is constructed, used, and contested, or of its implications for urban sustainability"; Hersperger et al. (2018) also revealed that "there is little empirical knowledge that would allow a generalization regarding how and when planning is implemented".

2.4 The ESPON SUPER Project

Due to the variability of sustainable urbanisation interventions put in each European country with heterogenous spatial planning systems (Solly et al., 2020), there is a lack of comprehensive evaluation on how these interventions were implemented to address contextualised problems related to sustainable development and how the spatial planning systems interact with the socio–economic drivers. Against this background, the ESPON SUPER project was carried out and set to measure and explain the sustainable urbanisation and land use practices within the European context as well as to identify the appropriate tools for land use sustainability that can be promoted through Europe (ESPON, 2020b).

The ESPON SUPER project aims to provide evidence and recommendations for promoting sustainable urbanisation and land use by investigating and analysing the implementation of sustainable interventions and practices, considering that land use conversion, as a dynamic process, is highly influenced by human activities and various interventions. These interventions primarily refer to the way how territorial governance and spatial planning systems intervene land use development practices, including "policies and regulations, subsidies and incentives, visions and strategies", as well as all aspects of factors that have an impact on land use conversion and the distribution of land use rights (ESPON, 2020b). Given that the implementation of interventions is based on different objectives of sustainable development and relies on different national contexts that remain heterogeneous (ESPON, 2020a), the ESPON SUPER project integrates these experiences and good practices from an inclusive and

interrelated perspective.

Specifically, the SUPER project offers “a conceptual framework to understand urbanisation and land use dynamics; evidence on urbanisation and land use developments within the ESPON space; evidence on policy interventions, including EU policies, and their relative success and sustainability; evidence on how interventions affect land use practices through case study within diverse territorial contexts; a holistic sustainability assessment framework applies to three urbanisation scenarios (compact, polycentric, and diffuse)” (ESPON, 2020b). The practical framework and evidence can help decision–makers and policymakers to contribute to more equal and sustainable urbanisation and land use and can provide ideas, information, and productive experiences for other relevant studies towards sustainable urbanisation.

As mentioned, the SUPER project has developed a conceptual framework to explain the cause–effect relationships that drives urbanisation and land use change (figure 3). This framework involves not only the quantitative data–driven research that has been conducted by many studies to demonstrate the land use patterns and change, but also the qualitative surveys on contextual conditions that affect the decisions made for land conversion. This study will evaluate the sustainability of urbanisation and land use in China based on this conceptual framework and analyse the cause–effect relationships driving land use change in China, taking into account the unique territorial and institutional context.

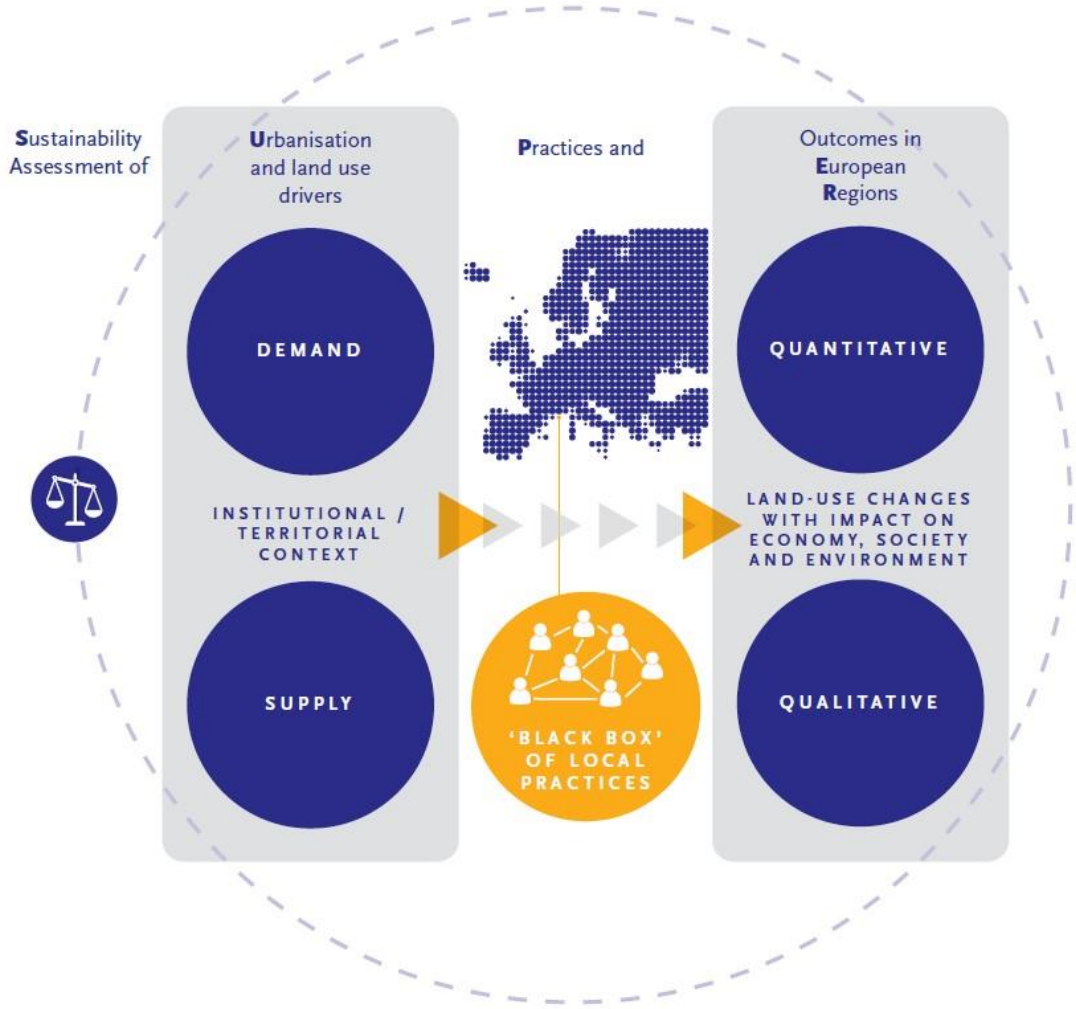

Figure 3 – The ESPON SUPER conceptual framework

Source: ESPON, 2020a

2.5 The Challenges and Pitfalls of Spatial Planning Policy Transfer

Policy transfer refers to the process of how "knowledge about the policies, administrative arrangements, institutions, ideas for the development of policies, administrative arrangements, institutions, ideas is used in another political system", and the broad range of objects that can be transferred are listed as "programmes, policies, institutions etc." (Dolowitz and Marsh, 2000). According to Bennett (1991; 1997), policy transfer is a measure that intends to absorb the external convergences of policy from other countries to modify the domestic policies. For policy makers, policy transfer is often considered as one of the most effective and quickest solutions to many problems without having to creating original policies that requires various

resources such as financial resources (Tavits, 2003; Rose, 2005; Randma–Liiv, 2005), thus, policy makers increasingly look for knowledge and ideas from other political systems for the development of their own system. There are three levels of good practices for actors engaging in policy transfer to 'borrow', which are presented by Dolowitz and Marsh as 'international, national, and local' – this means that they can transfer policies from other political systems within their own country as well as from other nations (Dolowitz and Marsh, 2000).

The process of policy transfer has increased in recent years and become more influential in contemporary policy making. This rapid growth mainly contributes to – as described by Parsons – global economic development and the increasing influence of transnational corporations and institutions, so the national policy makers became less capable of framing their own agenda (Parsons, 1996). Since policy transfer tends to be integrated into the international programmes (ESPON, 2020d), the rise of transnational organisations such as European Union (EU), OECD, World Bank etc. that encourage cross–nation learning also plays a part in the growth of policy transfer. For instance, the EU has promoted cross–national learning of knowledge and practice through comparative research (i.e. ESPON COMPASS project) and international forums, which helps policymakers and planning practitioners guide sustainable urbanisation in their countries and regions (Berisha et al., 2024). Additionally, technological improvements and the growth of all methods of communications have made it easier for policy makers to exchange ideas and knowledge with each other, along with which the occurrences of policy transfer have increased (Dolowitz and Marsh, 2000).

However, the transfer of good practices is sometimes limited and does not merely lead to success, in other words, policy transfer can also result in policy failure, making it necessary to reflect on the significance of research on policy transfer in a complex and context–specific activity such as spatial governance and planning (Berisha et al., 2024). There are three main factors that might contribute to policy failure (Dolowitz and Marsh, 2000): uninformed transfer – acquires insufficient information about the 'borrowing' policy and how it operates in the 'lending' country; incomplete transfer – the key components that brought success to the originating country may not be transferred; inappropriate transfer – the attention paid to the different economic, social, and institutional contexts may not be enough. Other factors

that might have a significant impact on limiting policy transfer are concluded by Evans as (Evans, 2009): cognitive obstacles – barriers may be generated if the policy problems are not well recognised in the pre–decision phase; environmental obstacles in the implementation phase, such as ineffective strategies and structural constraints; and public opinion from various public groups.

The restrictions of transferability and policy failure might as well occur in the practices of promoting sustainable urbanisation and land use, owing to the fact that the transferability of elements related to spatial planning and territorial governance is characterised by a higher degree of complexity, difficulty, and risk of failure compared to other fields of policy transfer (Cotella, Janin Rivolin and Santangelo, 2015). Although policies are composed of exchangeable components, not all components share the same degree of transferability, for instance, methods and techniques are easier to be transferred while the elements that relies on the specific contexts such as ideas, programmes, and institutions are not easily transferable (ESPON, 2020d), which might cause barriers when transferring policies and practices relevant to sustainable development from other countries. Taking EU as an example, it is limited to exchange European best practices even when those practices are assumed applicable and effective, because there are huge differences in economic, political, and institutional contexts between 'borrowing' and 'lending' countries (Stead, 2012), making it particularly significant to take unique contexts into considerations and avoid the potential pitfalls when implementing practices towards more sustainable urbanisation and land use.

In this context, the study of Berisha et al. (2024) shows that the ESPON SUPER project provides a methodology that minimises the risk of failure in policy transfer, particularly in facilitating sustainable urbanisation. The SUPER project has created a database of sustainable land use interventions and a guide for policymakers (ESPON, 2020a), which were applied to address the specific challenges faced by Lithuania and Croatia. These spin–offs did not adopt traditional top–down or linear approaches, but instead, through systematic collaboration between researchers and policymakers, the local context was thoroughly examined, and tailored methods were developed, thereby improving the transferability of knowledge and avoiding the pitfalls associated with directly replicating experiences.

Chapter 3
RESEARCH METHODOLOGY

3.1 Introduction

The methodology adopted to conduct this study mainly builds on the ESPON SUPER Spin–offs methodology that grants a comprehensive perspective for the research covering multifaceted aspects. Guided by the SUPER Spin–off methodology, the research methods of this study were designed and arranged in a structure with multiple steps and a mixed research methodology.

This chapter begins with the introduction to the research steps and methods applied in the conduct of the SUPER Spin–off project. Furthermore, it offers information on the procedure, purpose, and specific operational details for each method of the study, as well as the sources of data used in quantitative research.

3.2 The ESPON SUPER Spin–offs Methodology

Apart from extracting evidence and recommendations from research on diverse good practices, the ESPON SUPER project also involves integrating the knowledge into various practices to investigate the applicability of the SUPER Guide to policymaking, such as in Lithuania (ESPON, 2020d), which are presented as the SUPER Spin–off study. The Spin–off study set up a methodological protocol targeted to explore what value could the project bring to the decision and policymakers active in different contexts to promote sustainable urbanisation and land use, which contains a series of steps, objectives, actions, and expected outcomes interacting closely with the stakeholders that can contribute to the successful implementation of the knowledge provided by the SUPER project. There are four interrelated steps adopted in the protocol, each of which consists of a sequence of conducted activities and the production of their consequential outputs (figure 4).

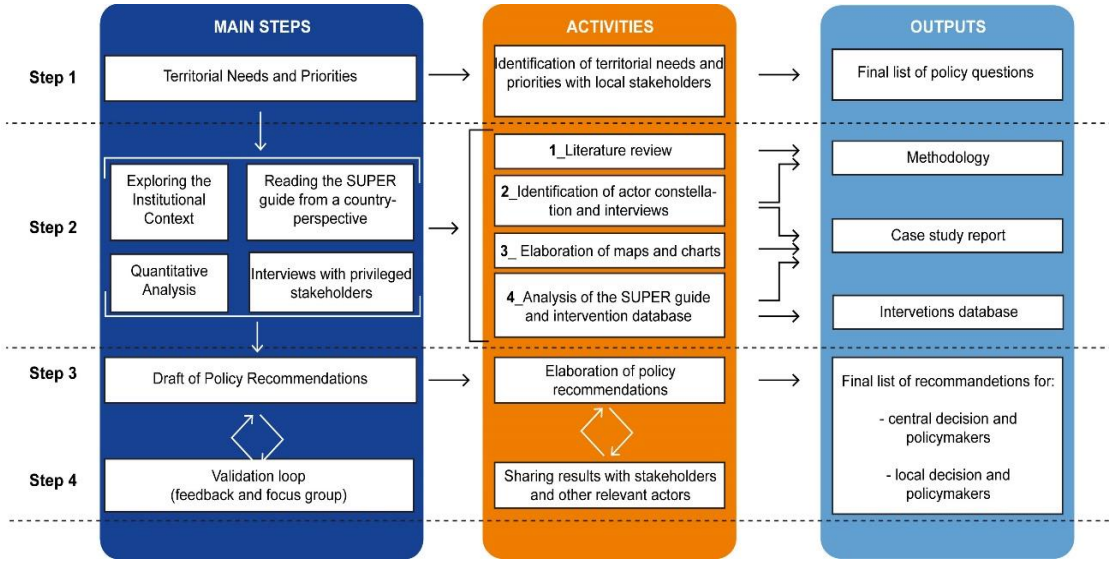

Figure 4 – The Spin–off Methodological Protocol

Source: ESPON, 2020d

The first step is to identify a list of policy needs and priorities with help of the service provider, according to the policy role and challenge presented by the stakeholders. This list is the precondition for the following steps that is required for successfully applying the SUPER Guide within specific territorial and institutional context.

There are mainly three objectives included in the second step: explore the institutional context to understand the administrative structure and the main spatial planning and governance; investigate the land use transformations and their corresponding socio–economic drivers through a number of data–oriented analyses; delve into the SUPER Guide to explore the land use development trends in relation to the main European trends, and evaluate the relevance of the interventions selecting from the Guide with respect to the territorial and institutional framework. To achieve the objectives, this step involves quantitative research and a thorough review of the literature to understand the local context, interviewing key actors who have an influence on the field of urbanisation and land use, as well as identification of interventions from the Guide that can fit in the actual context.

The third step is to provide solutions and site–based recommendations on promoting sustainable urbanisation and land use in view of the main European trends, and the last step is to test and discuss the final recommendations through meetings that encourage inclusion, diversity, and transparency.

3.3 The Structure of the Research and Its Methods

3.3.1 Research Structure

The thesis includes four major steps. Firstly, a detailed review and analysis of the ESPON SUPER project was carried out to define its applicability for the research, including research methods, intervention database and sustainability indicator, and the general insights generated from practical applications. Secondly, a comprehensive understanding of the study area was developed, mainly the territorial context and the institutional context. Following this, a series of land use examples were selected and systematically evaluated for assessing the urbanisation sustainability, and the last step was to select relevant interventions from the SUPER project and to draw up recommendations for the development of sustainable urbanisation.

3.3.2 Research Methodology

Tailored to different research contents contained in the research steps, the thesis adopted a mixed research methodology combining quantitative and qualitative methods to collect and analyse data more precisely.

– *Quantitative Methods*

Quantitative analysis was performed at both the national and regional levels integrating various sources of data to improve the accuracy of the study. First, collected data mainly from the China Statistical Yearbook to generate figures and charts showing the factors including demography and economy that drive land use change in China. Second, used the 30m annual land cover datasets in China derived from the research of Yang and Huang, which were produced by combining the data collected from China's Land use/Cover Datasets (CLUD) and Landsat images on the Google Earth Engine (Yang and Huang, 2022), to generate a series of maps and charts presenting the land use transformations and change trend of each province in China over the past two decades, and then used the data from Guangdong Province Land Change Survey Reports (Department of Natural Resources of Guangdong Province) to produce maps showing the current land use status of each city in Guangdong.

– Qualitative Methods

1) Review of the ESPON SUPER project

To establish a robust foundation for the research, it was necessary to undertake a thorough analysis of the ESPON SUPER project, along with all the relevant documents and associated projects, including the reports presenting all the evidence, SUPER Guide, and SUPER spin–offs study. In addition to acquiring the knowledge that would support the research, this study phase also aimed to compare the main European development trends of urbanisation and land use described in the SUPER project to the main trends in China, therefore, the similarities and differences of the development trends in the two regions can be examined to verify the applicability of the SUPER project; and then selected a preliminary set of interventions from the intervention database identified in the SUPER Guide for assessing the urbanisation sustainability in Guangdong Province based on the specific national and regional contexts.

2) Literature Review and Targeted Searching

This method was used to understand the current studies and research contexts relevant to urbanisation and land use, and to collect information in the field relevant to institutional context and research context of urbanisation and land use in China. By reading academic books, periodicals, online materials from official websites, conference reports, and specifically domestic laws and land use regulations as well as spatial planning instruments, the overview was formed to understand the multi–level spatial planning systems and the fundamental status of urbanisation and land use and in China. Besides, this method helped to describe the main spatial planning and governance institutions, their responsibilities and authorities, the influences they have on urbanisation and land use and highlight the problems in China's spatial planning such as overlapping conflicts that may affect the progress of promoting sustainable urbanisation.

3) Interview

The identified interviewees taking part in the research were mainly experts working in urbanisation and land use. Considering the diversity of the sample and different evidence made by actors with different research focuses, the interviewees were accordingly distributed across various fields, including professors and experts specialising in urban planning and spatial planning, who were asked a set of prepared

questions that provided shreds of indications for better understanding the current driving forces of urbanisation and land use, and how spatial planning and governance regulate land use in practices. Furthermore, the interviewees were asked to offer suggestions on assessing the interventions significantly affecting land use in Guangdong and providing policy suggestions.

4) Identification and Evaluation of the land use interventions

After completing the above research, the final step in the study was to select a series of land use interventions based on the combining results of interviews, literature review and all aspects of analyses, and then assessed them following the sustainability indicators identified by ESPON SUPER project.

Chapter 4
TERRITORIAL CONTEXT IN CHINA

4.1 Introduction

Land use is the result of contextual factors and human activities and measuring land use has gained significance in striving towards future sustainability goals (ESPON, 2020e; Future Earth, 2013). The changes in land use can substantially drive changes in the spatial distribution, indicating the intensity and pattern of relationship between human activities and natural environment (Lawler et al., 2014; J. Liu et al., 2010).

To deepen the understanding of the current situations of urbanisation and land use in China, this chapter aims to provide an overview of urbanisation dynamics in China, and then conduct research on urbanisation and land use patterns and changing trends, and to explore their relationship with the corresponding driving forces. Additionally, a series of comparisons among different regions from a national perspective are analysed to represent the characteristics and challenges in current urbanisation and land use.

4.2 Overview of Urbanisation Dynamics in China

The People's Republic of China is a socialist country located in East Asia, with an area of approximately 9.6 million square kilometres and the world's second–most population exceeding 1.4 billion. China is divided into 34 provincial administrations, comprising of 23 provinces, 5 autonomous regions (Inner Mongolia, Xinjiang, Tibet, Guangxi, Ningxia), 4 direct–administered municipalities (Beijing, Tianjin, Shanghai, Chongqing), and 2 special administrative regions (Hong Kong and Macau).

Figure 5 – Administrative areas of China

Source: Geology. Available at: https://geology.com/world/china–satellite–image.shtml

Before 1978, China's urbanisation level was significantly lower than the world average. An important beginning in the development of urbanisation was the "First Five–Year Plan" implementing between 1953 and 1957, during which the heavy industry developed with the aid of the former Soviet Union, and the number of industrial cities and the level of urbanisation increased. During the period of 1958 to 1961, the urbanisation rate has increased to nearly 20%. However, due to the fact that the scale of urban construction was far more beyond the level that the economy could sustain, and due to a series of unsuitable policies and activities implemented during that period, China's urbanisation basically stagnated between 1962 and 1978. Since the reform and opening up after the 1980s, with the development of all aspects of society and economy, rapid growth of urbanisation and the tremendous land use

changes have started to occur in China, leading to various land use patterns on different spatial scale (Liu et al., 2010).

Over the past decades, China has followed a unique path to urbanisation. The development history of urbanisation in China has distinctive characteristics, due to the unique systems in economy and politics that are different from many western countries which usually share a similar economic and political history of free market and social democratic regimes and so forth (Hamnett, 2020). As classified in the research of Chen, Liu and Tao (2013), there were three significant periods of China's urbanisation – the rapid decline phase from 1960 to 1978, the stable development phase from 1979 to 1995, and the rapid development phase after 1995. The rapid development of urbanisation in China mainly contributed to the world's largest rural–urban migration flow caused by relaxation of the government's regulation on internal migration (Kojima, 1995), while job opportunities and income discrepancies are the primary driving forces of this migration flow. Henderson et al. (2009) had defined the distinctive characteristics of China's urbanisation compared with other countries – the high urbanisation rate, huge income discrepancies between urban and rural, imbalanced population growth and economic structure among different cities, and strict administrative hierarchy. The "incomplete urbanisation" in China also demonstrates the characteristics including high investment, consumption, emission, and expansion, and low quality of inclusiveness and sustainability (Guan, 2017).

China's path to urbanisation have made great achievements in many aspects and avoided some of the pitfalls that have occurred in other developing countries in Africa, Asia, and South America (Guan, 2017). However, the unprecedented fast growth of urban population and the existing challenges such as severe ecological and environmental destruction, the imbalanced development among different regions and the huge gaps between urban and rural areas have caused many problems that are holding back the development of urbanisation sustainability in China. According to Tan, Xu and Zhang (2016), there are various issues including social inequalities, informal settlement and slums, land scarcity, and climate change resulting in destructive effects on sustainable development. Hamnett (2020) also mentioned the issue that around 200 million rural migrants in China settle in "urban villages" (Hamnett, 2020), which are usually located on the urban fringe with low quality of living and infrastructure conditions, high crime rates and high anti–social behaviours,

and this widely concerning social phenomenon has created certain negative impacts on the efficiency of allocating land resources, social stability, as well as urban planning management.

Figure 6 – Urban village in Guangzhou, Guangdong province

Source: Wikipedia. Available at:
https://zh.wikipedia.org/wiki/%E5%9F%8E%E4%B8%AD%E6%9D%91

These problems have drawn attention from Chinese governments. In the past decades, Chinese governments have adopted diverse policies to achieve sustainable urbanisation, consequently, many cities in China have made efforts to implement wide–ranged sustainable projects (Tan, Xu and Zhang, 2016). For instance, the practice of promoting eco–city in Shanghai, Chongming Island, and Dongtan, aimed at dealing with the challenges related to ecosystem, energy, economic and social development, and so on (Cheng and Hu, 2010). Although, the shortcomings of the current sustainable urbanisation practices are still quite noticeable, including the persisting imbalance between urban and rural development, and the unsolved issues such as “urban villages” and ecological degradation. Conducting a comprehensive examination of urbanisation, land use patterns and changing trends, as well as other related aspects remains crucial for proposing innovative solutions to promote urban sustainability in China.

4.3 Driving forces for Land use Trends in China

According to the ESPON SUPER Project, three main drivers should be identified for analysing the land use trends, including demographic development, economic growth, and employment development (ESPON, 2020d).

4.3.1 Demographic Trends

Population fluctuations have wide–ranging impacts on society, economy, and environment, which can significantly drive land use changes, making it crucial to analyse and manage these dynamics for promoting sustainable land use.

As shown in figure 7, from 2000 to 2020, the general population of showed a growing trend, with only four regions experiencing a decline: Heilongjiang, Jilin, Gansu, and Hubei. Population growth rates ranging from 40% to 60% can be observed in the four eastern provinces of Tianjin, Shanghai, Zhejiang, and Guangdong, as well as in the western province of Xinjiang. Moreover, the population growth rate in Beijing exceeded 60% during this period.

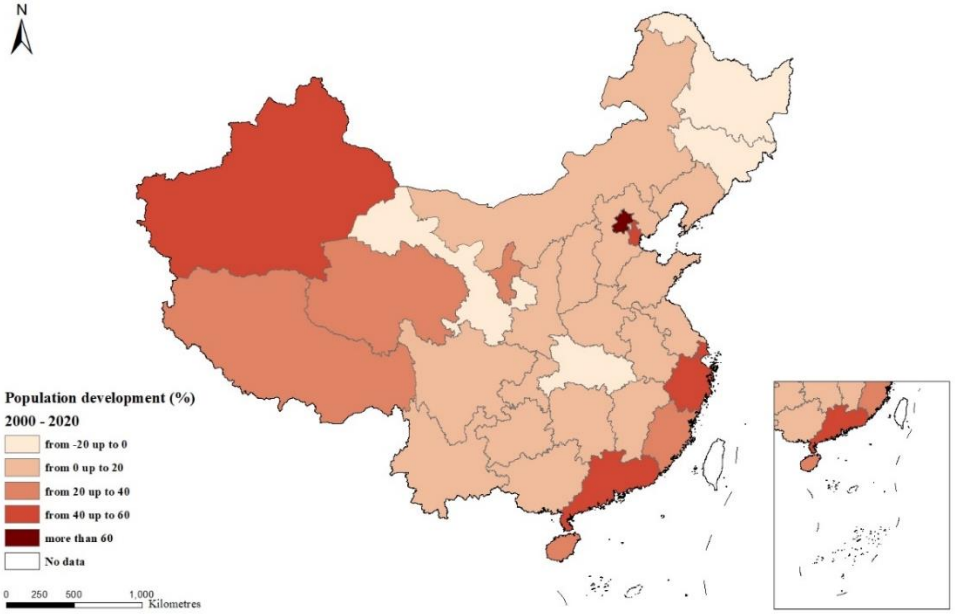

Figure 7 – Development of population in China from 2000 to 2020

Source: author's elaboration

Data source: National Bureau of Statistics of China, 2001a; 2021a

During the period from 2010 to 2020, China experienced notably imbalanced population migrations (see figure 8), primarily towards three major eastern megaregions, namely Jing (Tianjin) and Jin (Beijing), the Yangtze River Delta (Jiangsu, Zhejiang, Shanghai), and the Pearl River Delta (Guangdong), among which the highest net migration can be observed in the direct–administered municipalities of Beijing, Tianjin, and Shanghai. These migration trends mainly contribute to the developed economies in the megaregions, indicating more job opportunities and better infrastructure. However, starting from 2015, issues such as increasingly uneven distribution of public resources within the megaregions, along with the gradual relocation of industries to other areas, lead to a significant decline in population influx into the megaregions. Moreover, regions that have absorbed transferred industries, such as Hubei and Sichuan, have experienced a gradual decrease in the moving–out rates.

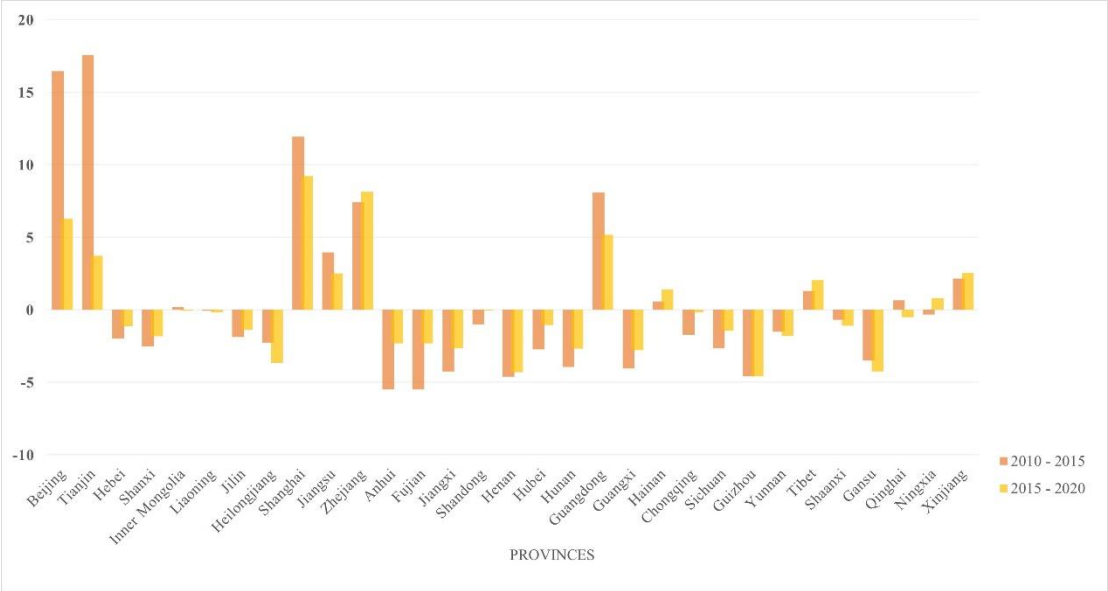

Figure 8 – Net migration in China from 2010 to 2020

Source: author's elaboration

Data source: Gu, 2022

Another driving factor related to demographic development is the proportion of urban population, reflecting the level of urbanisation of different regions in China to some extent. In the northeastern and eastern region of China, the urban population proportion exceeds 60% in all provinces, with Beijing, Tianjin, and Shanghai having the highest proportion exceeding 80%; in the central region, provinces with urban

proportion exceeding 60% including Shanxi, Hubei, and Jiangxi; in the western region, the proportion exceeding 60% appears in Inner Mongolia, Ningxia, Shaanxi, Chongqing, and Sichuan. Tibet has the lowest proportion of urban population, at less than 40%.

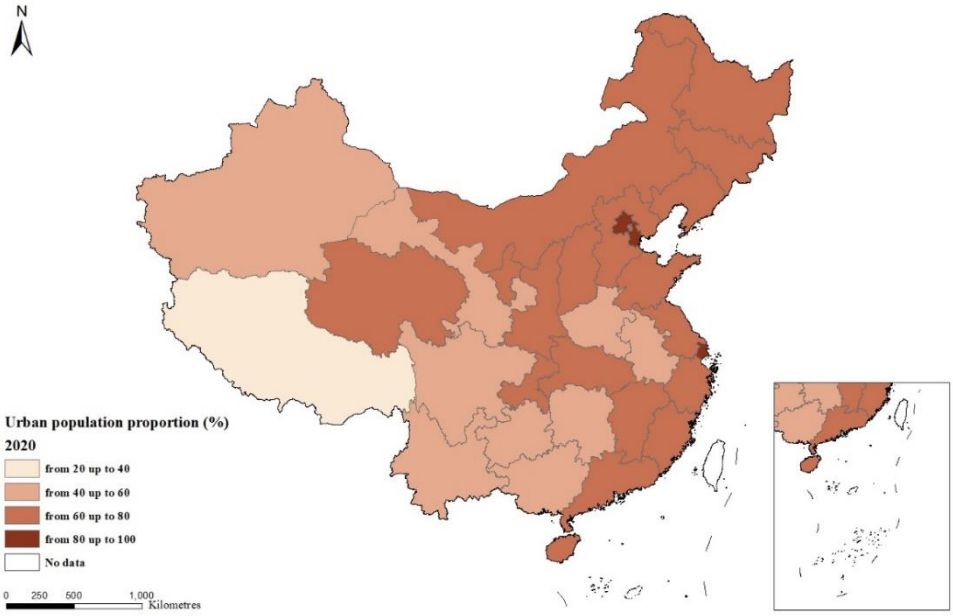

Figure 9 – Urban population proportion in China

Source: author's elaboration

Data source: National Bureau of Statistics of China, 2021a

4.3.2 Economic Trends

Economic growth also plays a crucial role in driving and measuring urbanisation development and changes in land use, because this implies an increase in demand of land consuming for industrial areas and offices, and so on (ESPON, 2020c). In China, land use change is not only considered as the result of economic growth but also a factor driving economic development (He, Huang and R. Wang, 2014).

In general, since the launch of market–oriented reforms, from 1980s until 2010, China's economic development has been in a state of rapid growth. However, due to the exhaustion of the demographic dividend and sustained structural change, there has been a substantial slowdown in growth in recent years (Lu, 2017). During the period of 2010 – 2015, all regions have performed well, with GDP continuing to

grow (see figure 10). Nevertheless, since 2015, the overall growth rate has slowed down, and five provinces (Inner Mongolia, Heilongjiang, Jilin, Liaoning, and Tianjin) have begun to experience negative growth in GDP (see figure 11).

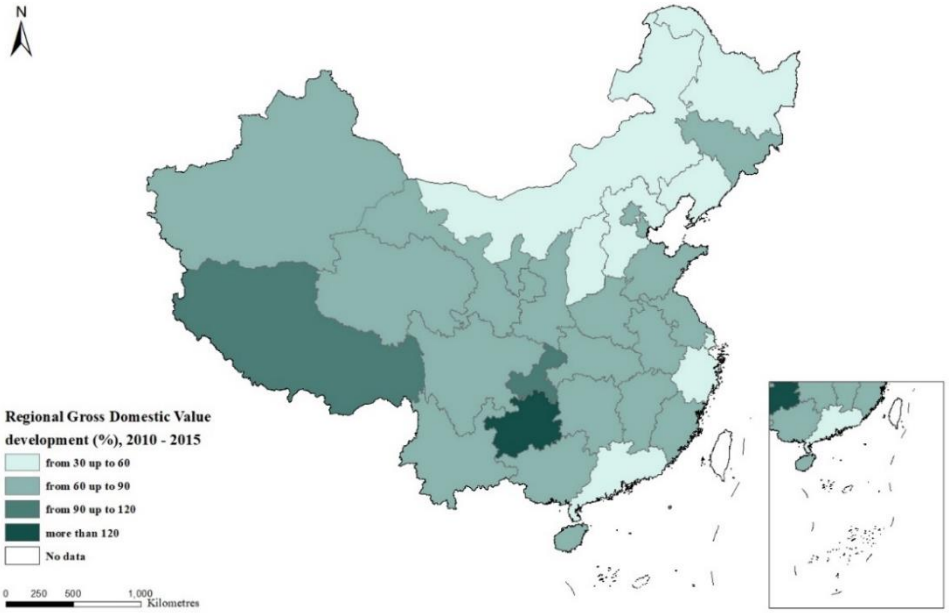

Figure 10 – Development of regional gross domestic value in China from 2010 to 2015

Source: author's elaboration

Data source: National Bureau of Statistics of China, 2011; 2016

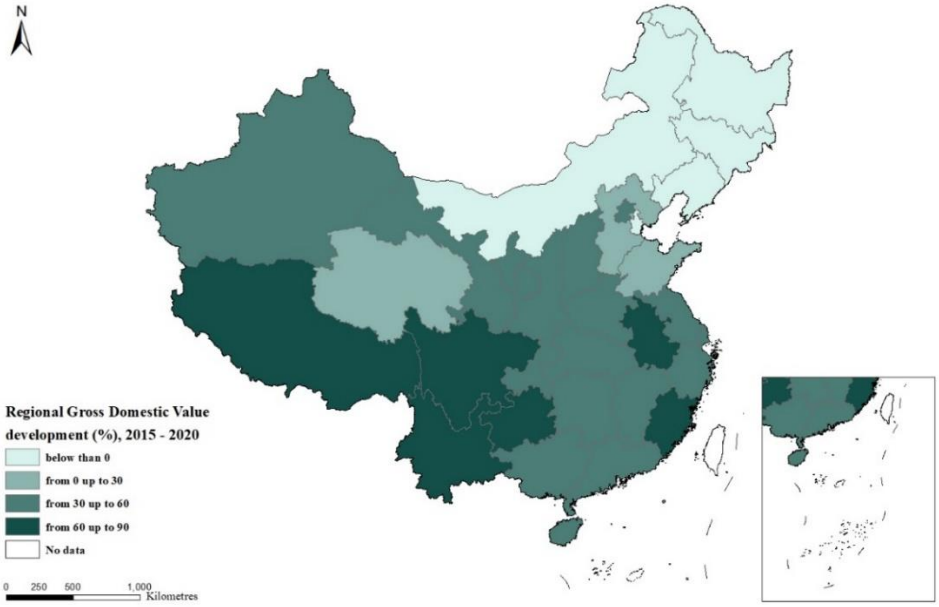

Figure 11 – Development of regional gross domestic value in China from 2015 to 2020

Source: author's elaboration

Data source: National Bureau of Statistics of China, 2016; 2021b

4.3.3 Employment Trends

Most regions in China show an increase in employment over the period of 2000 – 2020, especially in Beijing, Shanghai, Guangdong, Hainan, and Xinjiang, where the employment rate exceeds 60%. Only five provinces – Heilongjiang, Henan, Anhui, Guizhou, and Hunan – experience a decline in employment, where generally face a shortage of job opportunities, leading to a relatively large proportion of population moving out to other regions (NBSC, 2001b; 2021b).

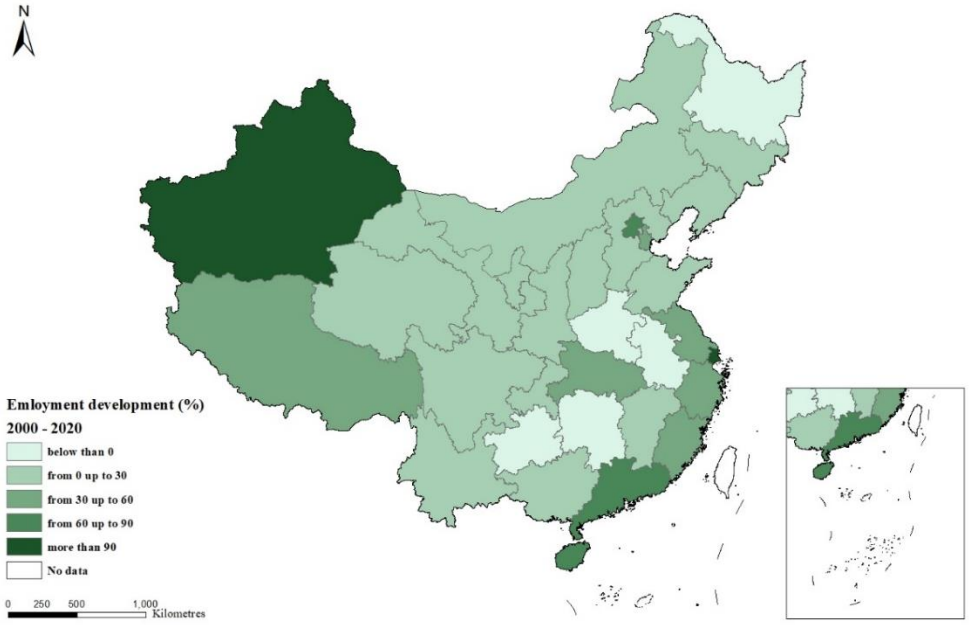

Figure 12 – Development of employment rate in China from 2000 to 2020

Source: author's elaboration

Data source: National Bureau of Statistics of China, 2001b; 2021b

4.4 Overall Trends of Land Use in China

4.4.1 Change in Urbanisation

The proportion of urban use in China shows distinctive regional characteristics, consistent with the level of economic development, gradually decreasing from the eastern coastal regions to the western inland regions. As shown in the figure 13, in 2020, the provinces with the highest urban use proportion are found in Tianjin,

Shanghai, and Macau, exceeding 30%, with Macau's data more than 40%. Following provinces are Beijing, Shandong, and Jiangsu, with urban use proportion exceeding 15%. In contrast, this data in five western provinces of Xinjiang, Tibet, Qinghai, Gansu, and Yunnan is under 0.5%, especially in Qinghai, where the share of urban use is below than 0.005%.

In Guangdong Province, the general urban use proportion is relatively high in the Pearl River Delta megaregion (see figure 14), represented by cities such as Shenzhen, Foshan, and Zhongshan, more than 25%. On the other hand, the urban use in the western and northern areas of Guangdong is all below 5%. Despite Guangdong consistently ranking first in GDP over the past three decades, this imbalanced development of urban construction is so substantial that the overall urban use proportion in 2020 is only 6%.

From 2000 to 2020, mainly motivated by the local governments (Lin, 2007), China's urban construction has continuously increased, with the most significant increases of more than 200% occurring in Xinjiang, Guizhou, Fujian, Chongqing, and Qinghai (see figure 15). Yet, it is worth mentioning that the current urban use in these provinces remains at relatively low levels. When comparing the urban use with demographic development, the population growth surpasses the expansion of built–up areas in 16 provinces, while the situation is opposite for the other provinces, especially in Xinjiang, where the trend is particularly noticeable (see figure 16).

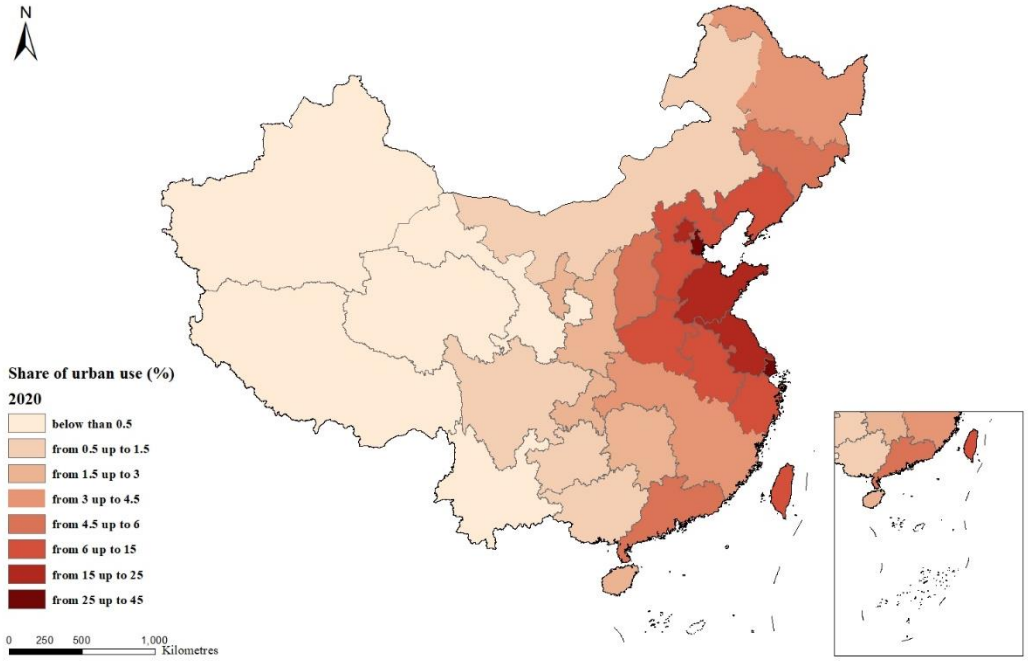

Figure 13 – Share of urban use in China in 2020

Source: author's elaboration

Data source: Yang and Huang, 2022

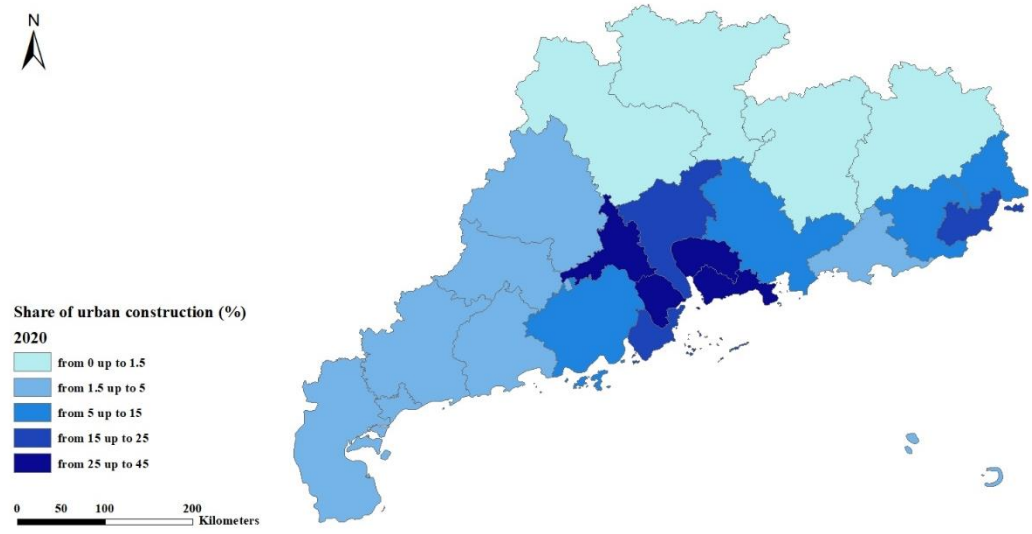

Figure 14 – Share of urban use in Guangdong Province in 2020

Source: author's elaboration

Data source: Department of Natural Resources of Guangdong Province, 2023

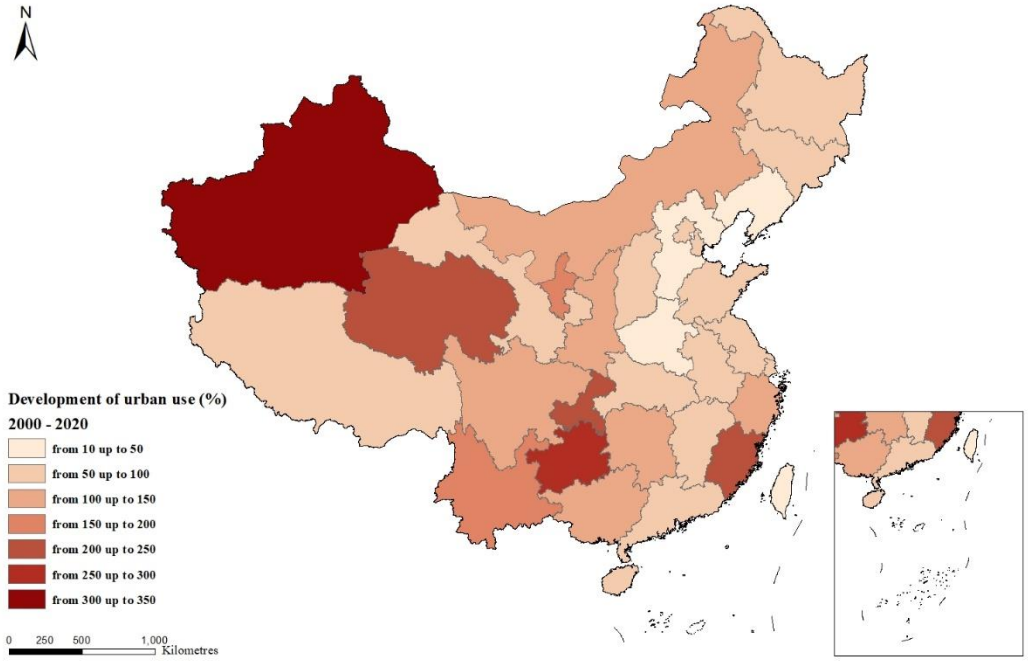

Figure 15 – Development of urban use in China from 2000 to 2020

Source: author's elaboration

Data source: Yang and Huang, 2022

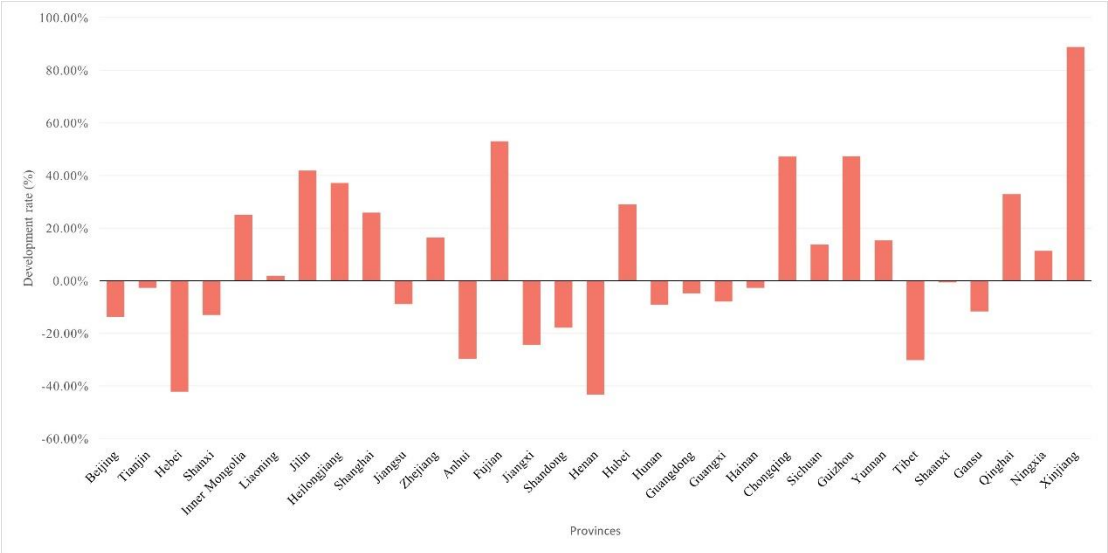

Figure 16 – Development of urban use per capita in China from 2000 to 2020

Source: author's elaboration

Data source: Yang and Huang, 2022; National Bureau of Statistics of China, 2001a; 2021a

4.4.2 Change in Agricultural Lands and Forest

Due to the huge benefits gap generated from agricultural land and construction land, it has become the main trend in China transforming agricultural land into industrial and residential land (Liu et al, 2010; Liu, Fang and Li, 2014). The great land conversion has led to notable agricultural land abandonment or loss in many regions (Yang and Li, 2000). In addition, a series of land policies were proposed around 2000 to manage ecological environment change (Zhang et al, 2022), such as "returning farmland to forest", making the loss of farmlands and the conversion between agricultural land and forests increasingly worthy of attention.

Apart from Inner Mongolia, Gansu, Qinghai, Xinjiang, and Tibet, where the main land cover is grassland or barren, most regions in China are primarily covered by agricultural land and forests (see figure 17 and figure 18). Provinces located in plain areas, such as Shandong, Henan, and Jiangsu, have a higher proportion of agricultural land coverage, with a share of cropland more than 60%, whereas in southern China, where the terrain is hillier, forest coverage is higher, for example, Fujian has a share of forest reaching 81%.

During the period of 2000 – 2020, the overall agricultural land area in China decreased by 3%. Most regions witnessed a shrinking trend in cropland, with provinces including Beijing, Tianjin, Shanghai, Shaanxi, and Qinghai experiencing reduction over 10%; only Hong Kong, Macau, and some of western provinces like Tibet and Xinjiang showed noticeable growth trend (see figure 19). Furthermore, the total forest area increased by 2% from 2000 to 2020, and most provinces showed an increase in forest, except for Jiangsu and Macau that experienced substantial decline of more than 20% (see figure 19). As mentioned before, the conversion of agricultural land into construction land and the implementation of policies such as "returning farmland to forests" have been the key factors behind these trends. Overall, the net conversion from agricultural land to forests was about 7800 square kilometres in this period (see figure 20).

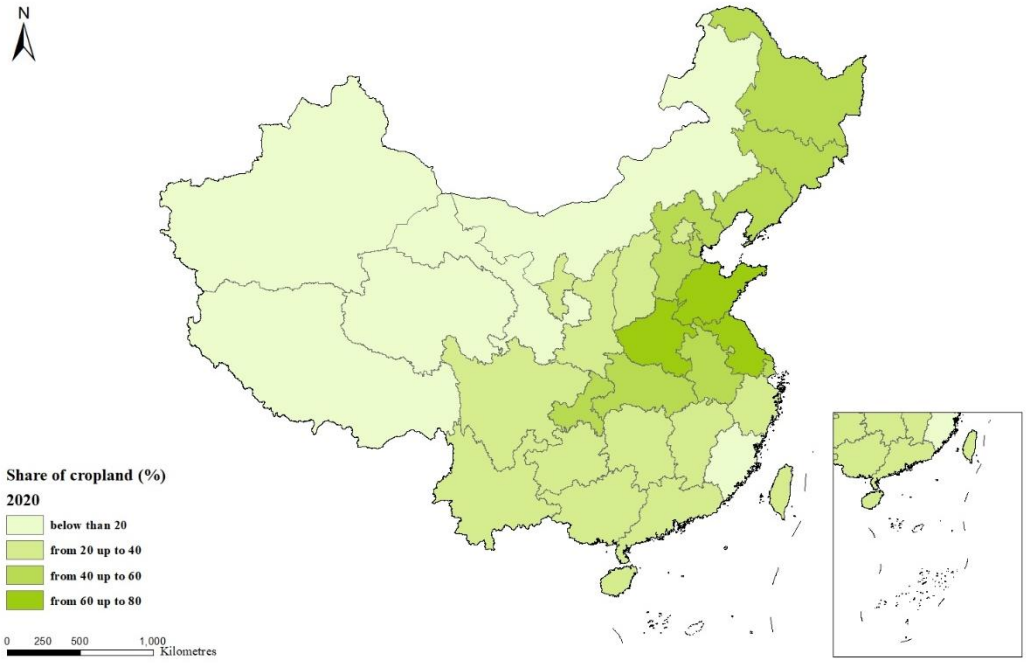

Figure 17 – Share of cropland in China in 2020

Source: author's elaboration

Data source: Yang and Huang, 2022

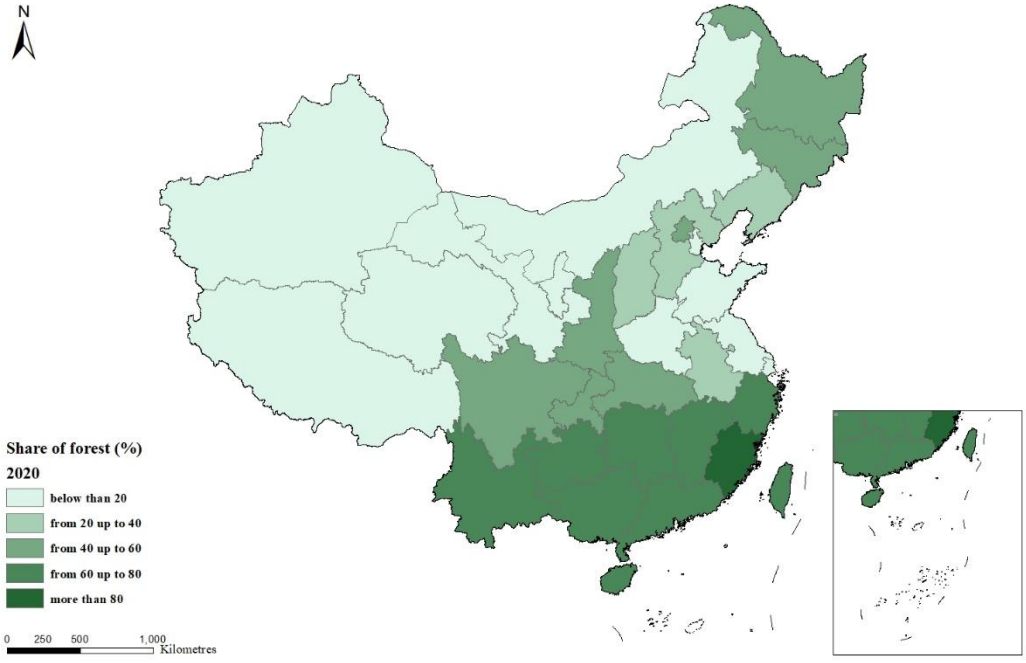

Figure 18 – Share of forest in China in 2020

Source: author's elaboration

Data source: Yang and Huang, 2022

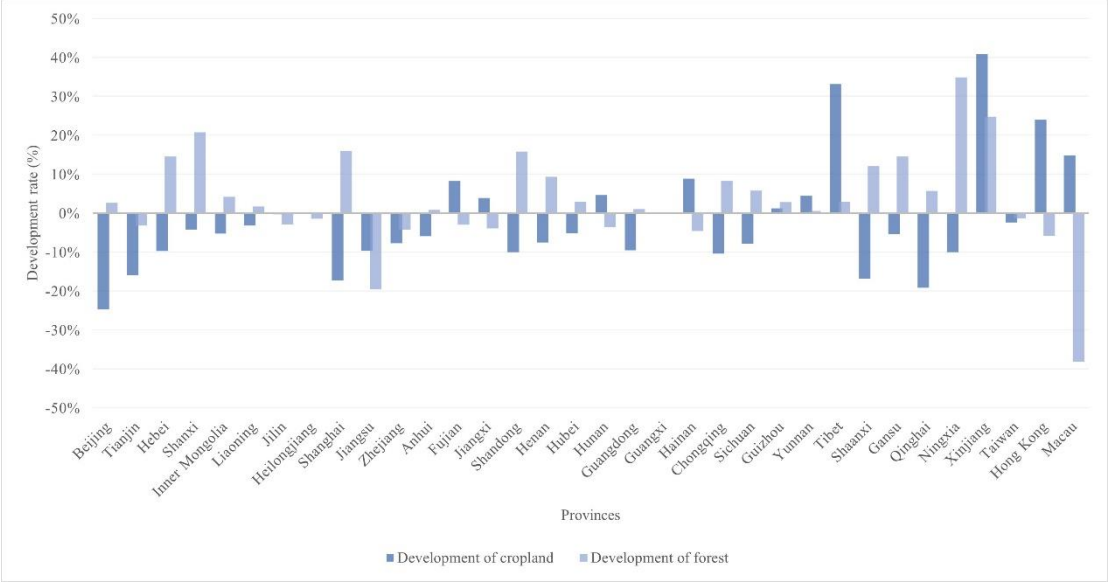

Figure 19 – Development of cropland and forest in China from 2000 to 2020

Source: author's elaboration

Data source: Yang and Huang, 2022

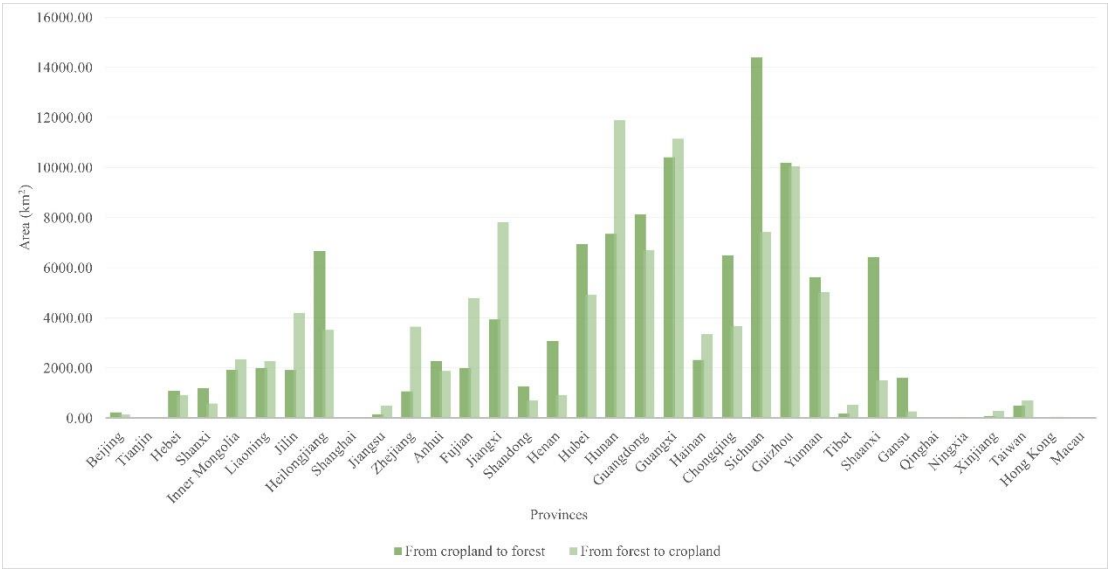

Figure 20 – Land change from cropland to forest and vice versa from 2000 to 2020

Source: author's elaboration

Data source: Yang and Huang, 2022

4.4 Conclusion on Urbanisation and Land Use Dynamics

Generally, China's land use dynamics are characterised by distinctive regional patterns shaped by rapid urbanisation, economic growth, and demographic shifts. Urban land use is concentrated in eastern coastal regions, such as Guangdong's Pearl

River Delta area and major cities like Beijing and Shanghai, while the inland and western regions, including Tibet and Xinjiang, maintain considerably low levels of urbanisation. This imbalanced pattern of urban expansion is driven by economic development and population migration towards major megaregions. However, recent trends show a decline in population inflows to these regions due to the relocation of industries, representing a potential change in future land use demands.

Key driving forces such as demographic change, economic growth, and employment opportunities significantly influence land use patterns across China. Population growth and urban migration have stimulated increased demand for urban land in major economic centres, especially in the developed eastern megaregions. Economic growth has further fuelled this trend by intensifying the demand for industrial and residential land, although recent economic decline may alter the pace and distribution of future urban expansion. Employment growth is also closely linked to land use changes, as regions with expanding job markets tend to have higher level of urbanisation, while regions with slower job growth, particularly in the northeast, experience less transformation in land use.

Rapid urban growth has led to significant urban–rural imbalances and regional disparities, with the need for improved resource distribution and infrastructure development to support equitable growth. Furthermore, the large–scale conversion of agricultural land to urban and industrial purposes poses environmental risks, emphasising the importance of policies to protect agricultural land and natural ecosystems. These critical factors significantly impact the sustainability of China's urbanisation and land use, requiring efficient planning and management as well as policy support to ensure long–term development.

Chapter 5
SPATIAL PLANNING IN CHINA

5.1 Introduction

This chapter is organised into four sections and provides a comprehensive explanation of the spatial planning system and relevant land use practices that have emerged under China's unique political system and socio–economic context. These insights offer the institutional background necessary for integrating the ESPON SUPER Project into the research, thereby facilitating a more scientific study of China's urbanisation and land use patterns.

The first section provides a thorough overview of the evolution of spatial planning in China over the past decades. The evolution process is mainly divided into three phases based on the characteristics of spatial planning in different periods: centralised planning during the socialist period, initial explorations after the economic reforms, and the gradual formation of a more rational spatial planning system through reforms after 2000.

The second section presents the administrative divisions, structures, and legislative framework in China. The administrative system can be described as a centralised power with a clear hierarchy of government and a combination of unified leadership and a certain degree of decentralisation.

The third section provides a detailed introduction of China's current territorial spatial planning system. This system operates across five levels: national, provincial, municipal, county, and town/township; and is composed of three categories: master planning, detailed planning, and relevant special planning. According to the "Guidance on Establishing the Territorial Spatial Planning System and Supervising Its Implementation", the operation of this planning is also constrained by various indicators, such as the "Three Zones and Three Lines" and "Double Evaluation". Furthermore, this section describes the focus and formulation process of planning at the national, provincial, and local level, as well as the responsibilities of relevant departments.

The final section discusses the land use challenges that China has faced since the reform and opening up, as well as the changes in land use policies and related practices in this context. The shift can be summarised as a transition from emphasising farmland protection to focusing on improving land use efficiency to achieve sustainable land use patterns. Additionally, this section describes some of the

existing restrictions in China's current land use practices.

5.2 Overview of the Spatial Planning Systems in China

In China, spatial planning mainly refers to the rational organisation of land resources and spatial distribution through long–term and comprehensive spatial development strategies formulated by the public sector, to promote scientific and effective management of land use layout and the balance between development and environmental protection.

It is widely accepted that spatial planning systems are embedded in "the specific histories and geographies of particular places, and the way these are interlocked with national institutional structures, cultures and economic opportunities" (Healey and Williams, 1993). Similarly, China's spatial planning systems have also gone through different changes and reforms under contexts in different periods. In the whole socialist period, oriented by the focus of industrial construction, spatial layout was primarily characterised by resources allocations and productivity. During the early decades of the reform and opening up, the focus has shifted towards economic growth as the economic system was shifted from planned economy to market economy, and urban planning started to be regarded as important planning tool to improve economic efficiency. Strategic spatial planning was re–emerged in the 1990s as policymakers began to rethink the significance of long–term planning in the wake of the rapid and disordered urban development, increasing land fragmentation, as well as environmental issues (Friedmann, 2004; Albrechts, 2004), since when China's spatial planning has entered a stage of stable development.

Table 1 – Development of Chinese spatial planning system

Source: Translated and adapted from Zhang and Xia, 2019

Phase	Planned economy	"Two-Tier" economic system	Growth-oriented	Regulation and stimulation	Reconstruction of the governance system
Year	1949 - 1977	1978 - 1992	1993 - 2000	2000 - 2012	After 2013
Governance System	Planned economy; Centralised authority; Macro regulation	A combination of planned economy and market-oriented economy; Decentralisation	Establishment of socialist market economy; Extensive decentralisation	Alternation of macro regulation and stimulation of local economic	Modernisation of governance system
Spatial planning system	Regional planning and city planning implemented to execute national economic plans	Central government organised territorial planning and regional planning; local governments formulated urban master plans	Development of growth-oriented urban master plans and detailed regulatory plans; Spatial planning as a tool for local governments to promote economic growth	Coexistence of multiple scatterd plans; Disordered hierarchical structure	Reconstruction of the spatial planning systems; Establishment of the Ministry of Natural Resources and implementation of "multi-planning integration"; Formation of the territorial spatial planning systems

5.2.1 Centralised Planning System during the Socialist Period

In the early 1950s, city planning in China was oriented by industrial land planning and controlled by central government ministries and their local departments. In 1953, with support from the Soviet Union, China launched the first Five–Year Plan overseen by the Urban Construction Committee, leading to creation of the first round of urban master plans in China, which was heavily influenced by socialist planning principles (Fisher, 1962; French and Hamilton, 1979). During the period from 1953 to 1958, in pursuit of the “redistributive” goal, some industries and infrastructure were relocated to China’s interior areas to address the imbalance in industrial distribution between coastal and interior regions (Yang, 1990), which to some extent affected the spatial layout of interior cities.

The high standards of Soviet city construction were subsequently proven less suitable for China at the early stage of development, which neglected the balance between residents’ living conditions and infrastructure construction and resulted in excessive consumption and waste of all sorts of resources including lands. In this context, the country began to establish the two–tier planning system in 1958 as Great Leap Forward started, which consisted of a master plan and a detailed layout plan. As

demonstrated by Wu (2015), the master plan was used to coordinate existing urban districts and new factories, while the detailed layout plan was used to manage industrial projects and "worker villages" that aimed at improving worker's living conditions. During the implementation of the two–tier plans, local control over the planning system was limited.

Between 1966 and 1976, during the Cultural Revolution, coordinated urban planning was basically abandoned, and only the approaches related to economy and resources distribution had an influence in spatial layout. During this period, with the implementation of the second and third Five–Year Plans, the country was divided into "First Front", "Second Front", and "Third Front" regions (see figure 21). Starting in 1964, due to the facilitation of "Third Front Construction", which involved relocating military and manufacturing industries from coastal cities to the "Third Front" area, China's industrial distribution expanded from "First Front" along the coastal areas to the "Second Front" in the central area, and particularly to the poorer "Third Front" area in the west (Li and Wu, 2012). At the end of the Cultural Revolution in 1976, taking the opportunity to restore Tangshan, which was severely damaged by an earthquake, the principles of urban planning were clearly defined as beneficial to industrial production, improving residents' living conditions, achieving more rational spatial layouts, and environmental protection (Zhang and Luo, 2013). This marked a break from the standstill in city planning and a shift towards a more scientific approach considering socioeconomic conditions.

Figure 21 – China's regional division between 1966 to 1976

Source: Adapted from Li and Wu, 2012

During the whole socialist period, in general words, China implemented centrally planned economy and a centralised planning system, with all means of production nationalised and the state holding ultimate decision–making power, and comprehensive planning was seen as a mechanism superior to market capitalism for achieving socialist (Wu, 2015). As described by Li and Wu (2012), the multiple levels of the local states mirrored those of the central government (see figure 22), and the institutional design between central and local governments facilitated top–down administration through layers of governmental bureaucracy. Although central planning involved collecting plans from lower–level administrative departments and consolidating them into top–level plans, the shortcomings of this comprehensive top–down planning approach became increasingly apparent, such as rigid and untimely decision–making process, especially as the external investments beyond government plans started to be introduced after the reform and opening up. Undoubtedly, without timely supplementation of detailed plans to adapt to the changes, relying solely on master plan was insufficient for controlling development.

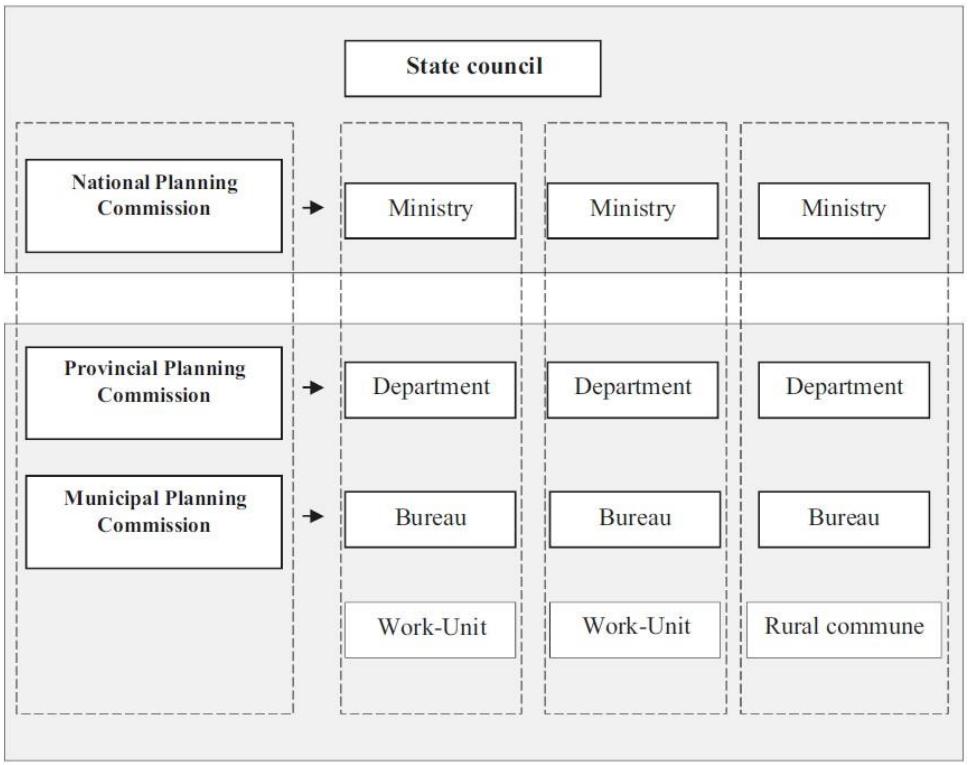

Figure 22 – Sectoral dominance and administrative hierarchy

Source: Li and Wu, 2012

5.2.2 Exploration of Spatial Planning System after the Economic Reform

Since the implementation of the reform and opening up policy in 1978, as China's economic system gradually shifting from a planned economy to a market–oriented economy, the country has also plunged into the exploration and reform of spatial planning systems and land use management.

In terms of city planning, China continued to develop and update the two–tier planning system established during the socialist period, namely the urban master plan and the detailed construction plan. The urban master plan is utilised to direct the overall planning and land use, while the detailed construction plan specifies the building layouts. This process was seen as the power of central government devolving to local governments, as the role and autonomy of local governments in city planning were strengthened (Wu, 2015). Additionally, starting from the 1980s, China began to introduce a system of Territorial Planning from Japan and Western countries, which was mainly used to manage the relationship between economic development, territorial resources, and environmental protection through top–down coordination, and to establish city planning and infrastructure systems.

In 1986, the Land Administration Law was promulgated and officially implemented in 1987, which not only provided legal protection for land use and conservation but also further approved the decentralisation of spatial administration power from central ministries to territorial governments. Territorial governments were granted the power to authorise "land expropriation, land supply, and rural land conservation" (Xu and Yeh, 2009), which increased the efficiency of designating land use and facilitated local economic development.

Due to the objective of promoting economic development in the early stages of the reform and opening up policy, the pursuit of regional balance and egalitarianism was no longer emphasised, instead, an uneven regional development approach, which aimed to improve economic efficiency, was adopted. Starting in 1980s, the spatial pattern of "three–economic–belts" (Fan, 1995) had been formed, namely the coastal, central, and western region. The "ladder–step" theory was applied when organising this pattern (Yang, 1990), which prioritised the development of coastal areas that were more competitive in terms of geographical location and economic foundation, with the expectation that economic growth would subsequently

shift towards the interior regions. In this period, the Pearl River Delta, the Yangtze River Delta, and Beijing – Tianjin – Tangshan region, Liaoning peninsular, and Shandong peninsular were designated as key development regions by national spatial policy (Wu, 2015). Additionally, the country established "Special Economic Zone" to attract foreign investment and promote international trade, including three cities in Guangdong province – Shenzhen, Zhuhai, Shantou, as well as Xiamen and Hainan.

Figure 23 – Evolution of Chinese regional policy and spatial pattern

Source: Fan, 1995

5.2.3 Significant Reforms in Territorial Governance and Spatial Planning after 2000s

Since 2000, the central government has strengthened top–down spatial regulation to manage multiple conflicts, as economic disparities between coastal and interior regions have increased and issues such as environmental degradation have emerged, which resulted by the increased autonomy of local governments and their excessive pursuit of economic benefits. In 2002, the National Development and Reform Commission (NDRC) changed the name of "National Five–Year Plan" to "National Five–Year Spatial Plan", indicating that the spatial planning strategy has been involved in the conventional economic plan (Li and Wu., 2012). In 2005, the

first national–level plan on spatial development, the National Urban System Plan, was prepared by the Ministry of Housing and Urban and Rural Development (MHURD) for intensifying the top–down spatial regulations, which identified urban clusters and formulated urbanisation development strategies (Li and Wu, 2012). In addition, the central government has formulated a series of policies to develop interior regions in order to narrow the economic disparities between different regions, which include Developing the Western Region, Reviving the North–East Industrial Base and Boosting the Midland Economic Growth. However, it is noted that although more attention from the central state has been put to the interior region, only those areas and cities with more competence and development efficiency are selected and prioritised (Li and Wu, 2015).

The Territorial Planning introduced from western countries in last century was later replaced by the concept of Main Functional Area Plan promoted by the National Development and Reform Commission (NDRC) in 2006, shifting emphasis from economic growth to the control of undesirable development for the entire national territory and intending to guide the territorial development and population distribution more rationally (Li and Wu, 2012). As one of the prevailing innovations in China's spatial planning (Fan and Li, 2009; Fan et al., 2012), this concept emerged in the context of Chinese local governments' single–minded pursuit of narrowing economic gaps when attempting to reduce regional disparities, which led to a lack of constraints on spatial development and ecological degradation (Long et al., 2014). Therefore, to achieve sustainable spatial development, the Main Functional Area Plan divided the national territory into four types of developmental units: prioritized development area, optimized development area, constrained development area, and forbidden development area. In 2011, this concept was officially promulgated as the Major Function–Oriented Zoning (MFOZ) by the State Council, divided into national and provincial levels.

Table 2 – Major function–oriented zoning

Source: Author's elaboration based on the document of the *National Major Function Zone Planning*
Available at: https://www.gov.cn/zwgk/2011–06/08/content_1879180.htm

Types of zoning		Major functions
Development zone	Prioritised development area	Advanced manufacturing and innovation industries
	Optimised development area	Equipment manufacturing and labour-intensive industries
Protection zone	Constrained development area	Agricultural production and environmental protection
	Forbidden development area	Conservation of rare plant and animal resources

A significant reform of China's spatial planning system was the shift from scattered plans to "multi–planning integration". Before the reform (see figure 24), the plans of China's spatial planning mainly include major–function zone planning, territorial planning, land use planning, urban and rural planning, and marine functional zoning. However, due to the lack of unified upper spatial planning and macro–level design for a long time, there are inevitable overlapping contents between these plans and a lack of coordination, and the decision–making process is complicated and takes too long, resulting in inefficiencies during implementation and many challenges. For example, Land use planning failed to manage land because land use is under control of two different spatial planning systems (urban and non–urban), leading to discrepancy in land control (Zhou, Tan and Zhang, 2015).

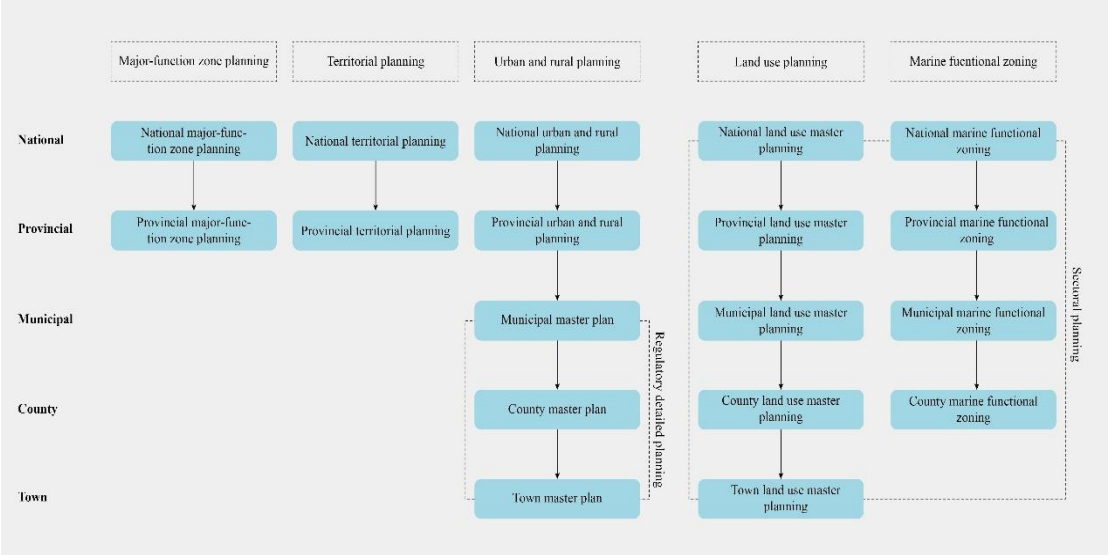

Figure 24 – Chinese spatial planning systems before the integration

Source: Translated and adapted from Pan and Zhao, 2019

In this context, and in response as well to the goals of coordinating territorial spatial planning to achieve sustainable development and ecological civilisation construction, the idea of integrating multiple plans started to emerge in the early 2000s, though it wasn't systematically implemented until 2014 when the central government began the spatial planning reform of "multi–planning integration" in some pilot cities and counties. Later, the State Council promulgated "The Deepening Institutional Reform Plan on the Party and the State" in 2018 that announced establishment of the Ministry of Natural Resources (MNR) that unified the functions and responsibilities of all the departments of land use control and environmental and ecological protection, and then the MNR has published different opinions and standards for better management of spatial planning, marking that "multi–planning integration" has entered the comprehensive implementation phase.

Alongside the introduction of the concept of "multiple–plans integration", another significant reform in spatial planning has also been promoted, which is the formation of the system of Territorial Spatial Planning. In 2017, the document of "Notice of Publishing the Outline of National Territorial Spatial Planning" was officially issued by the State Council to local authorities, making general deployment and arrangements for comprehensive territorial spatial development, resource and environmental protection, land management, and the construction of relevant support systems. The Outline provides guidance and control over all activities related to spatial planning, protection, and management, and serves to coordinate relevant spatial special plans.

In 2019, the CPC Central Committee and the State Council issued a document titled "The Guidance on Establishing the Territorial Spatial Planning System and Supervising Its Implementation", introducing that the territorial spatial planning system integrates the previously scattered spatial plans such as major–function zone planning, land use planning, and urban–rural planning to form a unified and integrated system, and strengthens the guiding and constraining role of spatial planning over various special plans.

In the same year, the "Land Administration Law" was revised and the added article 18 states that "The country established a territorial spatial planning system. The preparation of territorial spatial plans should adhere to the principles of ecological priority, green and sustainable development, and scientifically and orderly

arrange ecological, agricultural, and urban functions to optimise the structure and layout of territorial spatial development and protection. Legally approved territorial spatial plans are the bases for all sorts of development, protection, and construction activities. Once territorial spatial plans have been prepared, no more land use master plans or urban–rural plans will be prepared." This updated land administration law has further clarified the legislative status of territorial spatial planning in China.

5.3 Administrative Organisation and Legislative Framework

China's administrative divisions mainly include four levels: the provincial–level divisions, including provinces, autonomous regions, direct–administered municipalities, and special administrative regions; the prefectural–level divisions, including prefecture–level city, autonomous prefecture, prefecture, and league; the county–level divisions, including counties, autonomous counties, county–level cities, and so on; the township–level subdivisions, including towns, townships, ethnic townships, and so on.

Figure 25 – Provincial administrative divisions of China

Source: Wikipedia. Available at: https://en.wikipedia.org/wiki/Administrative_divisions_of_China

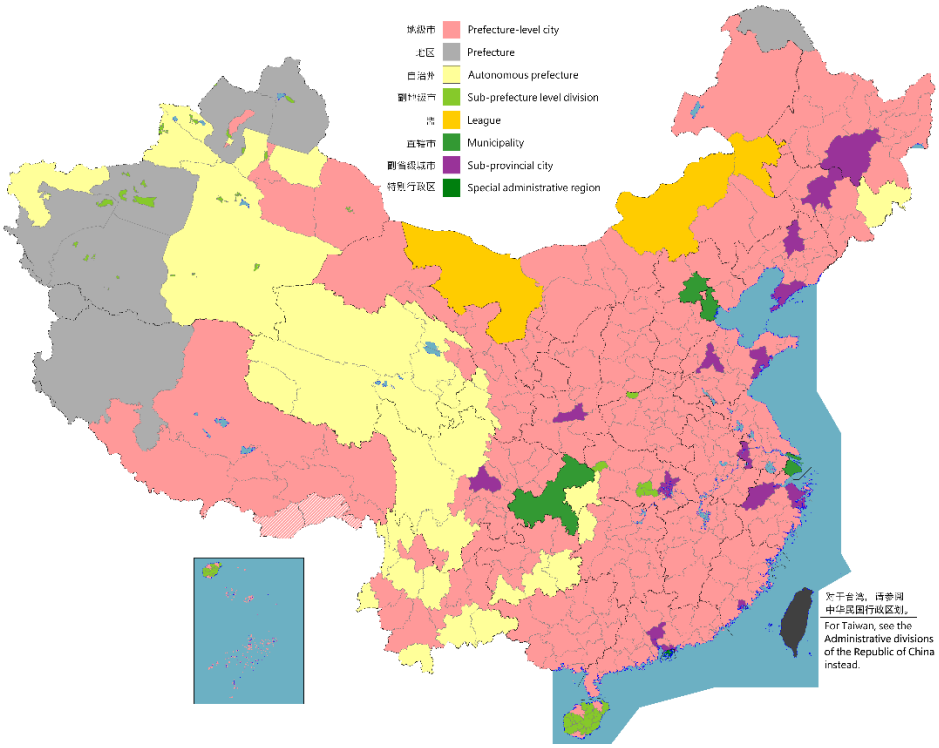

Figure 26 – Prefectural administration divisions of China

Source: Wikipedia. Available at: https://en.wikipedia.org/wiki/Administrative_divisions_of_China

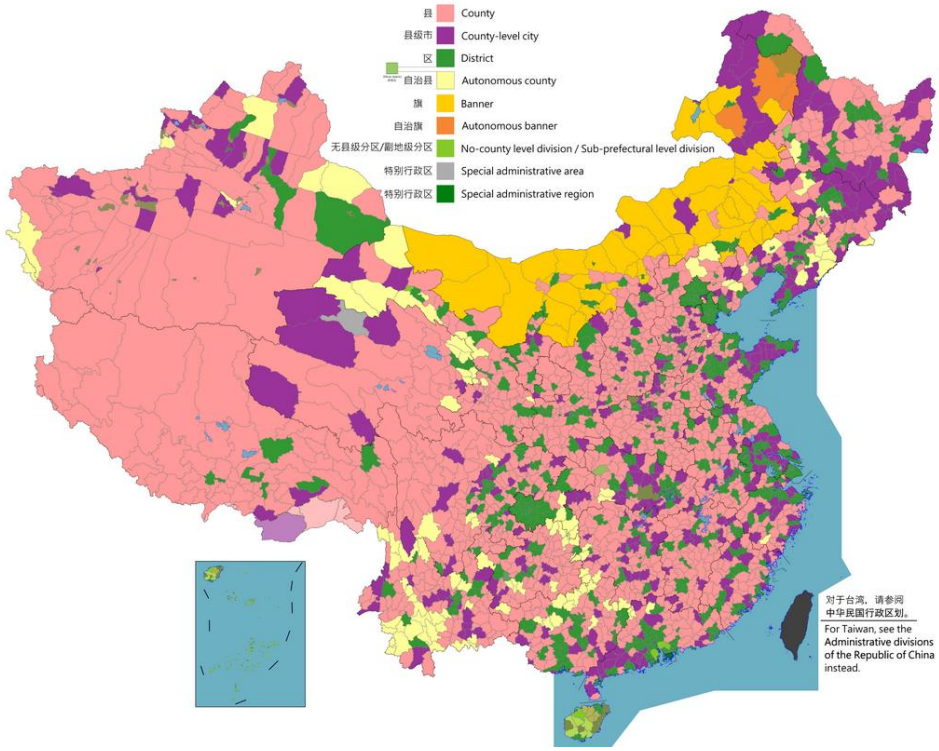

Figure 27 – County Administrative Divisions of China

Source: Wikipedia. Available at: https://en.wikipedia.org/wiki/Administrative_divisions_of_China

China's current administrative and authority system operates under unified central leadership with a certain degree of decentralisation, meaning that the administrative power is distributed from top to bottom within this system, and the local governments are assigned with the authority to independently exercise specific economic and administrative functions.

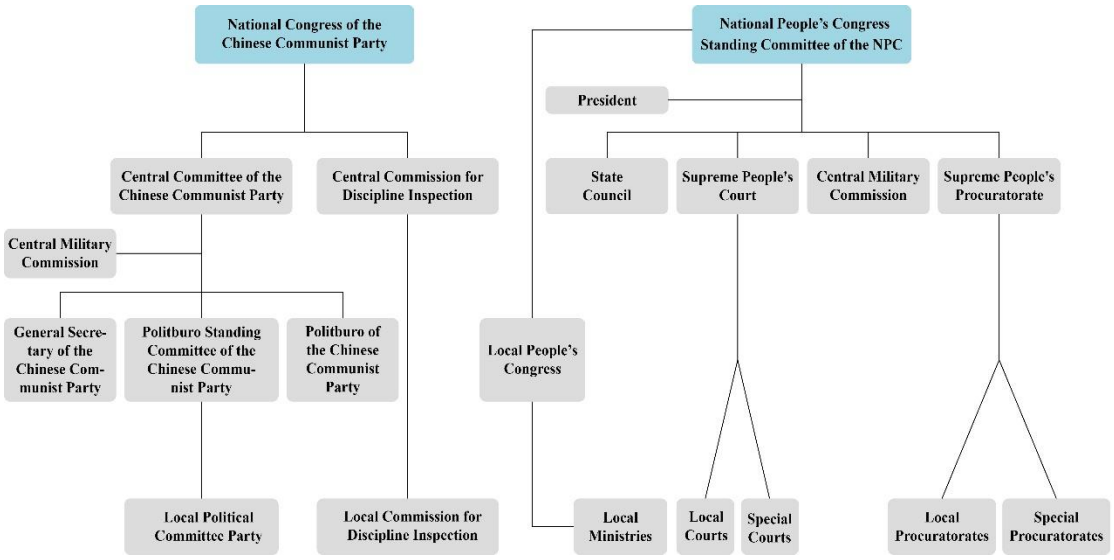

Figure 28 – The organisational structure of Chinese government

Source: Author's elaboration based on the Constitution

Under this system, China's legislative framework is characterised by a combination of central leadership and decentralisation, featuring a multi–tiered, multi–faceted division of legislative powers. According to the Constitution, the National People's Congress (NPC) is the highest authority in the country that possesses legislative power, the power to amend the Constitutions, supervisory power, and electoral power. During the intervals between sessions of the National People's Congress, its powers are exercised by the Politburo Standing Committee (PSC). Another national agency with legislative power is the State Council, also known as the Central People's Government, which is the chief administrative authority and the national cabinet of China, and the executive organ of the NPC. In addition to legislative power, the State Council also holds administrative management power, diplomatic power, supervisory power, and other authorities. Additionally, local People's Congresses are set up at various local administrative levels to exercise legislative powers within their administrative regions.

5.4 The Territorial Spatial Planning System

The system of Territorial Spatial Planning is defined as the arrangement of spatial and temporal aspects of territorial development and protection in certain areas. The key contents mentioned in the Guidance can be summarised as “five levels” and “three categories”. “Five levels” refers to the hierarchical levels of China’s administrative management system: national, provincial, municipal, county, and town/township; while “three categories” include master planning, detailed planning, and relevant special planning. China’s planning system is attached to the administrative structure and is nationally controlled by the central ministries. All communications are transmitted level by level from the central government to each level of local governments except for special administrative regions such as Hong Kong and Macau. Lower–level territorial spatial planning must comply with higher–level territorial spatial planning, and detailed planning and relevant special planning must comply with master planning. In the process of implementing spatial plans, higher–level governments are responsible for supervising the enforcement of binding indicators and other requirements included in the lower–level spatial plans.

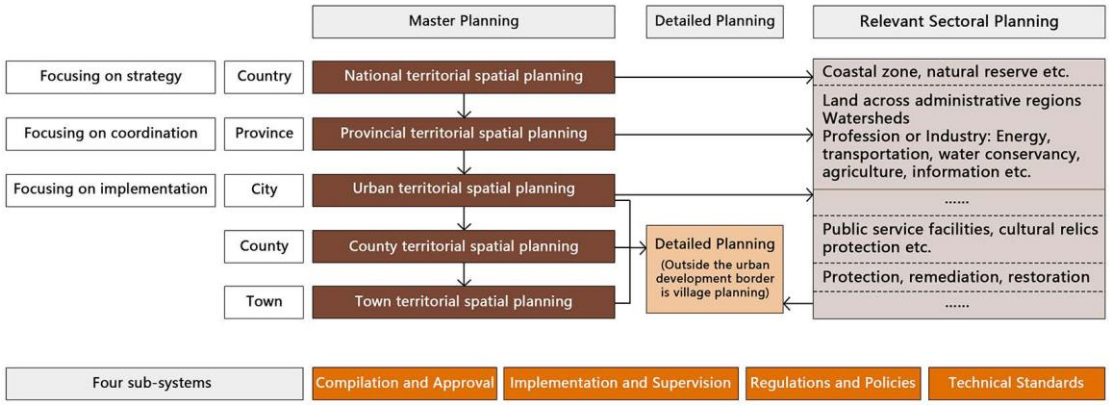

Figure 29 – The framework of Chinese territorial spatial planning system

Source: Hu et al., 2023

Master planning involves overall arrangements and layouts for the protection, development, and restoration of territorial of a certain territorial space, and the emphasis is placed on formulating comprehensive guidance. It is prepared at the national, provincial, municipal, and county levels, with local governments preparing town–level spatial plans based on the local contexts. Master planning serves as the

basis for detailed planning and relevant special planning.

Detailed planning makes implementation arrangements for specific size and intensity of land development, focusing on promoting specific practices. Pan and Zhao (2019) mentioned that a fundamental principle that must be followed when creating detailed plans is to formulate different strategies according to local conditions, since Chinese municipalities, counties, and towns are of varieties in area, population size, and level of economic development. Additionally, differentiated management of urban and rural areas is required.

Relevant special planning or sectoral planning refers to specialised arrangements for spatial development and protection. Special planning can be divided into two categories: planning related to specific areas, such as coastal zones, ecological and environmental protection, cultural heritage protection, forestry, and grasslands; and planning related to spatial utilisation in specific fields, such as transportation (see the example elaborated in figure 30), energy, water conservation, agriculture, public service facilities, military facilities, and so forth. The contents of special planning are included in detailed planning.

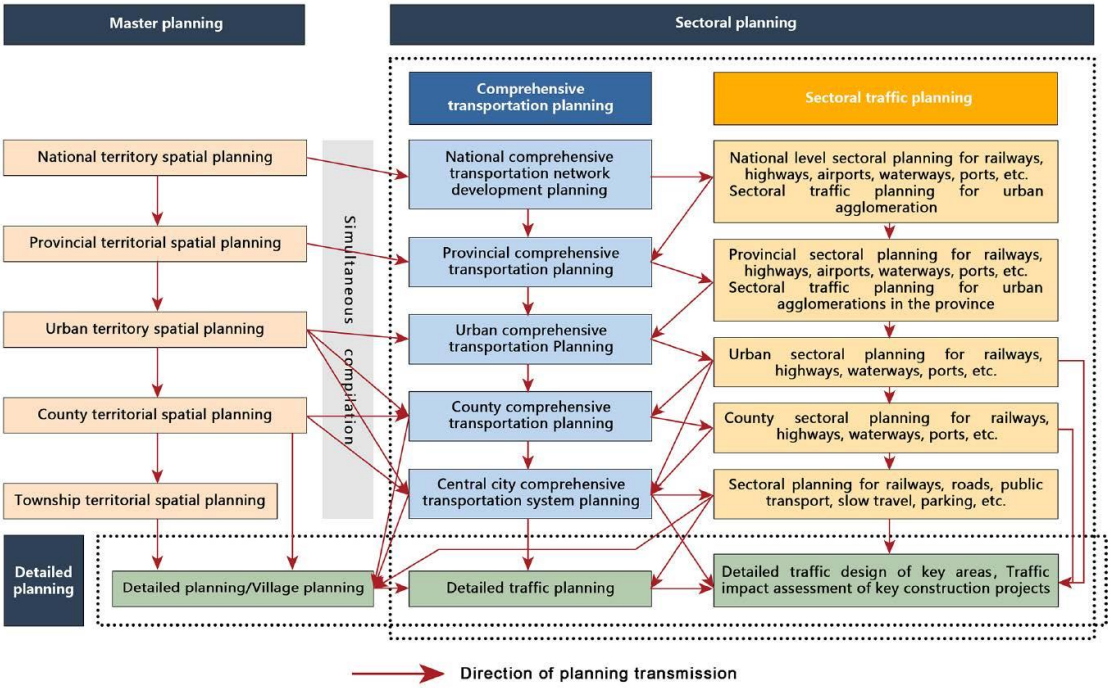

Figure 30 – Comprehensive transportation sectoral planning system coordinated with the territorial spatial planning system

Source: Hu et al., 2023

The Guidance also mentioned that a significant principle in territorial spatial layout arrangements is to implement the Regional Development Overall Strategy and the Major Function–Oriented Zoning Strategy.

The Regional Development Overall Strategy generally defines the functional orientation of different regions in China and aims to promote differentiated development among them. It guides spatial planning to create distinctive spatial patterns and functional configurations according to different development goals. Over time, the country has established a series of key contents of the overall strategy including the “Four Regions” and “Three Supporting Belts”. The “Four Regions” include continuing to prioritise the development of the Eastern region with economic advantages; driving economic development in the Western region; revitalising the Northeast industrial areas by transforming government functions; and promoting the rise of the Central region to construct an economic belt connecting the other three defined regions. The “Three Supporting Belts” refers to the “Belt and Road Initiative”, coordinated development of Beijing–Tianjin–Hebei, and the Yangtze River economic belt. Based on these strategies, territorial spatial planning aims for unified patterns in transportation, industry, and ecology, such as promoting integration in the Beijing–Tian–Hebei region and optimising the industrial layout along the Yangtze River.

The Major Function–Oriented Zoning Strategy divides the national lands into areas with different major functions based on resource distribution, environmental resilience, economic potential, to promote coordinated spatial development. As mentioned earlier, the national land is classified into four types: prioritized development area, such as the Pearl River Delta in Guangdong Province; optimized development area, such as Chengdu and Chongqing; constrained development area, such as the main agricultural production area in Northeast Plain; and forbidden development area, including all the key ecological function areas such as important national reserves and forests. This strategy is an important tool guiding spatial planning to efficiently allocate land and environment resources and promote sustainable land use development.

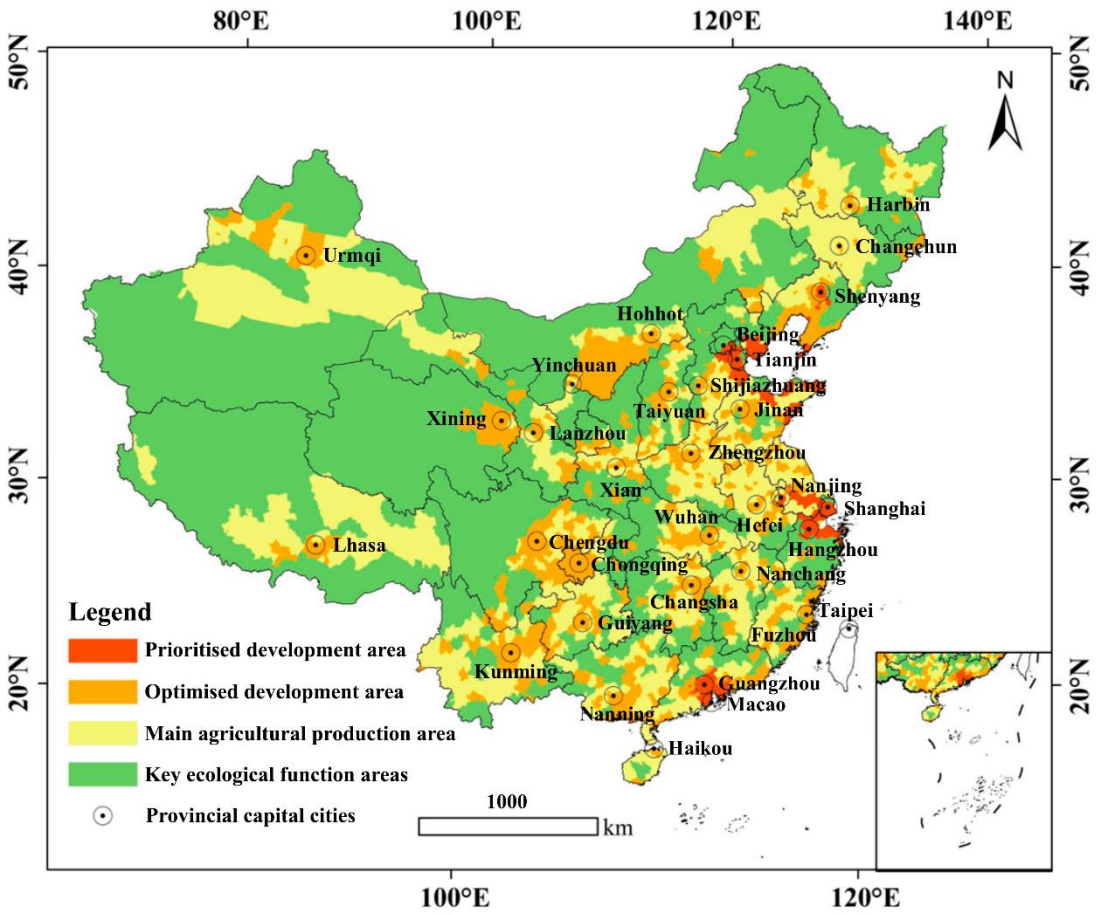

Figure 31 – Divisions of major functional zoning in China

Source: Xu et al., 2023

Additionally, there are two important tools binding for territorial spatial planning, namely, “Three Zones and Three Lines” and “Double Evaluation”.

“Three Zones” refer to three different types of spaces with ecological, agricultural, and urban construction functions, which highlight the division of dominant functions; while “Three Lines” specifies the ecological protection of red line, permanent primary farmland, and urban development boundary, which defines the boundaries of “Three Zones” and emphasises the regulation over boundaries. This spatial instrument is used to regulate spatial management and have a profound impact on forming a reasonable spatial structure and land use system, for example, when coordinating the general development of Beijing–Tianjin–Hebei region, delineating urban development boundaries effectively limits the disordered expansion of Beijing and Tianjin.

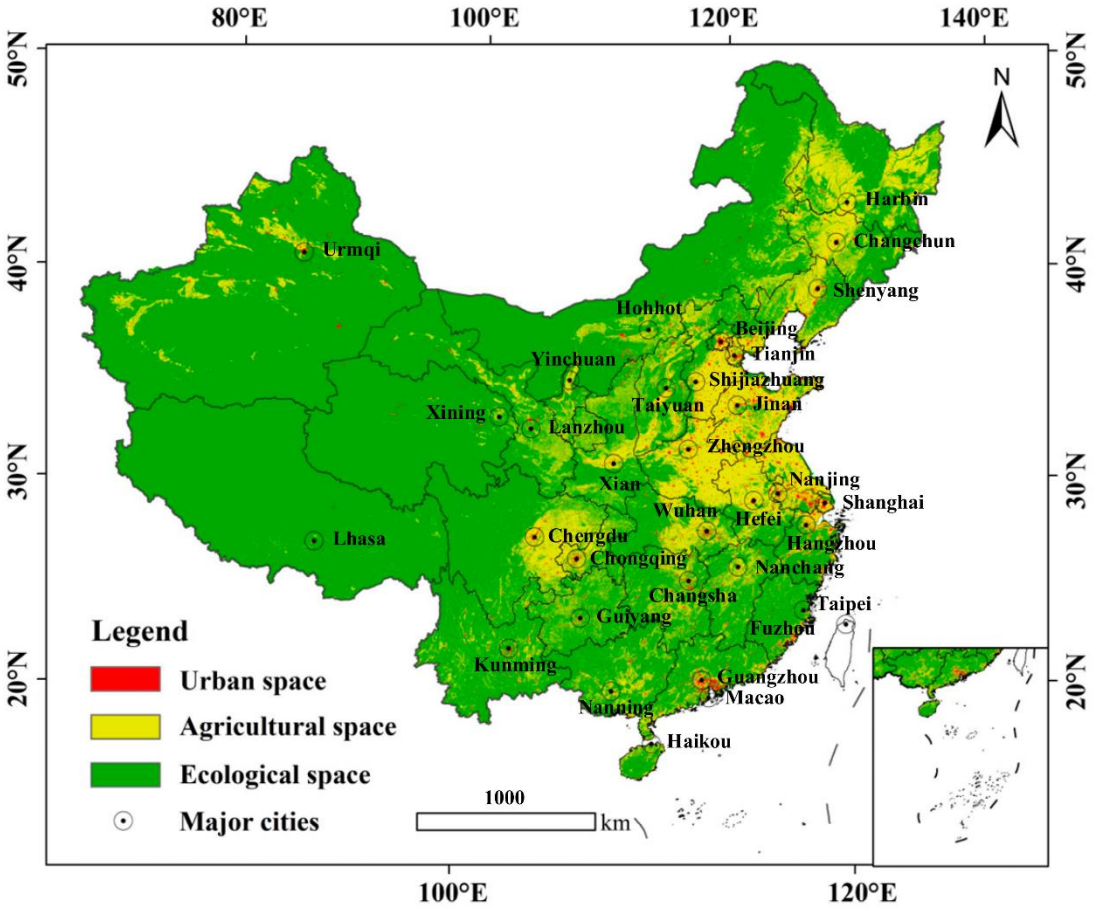

Figure 32 – Distribution of "Three Zones" in 2020

Source: Xu et al., 2023

"Double Evaluation" is another important spatial planning tool coordinated by the Ministry of Natural Resources, which refers to the evaluation of resource and environmental carrying capacity and the evaluation of sustainability of land for development. "Double Evaluation" mainly addresses three core functions, namely, ecological protection, agricultural production, and urban construction, and serves as the basis for formulating national spatial planning and designating "Three Zones and Three Lines".

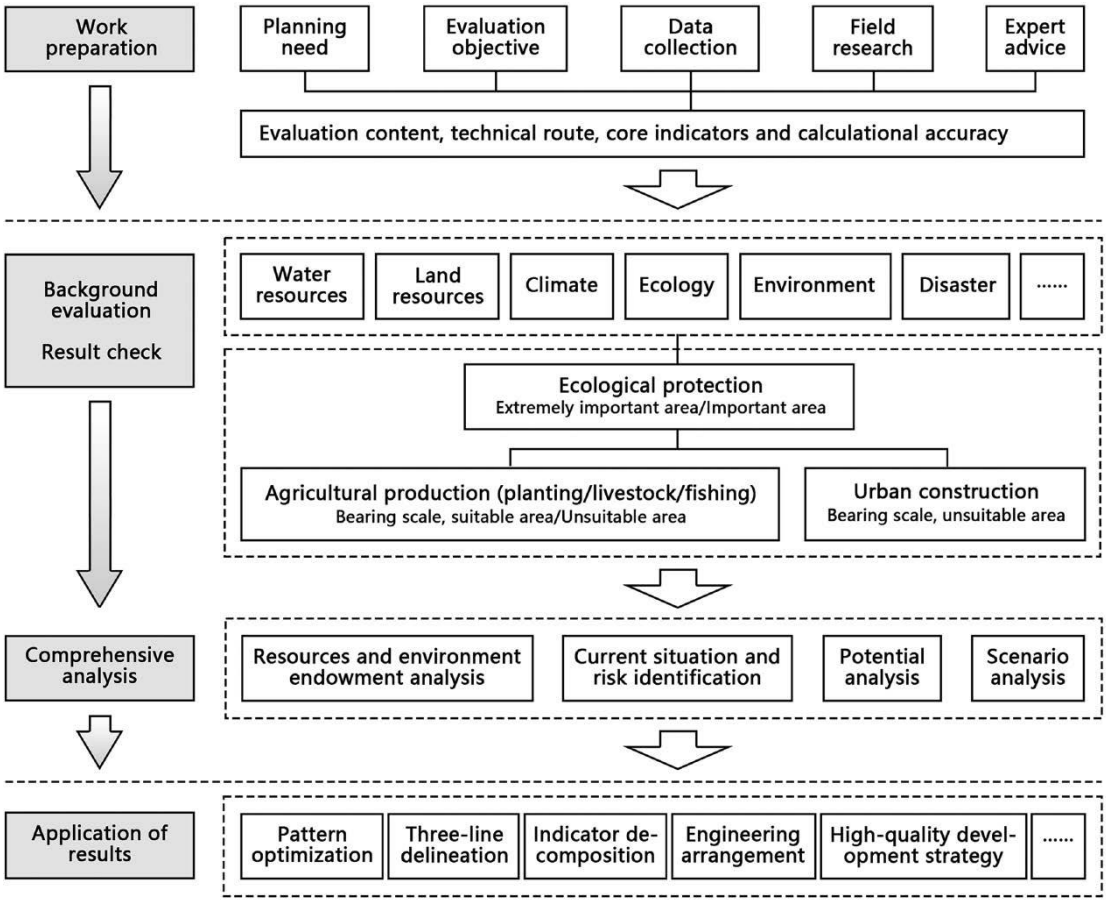

Figure 33 – Workflow of "Double Evaluation"

Source: Hu et al., 2023

5.4.1 National Level

National spatial planning in China involves unified layout and strategic arrangements for the country's land development and protection based on the general principles and binding instruments, including the designation of main functional areas and major territorial layouts to clarify the direction of national spatial development. As the foundation and guiding framework for local political structures to formulate spatial development, national spatial planning is responsible for setting general development objectives and comprehensive plans, which are drafted by the Ministry of Natural Resources (MNR) and relevant ministries and then approved by the State Council. Moreover, national planning provides guidance, management, and coordination for provincial planning to ensure that all local plans are in conformity with the national strategies.

The main responsibilities of the national departments involve the overall

coordination and planning of national territory, ensuring the rational use and sustainable development of land resources. Below is a list of key departments and their corresponding responsibilities at the national level involved in spatial planning system:

The Ministry of Natural Resources (MNR) was established after being approved in the 13th National People's Congress and operates under the State Council. It is the primary department responsible for establishing and implementing the national spatial planning system, as well as supervising land use management and the development and protection of natural resources. Under the guidance of the State Council, the MNR is assigned with formulating the outline of national spatial planning that determines the overall land use layout at the national level and defining the multi–level structures of spatial planning across different administrative levels. To facilitate the implementation of spatial planning, the MNR provides the necessary legal framework by drafting and promoting laws related to spatial planning such as the Land Administration Law, which are ultimately submitted to the National People's Congress and its Standing Committee for approval and enactment.

As a department responsible for macroeconomic regulation and promoting overall economic development, the National Development and Reform Commission (NDRC) at the national level plays a crucial role in optimising national economic structure, planning for urbanisation and key national infrastructure construction, and promoting interregional cooperation to coordinate regional development, which pose an influence on the formulation and implementation of spatial planning. By guiding economic development at the national level and setting development goals for different regions, the strategies made by NDRC directly impact the design of land use arrangements, resources allocation, and ecological protection within the national spatial planning framework. For instance, the NDRC's introduction of the "ecological economic zones" concept drives spatial planning to consider the rational use of resources, aiming to balance economic development with the achievement of a favourable ecological environment.

The Ministry of Housing and Urban–Rural Development (MHURD) is essential for spatial planning at the national level by formulating general urban–rural pattern, urban master plans, and housing policies. The urban–rural overall plans drafted by the MHURD establish the spatial planning framework and specific layouts

for cities and towns that promote the coordinated urban–rural development. Additionally, it manages urban planning to address the challenges caused by population growth and urban expansion during urbanisation process. The MHURD also drafts key regulations such as the Urban and Rural Planning Law, the Real Estate Management Law, as well as building design and construction standards, which provide the legal framework and practical guidelines for urban–rural planning and housing management.

5.4.2 Provincial Level

Territorial spatial planning at the provincial level is the concrete implementation of the national territorial spatial plans, emphasising coordination and acting as a transition between national and local spatial planning. Each province refines the national planning framework based on specific conditions, with the provincial–level Department of Natural Resources and various relevant departments responsible for drafting and promulgating the provincial master planning, as well as the implementation standards and ordinances for local governments to ensure no deviation from the general objective. All these plans and documents are ultimately approved by the State Council after reviewed by the Standing Committee of the Provincial People's Congress, which serve as the guideline directing the municipal and county–level spatial planning. Additionally, provincial governments are responsible for supervising the formulation and implementation of spatial plans made by local governments.

When formulating the provincial–level master plan, it is crucial to take into account the local contexts and align closely with the objectives established in the national master plan and adhere to the principles and constraints such as the "Three Zones and Three Lines", the Regional Development Overall Strategy, and the Major Function–Oriented Zoning Strategy. Thus, provincial departments delineate functional zones based on local economic development needs and environmental carrying capacity, comprehensively considering the development of various cities and areas within the province, optimising the urban layout for better productivity, reducing the regional development disparities, and promoting coordinated urban–rural development.

Driven by the national goal of beautiful China construction and ecological, civilisation, provincial spatial planning also puts an emphasis on identifying ecological redline areas, formulating protection and restoration plans to ensure that key ecological functional zones and nature reserves are not compromised. Furthermore, the plan aims at facilitating the revitalisation of rural areas, promoting urban–rural integration through the construction of transportation and infrastructure.

5.4.3 Local Level

In China's territorial spatial planning system, local–level spatial planning includes municipal, county, and town–level planning. In accordance with the general planning requirements and principles set by national and provincial governments, local–level governments are responsible for specific implementation.

In addition to developing master planning that aligns with the provincial–level master planning and the national planning constraints such as the "Three Zones and Three Lines" strategy, local governments should also formulate detailed planning that involves making specific arrangements for the development and protection of land resources within their administrative regions and providing clear technical guidance and control methods. For instance, after the zoning and spatial layouts for urban land use are established in the master planning, local governments are required to further create detailed planning for urban construction, which includes the specific layout schemes for urban clusters and building complexes as well as the designation of development indicators such as building density and green space ratios.

In terms of formulation and approval process at local level, The Guidance explicitly states that municipal–level territorial spatial plans are to be formulated by municipal governments, reviewed by the Standing Committee of the municipal People's Congress, and then submitted by the provincial government to the State Council for approval. For other municipal, county, and township–level detailed plans, the provincial government is responsible for defining and approving the content and procedural requirements based on local circumstances. Detailed plans within urban development boundaries are to be prepared by the municipal or county natural resources departments, while detailed rural plans for the administrative villages are to be formulated by town governments.

5.5 Land Use Practices and Current Restrictions

Since the reform and opening up, China has experienced a long period of rapid urbanisation, during which a large number of populations migrated from rural area to urban areas, leading to a transformation of the urban–rural structure (Wang et al., 2016). Due to the demands of regional economic development, local governments have focused on land requisition for conversion into construction land, particularly converting agricultural land into industrial and residential land (Liu, Fang and Li, 2014). Land reservation operations often involve purchasing farmlands from farmers at low price and selling them at higher prices (Wang et al., 2018). In this process, a large amount of arable land has been lost due to requisition and occupation, resulting in issues such as built land vacancy and rural hollowing (Liu, Fang and Li, 2014).

Furthermore, in the late 1990s, China implemented the Grain for Green programme to address severe environmental issues caused by excessive reclamation and deforestation, which mainly involved converting part of agricultural lands into forests or grasslands in western and northern regions. While effective in curbing desertification and soil erosion, it also led to a reduction in arable land to some extent.

In this context, China began introducing land management policies to address the unsustainable land development patterns, with a focus on protecting arable land. The revised Land Administration Law enhances the protection of arable land, and one of the most significant articulations is the “Land Expropriation and Compensation Regulations”, which requires that during the construction process, the arable land occupied for non–agricultural development must be compensated by reclaiming an equivalent amount of arable land or paying a corresponding reclamation fee.

Additionally, Article 44 of the Land Administration Law stipulates that the conversion of arable land to construction land requires approval. It states that the conversion of permanent basic farmland to construction land must be approved by the State Council; for converting other arable land within the scope of urban and rural development land specified in the master planning, approval must be obtained from the authority that approved the master planning; for land outside this scope, approval must be obtained from the State Council or other departments authorised by the State Council.

However, the arable land being occupied is often more productive and larger

in size than the land being compensated (Liu, Fang and Li, 2014), which means that China still faces ongoing challenges in ensuring food security with a growing population and continued reduction in arable land. Moreover, during the implementation of arable land protection lands, restrictions on land use exacerbated the conflict between development needs reliant on land and the shortage of land supply, which sparked reflections on the inefficiencies and serious waste in China's land use.

Land use practice reforms emerged in this context to promote more efficient land use. In 2019, the Ministry of Natural Resources (MNR) amended the Regulations on the Economic and Intensive Land Use, which were initially issued by the Ministry of Land Resources (the predecessor of the MNR) in 2008 and officially implemented in 2014, emphasising the need to strictly control and optimise the scale and layout of urban and rural construction land through master planning. The regulations encourage the redevelopment of idle land and urban renewal or urban renovation, thereby alleviating the conflict between construction demand and limited land supply and promoting sustainable land resource development, which have significantly contributed to the rational allocation of land resources nationwide, especially in eastern regions. For example, in Guangdong Province, the "Three Old (san jiu)" redevelopment projects, such as the urban village renewal projects in Guangzhou, are gradually freeing up land for urban construction and promoting sustainable land use.

Due to factors such as different economic development level as well as the limitation of supporting facilities, there are inevitable spatial disparities in the degree of land intensification, mainly decreasing from east to west (Wang et al., 2018). Besides, as Liu, Fang and Li (2014) mentioned, the intensive land use regulations also face certain restrictions, including failure in improving land efficiencies resulted by the pursuit of maximising land's economic value, the unsuccessful implementation of some projects caused by the lack of supporting financial, institutional, and management system.

In general, China has made progress in improving land use management systems to promote sustainable land use. With limited land resources, the focus has shifted from single measures like limiting construction or compensating for arable land requisition, to the more rational methods such as enhancing land use efficiency through optimising layouts and improving land quality. However, it cannot be ignored

that China's current land use practices still face multiple restrictions that hinder sustainable development:

1) Imbalanced Regional Development

China's current land use practices exhibit uneven distribution of land resources between regions. The economically developed eastern coastal regions have higher level of intensive land use and more prominent land supply–demand conflicts. In national planning, the construction indicators are often allocated to regions with greater economic potential, which in turn limits the economic development and efficient land use in the less developed western regions. This phenomenon is not only present at the national level but also within some regions, for instance, cities in Guangdong province other than the Pearl River Delta that are economically lagging still suffer from uneven industrial distribution and large amounts of inefficiently used land.

2) Lack of a comprehensive framework

China's land use policies often target on addressing specific issues while lacking an overarching framework (Liu, Fang and Li, 2014), such as "requisition–compensation balance of arable land", "rural land consolidation", and "economic and intensive land use". The absence of a comprehensive guiding framework may lead to conflicts between these policies.

3) Homogeneous and uncoordinated land use policies

Land use polices and master planning formulated at the national level may not always consider the specific conditions in different regions. Although local governments usually adjust the spatial plans based on local contexts, the current strict land use policies and state–distributed indicators still lead to homogenisation sometimes, resulting in inefficient land use system. For example, with the needs of industrial development, some areas can only choose to transform ecological land into arable land after converting arable land for development due to the existence of expropriation–compensation balance policies.

Chapter 6

CASE STUDY: EVALUATE THE URBANISATION SUSTAINABILITY IN GUANGDONG PROVINCE

6.1 Introduction

This chapter is divided into four sections. First, it provides a brief introduction to the socio–economic background of Guangdong Province. Next, it presents and evaluates a series of land use interventions that have significantly impacted the province's urbanisation and land use patterns, using sustainability indicators developed in the ESPON SUPER project. It then concludes with the main challenges to achieving sustainable development, followed by relevant interventions from the SUPER project that offer insights to address these challenges.

This chapter not only provides a detailed understanding of the current state of sustainable urbanisation and land use in Guangdong province but also offers insights into the potential long–term impacts of these interventions. By evaluating the effectiveness and adaptability of the interventions, this chapter aims to identify best practices and areas for improvement that could guide future policy making. This forward–looking perspective is essential, as Guangdong continues to evolve within the broader context of China's national development goals. The findings of this analysis may also serve as a reference for other regions facing similar challenges, contributing to a more sustainable approach to urbanisation and land management in the future.

6.2 Administrative Divisions and Socio–economic Background

Guangdong Province is located in the southern part of mainland China, covering an area of approximately 179,700 square kilometres, with 21 prefecture–level cities, 65 municipal districts, 20 county–level cities, 34 counties, and 3 autonomous counties, of which Guangzhou and Shenzhen are classified as sub–provincial cities. 60% of Guangdong's land is mountainous, with the largest plain being the Pearl River Delta (PRD), followed by the Chaoshan Plain in the eastern part of the province.

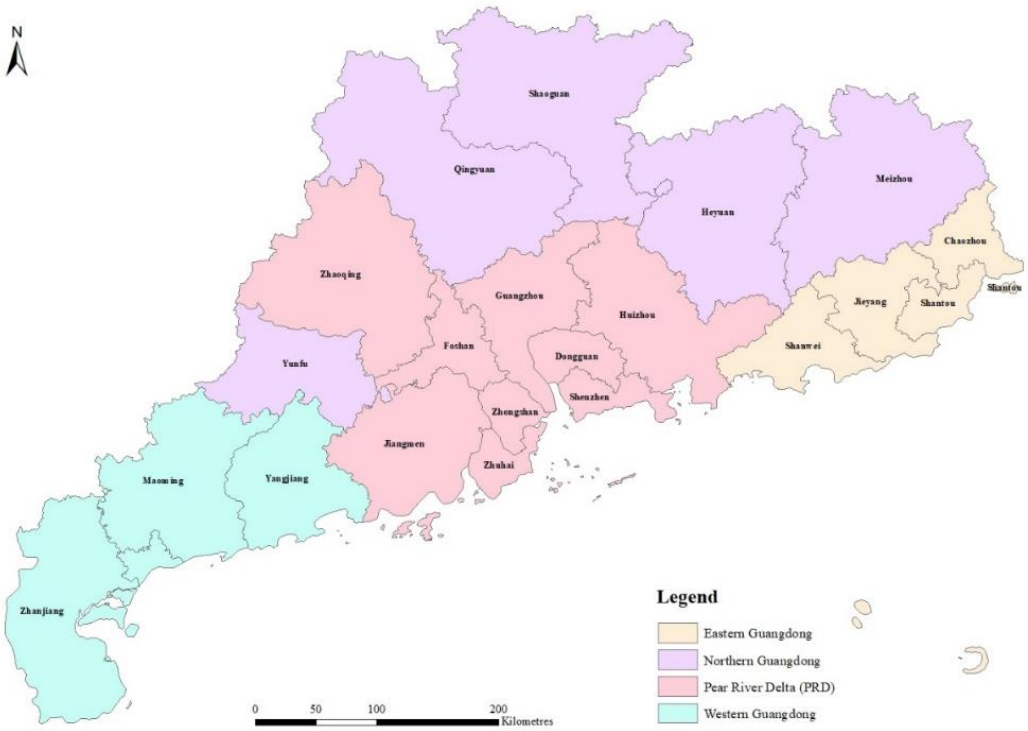

Figure 34 – Administrative divisions of Guangdong province

Source: Author's Elaboration

According to the census data, the province has a large and continuously growing population, which has maintained the highest number in China over the past two decades. By the end of 2023, the population had exceeded 126 million, with an urban population rate of over 75%. Due to the large population, Guangdong has a relatively high population density, particularly in the PRD area, which is one of the most densely populated areas in the country. Additionally, Guangdong is one of the provinces with the highest population inflow in the country, primarily concentrated in the PRD area, including cities such as Guangzhou, Shenzhen, Foshan, and Dongguan. While the influx of people has driven the urbanisation process in Guangdong, it also brought about a range of social issues, such as overloaded infrastructure, environmental pressure, and widening urban–rural disparities.

As the earliest province to carry out reform and opening up, Guangdong has been the leading province in China in terms of economic development and its economic output has consistently ranked first in China since the 1990s. Furthermore, the key industries in different regions of Guangdong are diverse, contributing to a multi–faceted industrial structure that enhances its economic resilience. However, despite being the province with the highest economic output and tax revenue,

Guangdong has faced significant regional and urban–rural development imbalances since the economic reform. While the PRD area accounts for over 80% of Guangdong's total GDP, making it one of the most economically vibrant regions in the world, some regions and cities in other parts of Guangdong even lag behind some of the notably less–developed areas in central and western China.

6.3 Overview of Land use Change and Policy Orientations

According to the evidence elaborated in the SUPER project, the urbanisation and land use interventions can be classified based on the type of instruments, including visions and strategies, legal devices, land use regulations, programmes, and projects. Another classification is the type of interventions, which mainly includes urban densification, regeneration on the problematic sites, containment on urban expansion, governance, spatial quality, and sectoral policies such as transportation, environment, and rural development.

This section, following the previously outlined classification method and considering the province's specific land use practices and challenges, introduces a series of interventions that have significantly influenced urbanisation and land use trends in Guangdong Province. These interventions are explored in detail, highlighting how they address both the opportunities and constraints posed by the whole province's rapid development. Furthermore, the sustainability indicators of these interventions are critically assessed through a comprehensive evaluation, drawing on government–issued factsheets, survey results, and insights from interviews with experts in the relevant fields. This analysis ultimately aims to provide a detailed understanding of the current state of sustainable urbanisation and land use in Guangdong Province.

6.3.1 Visions and Strategies

As the long–term development direction in land use planning, the success of visions and strategies lies in setting ambitious, future–oriented, and realistic objectives (ESPON, 2020a). To address challenges such as continuous population growth, resources and environmental pressure, and economic restructuring, and

achieve sustainable development in all aspects of society, economy, and environment through scientific spatial planning, Guangdong Province has established long–term development objectives in areas including economic sustainability, regional coordination, urban–rural integration, and ecological civilisation construction.

1) Territorial Spatial Planning of Guangdong Province

To promote the "multi–plan integration" spatial planning reform and align with the objectives established by the national master planning, the provincial planning department of Guangdong Province formulated the Territorial Spatial Planning of Guangdong Province (People's Government of Guangdong Province, 2024), which outlines the overall arrangement for the development and protection of the province's territorial space from 2021 to 2035. After being approved by the State Council, this comprehensive master plan was officially issued in early 2024. This plan generally serves as the foundation for relevant special planning, as well as subordinate master and detailed planning.

The plan clearly specifies Guangdong's long–term development goal of achieving a balanced and coordinated territorial spatial structure across the entire province by 2035. It aims to build a more sustainable and resilient territorial pattern to ensure food security and energy security and enhance the ability to cope with natural disasters. Additionally, the plan seeks to create an intensive and efficient land use pattern that improves the efficiency of natural resources utilisation; coordinate the development disparities between regions and urban–rural areas; and promote the environmental protection.

Table 3 – Spatial development and protection indicator system of Guangdong province

Source: Translated from the People's Government of Guangdong Province, 2024. * Territorial Spatial Planning of Guangdong Province*

Available at: https://www.gd.gov.cn/zwgk/wjk/qbwj/yf/content/post_4332417.html

Indicators		By 2025	By 2035	Attribute
1	Amount of cultivated land (10,000 mu)	≥2751.00	≥2751.00	Binding
2	Permanent basic farmland protection area (10,000 mu)	≥2523.00	≥2523.01	Binding
3	Ecological protection redline area (10,000 km^2)	≥5.07	≥5.08	Binding
4	Mainland natural shoreline retention rate (%)	≥36.4%	Determined according to the tasks assigned by the national government	Binding
5	Proportion of nature reserves areas to total land area (%)	≥13%	≥15%	Expected
6	Forest coverage rate (%)	Determined according to the tasks assigned by the national government	Determined according to the tasks assigned by the national government	Expected
7	Wetland protection rate (%)	28%	30%	Expected
8	Retained water space (10,000 mu)	≥1895.00	≥1895.01	Expected
9	Total water consumption (100 million m^3)	≤435.00	Determined according to the tasks assigned by the national government	Binding
10	Urban development boundary expansion ratio	≤1.30	≤1.31	Binding
11	Decrease in construction land area per unit of GDP (%)	≥15%*	≥40%*	Expected
12	Complete area of "Three Olds (sanjiu)" renovation (10, 000 mu)	20*	60*	Expected
Note: entries marked with * are cumulative values; 1 mu is approximately equal to 666.7 square metres				

Based on the strategic layout of "Three Zones and Three Lines" and Major Function–Oriented Zoning Strategy, the plan proposes the spatial development and protection pattern of "one core, two poles, and multiple pivots; one line, two barriers, and multiple corridors" and the regional development pattern of "one core, one belt, and one zone", to promote coordinated development across the province and reduce regional development disparities. Specifically, the pattern centres on the Pearl River Delta (PRD), fostering high–quality development of urban agglomeration in the PRD area; designates the eastern and western coastal economic belts as key development poles and constructs a number of important development pivots; and continues to reinforce the northern ecological barrier and constructs a southern marine ecological chain, ultimately forming an integrated ecological corridor system.

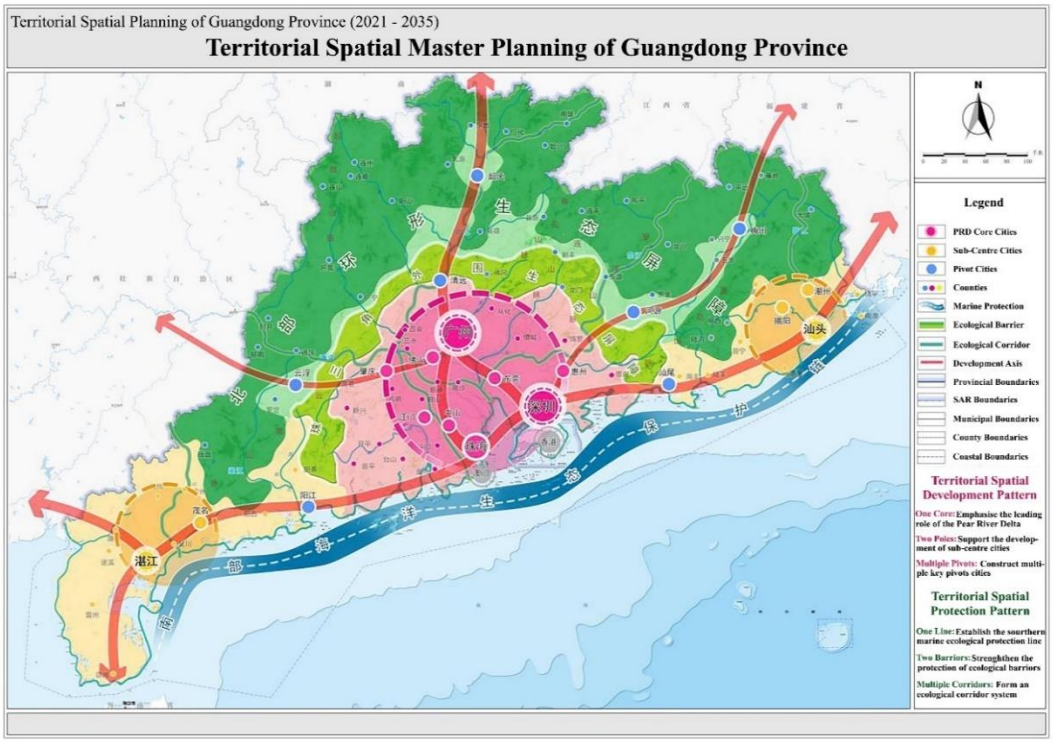

Figure 35 – Territorial spatial master planning of Guangdong province

Source: Translated from the People's Government of Guangdong Province, 2021. * Territorial Spatial Planning of Guangdong Province (public version) *

To achieve the territorial development focus on ecological civilisation construction, in addition to fundamental measures such as mine ecological restoration, soil erosion control, maintaining a high level of forest coverage, and protecting biodiversity, the plan also emphasises the significance of implementing the national policy of the arable land exploitation–compensation system, namely, "compensate the use of high–quality farmland with equivalent high–quality land". This intervention is critical for enhancing the protection of arable land by ensuring that equivalent–quality land is provided as compensation for any necessary arable land occupation and by improving the quality of arable land to construct high–standard farmland.

Furthermore, the plan also calls for the implementation of the "three control lines" strategy (see table 4) in line with the province's specific conditions, which includes the prioritised delineation of arable land and permanent basic farmland, scientific delineation of the ecological protection redlines, and rational delineation of urban development boundaries. These measures aim to form the key control areas with different functions, balancing resources protection and utilisation and optimising the spatial layout of agricultural, ecological, and urban construction areas.

Table 4 – Basic requirements of the "Three Control Lines" strategy

Source: Author's elaboration based on the People's Government of Guangdong Province, 2024. * Territorial Spatial Planning of Guangdong Province*

Three Control Lines	Highlights
Arable land and permanent basic farmland	Strictly control the conversion of farmland to non–farmland and adhere to the exploitation–compensation principle. The permanent basic farmland should not be subject to unauthorised occupation and change of use.
Ecological protection redlines	Areas with important ecological functions, potential ecological value, and ecological fragility shall be designated as ecological protection redlines, where human activities are prohibited or restricted.
Urban development boundaries	Avoid areas of protected farmland, ecological protection zones, and areas with high risk of natural disasters when delineating urban development boundaries, and strictly regulate land use patterns within these boundaries.

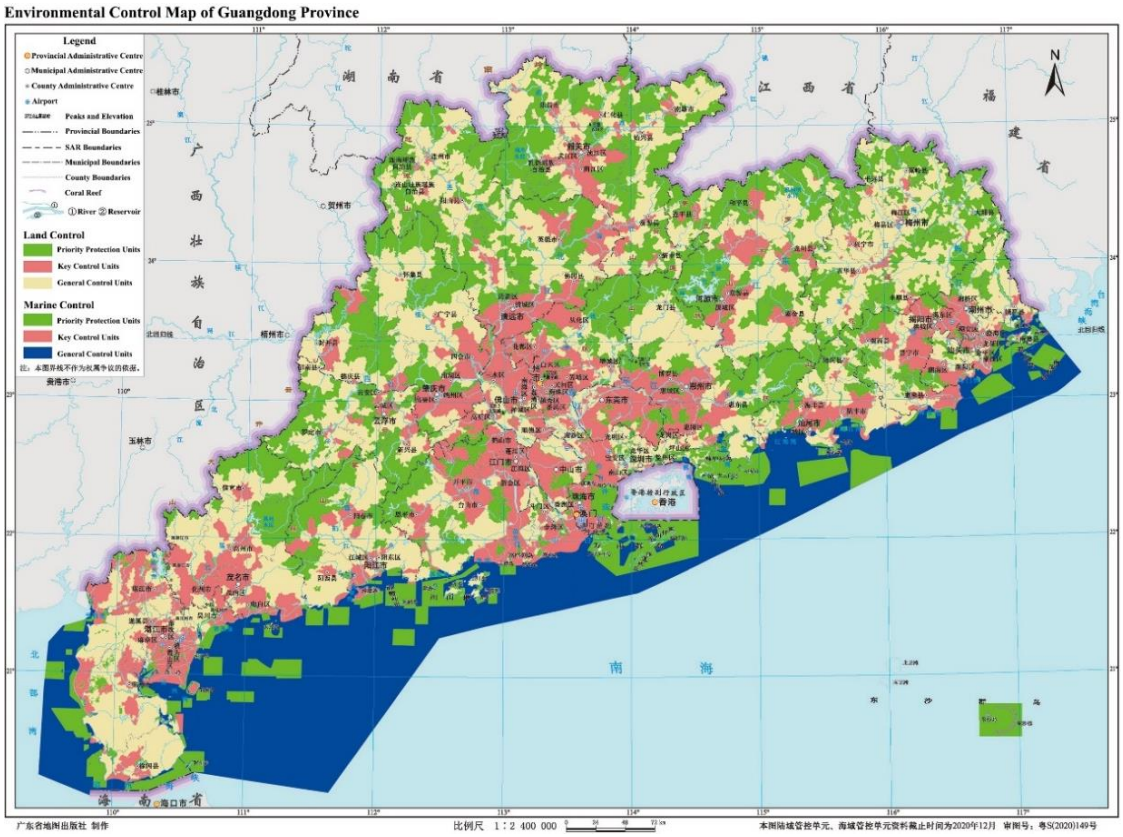

Figure 36 – Environmental control map of Guangdong province

Source: Translated from the Department of Ecology and Environment of Guangdong Province, 2021. Available at: https://gdee.gd.gov.cn/shbtwj/content/post_3166580.html

The country, including Guangdong Province, has long been facing significant disparities in development and public resource distribution between urban and rural areas, which is primarily reflected in the high development level of urban areas coupled with land resource scarcity and a series of social conflicts, while the rural areas are lagging in terms of economic development and public services such as infrastructure construction and education. To address this challenge, China has issued the "Rural Revitalisation Strategic Plan" at the national level as one of the key planning emphases. In line with this national plan, the provincial master plan of Guangdong Province defines the strategic focus on rural revitalisation and urban–rural integration, and proposes corresponding strategies, mainly covering integrated management, optimised urban–rural layout, and implementing rational land use policies and regulations.

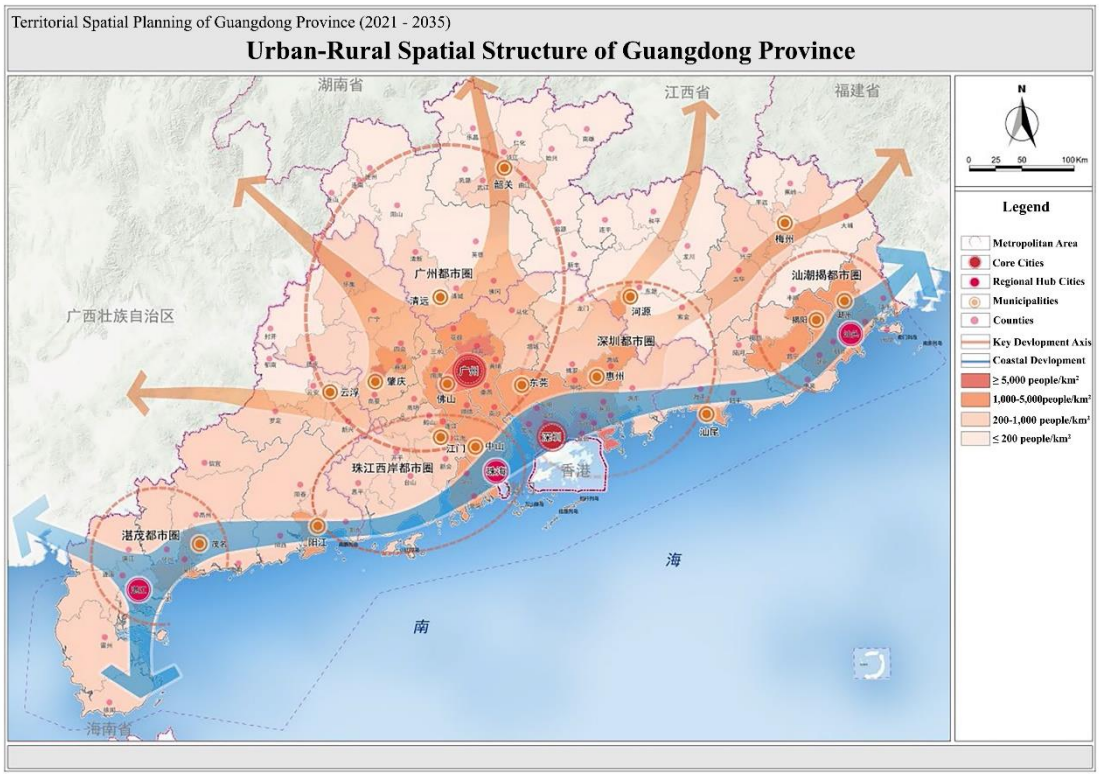

Figure 37 – Urban–rural spatial structure of Guangdong province

Source: Translated from the People's Government of Guangdong Province, 2021. * Territorial Spatial Planning of Guangdong Province (public version) *

Available at: https://nr.gd.gov.cn/attachment/0/413/413359/3225407.pdf

With respect to further promoting sustainable land use, the plan emphasises creating an intensive and efficient urban space strategy, that is, implementing the land

use policy of the Regulations on the Economic and Intensive Land Use issued at the national level. To this end, the plan outlines a series of visions and strategies, including comprehensively improving the efficiency of spatial use; developing a coordinated urban space system for different sizes of cities; creating high–quality urban clusters with distinct characteristics in various regions; optimising the industrial spatial layout; and establishing a balanced and high–quality public service infrastructure system.

2) Territorial Spatial Master Planning of Shenzhen

Municipal governments are responsible for developing municipal strategic documents based on binding indicators and local conditions, while adhering to the provincial master planning. This subsection provides an example of the territorial spatial planning in Shenzhen, given that Shenzhen's economic influence impacts the economic pattern of the entire province, and the strategies that Shenzhen's master planning utilise to cope with the common urbanisation and land use challenges are considered applicable in other municipalities in Guangdong.

Shenzhen was established as a Special Economic Zone during the early stage of China's reform and opening up, and it has transformed from a small village into one of China's most developed and economically dynamic cities over the past few decades, which involved extremely rapid urbanisation and urban expansion. Alongside this growth, Shenzhen has faced several challenges due to a large influx of immigrants, including land resource shortage, high urban density, and uneven distribution of infrastructure and public service. To address these issues, the Planning and Natural Resources Bureau of Shenzhen Municipal People's Government has developed a long–term comprehensive plan titled Territorial Spatial Master Planning of Shenzhen aimed at making Shenzhen a high quality, land–efficient, and ecologically sustainable city.

As one of the economic drivers of the Pearl River Delta and the entire Guangdong Province, Shenzhen's planning focuses on promoting coordinated regional development by rationally arranging the spatial structure. This mainly involves implementing the strategy of the Guangdong–Hong Kong–Macau Greater Bay Area Construction, such as advancing key platforms like the Shenzhen–Hong Kong Innovation and Technology Cooperation Zone, constructing comprehensive transportation hubs and related infrastructure, and fostering cross–city industrial chain

collaboration mechanisms. Additionally, Shenzhen's spatial structure aligns with the "one core, one belt, and one zone" regional development pattern, connecting coastal economic belts of Eastern and Western Guangdong, and supporting the construction of Northern Guangdong Ecological Development Zone.

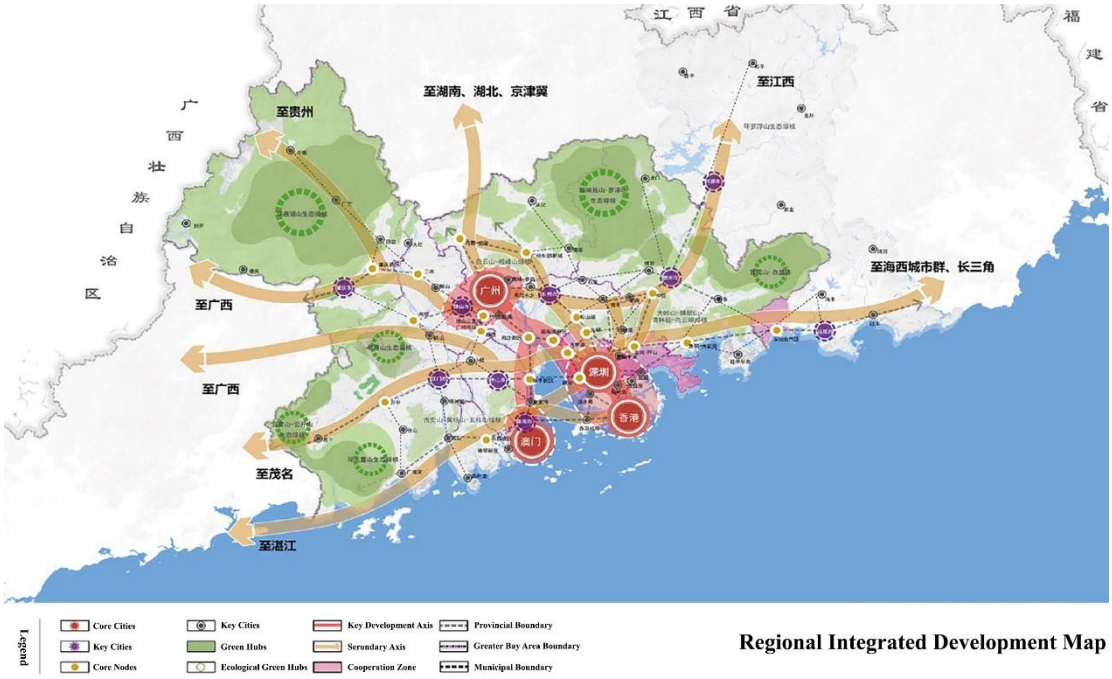

Figure 38 – Regional integrated development

Source: Translated from the Planning and Natural Resources Bureau of Shenzhen Municipal People's Government, 2021. * Territorial Spatial Master Planning of Shenzhen (public version) * Available at: http://pnr.sz.gov.cn/attachment/0/794/794784/8858879.pdf

The spatial arrangement of the Shenzhen Metropolitan Area, referred to as "one core and three sub–centres" is also clearly defined, which aims to promote regional integration and improve the efficiency of land use utilisation of the whole region. The central metropolitan area consists of the Shenzhen–Dongguan–Huizhou metropolitan area, while the sub–centres include the Shenzhen–Shanwei special cooperation zone, the Shanwei metropolitan area, and the Heyuan metropolitan area. Despite being theoretically grounded, the actual implementation of this structure still faces challenges such as unclear functional positioning of the sub–centres, unreasonable resources allocation and other issues that barely aligns with preset strategic goals, which require continuous adjustments and coordination during the implementation process.

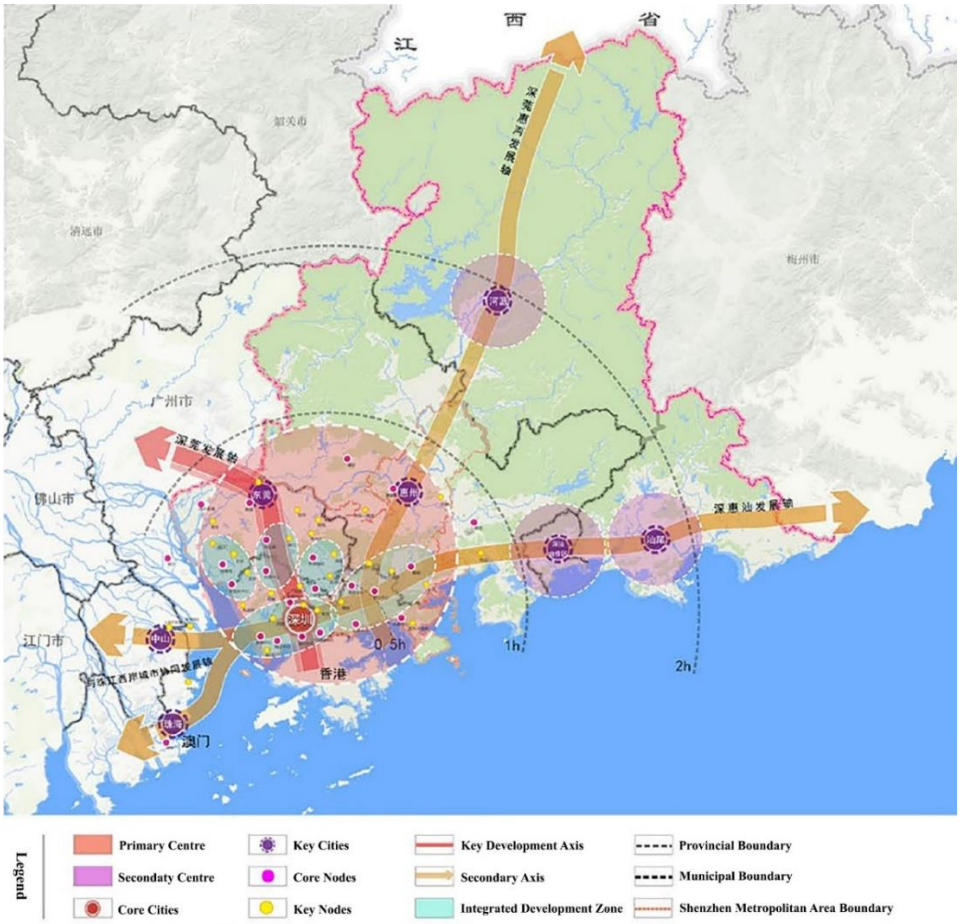

Figure 39 – Spatial arrangement of Shenzhen metropolitan area

Source: Translated from the Planning and Natural Resources Bureau of Shenzhen Municipal People's Government, 2021. * Territorial Spatial Master Planning of Shenzhen (public version) * Available at: http://pnr.sz.gov.cn/attachment/0/794/794784/8858879.pdf

Figure 40 – Spatial structures planning of Shenzhen

Source: Translated from the Planning and Natural Resources Bureau of Shenzhen Municipal People's Government, 2021. * Territorial Spatial Master Planning of Shenzhen (public version) *

Regarding ecological civilisation construction, Shenzhen's planning conforms to the "Three Control Lines" strategy established by the provincial master planning. This includes designating areas with significant ecological functions and potential values as ecological protection zones, where development is either prohibited or restricted, such as natural reserves, important mountains and wetlands; setting up basic farmland protection lines for lands with favourable agricultural conditions and high food production values, and following the exploitation–compensation principle, to ensure food security and promote environmental sustainability; and delineating urban development boundaries to effectively control the unregulated expansion of Shenzhen.

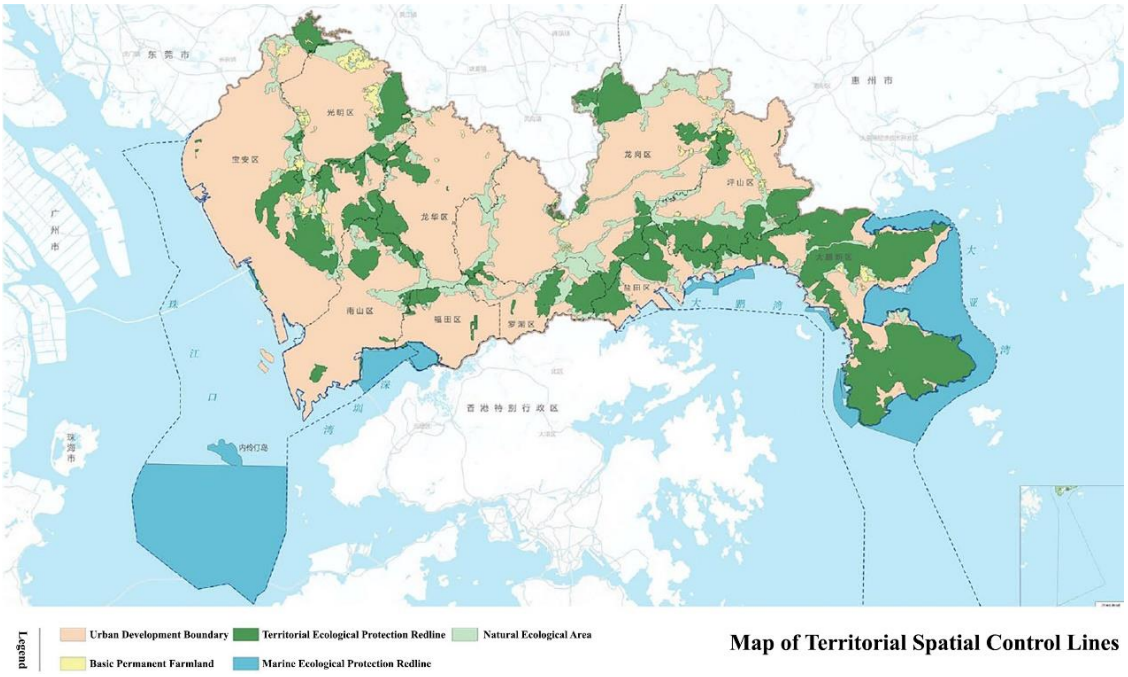

Figure 41 – Spatial control lines planning of Shenzhen

Source: Translated from the Planning and Natural Resources Bureau of Shenzhen Municipal People's Government, 2021. * Territorial Spatial Master Planning of Shenzhen (public version) * Available at: http://pnr.sz.gov.cn/attachment/0/794/794784/8858879.pdf

Furthermore, to comprehensively promote Shenzhen's sustainable development, the planning proposes a series of corresponding strategies, including constructing an ecological spatial pattern that connects the blue and green infrastructure, and implementing a range of ecological restoration projects such as mine reclamation, improving water features' quality, and afforestation. It also emphasises various socio–economic strategies, consisting of building high–quality infrastructure and balancing public services to foster social harmony, developing a

cultural heritage protection system to enhance the city's identity, and strengthening the city's resilience in all sorts of resources, disaster prevention, and climate change. These strategies consider overall direction of national and provincial sustainable development and offer valuable insights for other cities in Guangdong province in promoting sustainable land use.

6.3.2 Legal Devices

As specified in SUPER Guide (ESPON, 2020a), creating a supportive institutional framework for achieving sustainable land use involves deploying specific legal devices, such as binding laws and bylaws.

Land use planning in Guangdong Province is fundamentally guided by the national legal framework, which includes two key laws directly related to sustainable land use: the Land Administration Law and the Urban and Rural Planning Law. These legal devices ensure the local practices in Guangdong align with national sustainability objectives and contribute to the responsible and sustainable arrangement of land use patterns and land resources.

1) Land Administration Law

The Land Administration Law is China's fundamental legal framework for national land use and management, establishing a basic system of land management based on public ownership of land, with the protection of arable land as the primary goal and the control of land use as the core principle. The law establishes a dual system of land ownership and land use rights, meaning that urban land is owned by the state, while rural land, including land used for agriculture, forestry, and housing, is owned by rural collectives, typically represented by village communities or collective economic organisations. Individuals and entities can only use land for a certain period through leases, transfers, or allocations, but do not have ownership.

To promote sustainable land use by setting the goal of protecting arable land, as described in Chapter Five regarding China's land use practices, an important provision is the "requisition–compensation balance of arable land". This provision requires the replenishment of arable land equal in both quantity and quality to the land that has been occupies, which has also been practically applied and played an essential role in protecting arable land in Guangdong. Additionally, the law stipulates

that governments at all levels must take strict measures to protect arable land, ensuring that the quantity and quality of arable land is not compromised by construction or other uses, and to prevent the arbitrary occupation of arable land resources through designating permanent basic farmland and prohibiting unauthorised use of arable land.

Land use control and intensive land use are also important provisions to promote sustainable land use, which involve improving land use efficiency to avoid unregulated development and the waste of land resources. These provisions include measures such as strictly control the expansion of new construction land, encouraging the redevelopment of vacant and abandoned construction land, and setting up a system for evaluating the economical and intensive use of land. The law clearly requires governments at all levels to take measures to reduce land use waste and prioritise the use of existing land, thereby achieving efficient and sustainable management of land resources.

It is worth mentioning that the 2019 revised version introduced three significant reforms to the land requisition system. Firstly, it clearly defines the public interest in land requisition, limiting the government's abuse of land expropriation rights that previously led to an expanding scope of land requisition. Secondly, it specifies compensation guarantees for those whose land is requisitioned. Thirdly, it changes the post–approval announcement to a pre–approval announcement and ensure that rural collective economic organisations and individuals have the rights to information, participation, and supervision throughout the requisition process.

The Land Administration Law is continuously being adjusted to achieve the goal of sustainable development, although there are still shortcomings in guaranteeing compensation transparency, and refining the criteria for balancing economic development and ecological protection.

2) Urban and Rural Planning Law

Revitalising rural economies, balancing the urban–rural development disparities, and coordinating urban and rural spatial layouts have long been the key focuses of spatial planning in China. The Urban and Rural Planning Law, first approved in 2007 and amended in 2015 and 2019, is a legal device specifically designed to promote urban–rural integration and ensure comprehensive, coordinated, and sustainable development of the urban and rural economy and society to promote

balanced growth. It provides detailed planning guidelines for arranging construction activities within the built–up areas of cities, towns, and villages.

This law establishes principles for all aspects of urban and rural spatial planning, including rational spatial layouts such as integrating urban and rural areas, conserving land resources, promoting intensive development, enhancing the comprehensive utilisation of resources and energy, and improving the ecological environment, which generally aligns with the needs for sustainable land use development. Nevertheless, in practice, due to the constraints brought by the urban–rural dual structure and land transfer mechanisms in China, limited access to information for public participation and supervision, and the relatively small influence of public input on planning decision–making process, some challenges still persist in the long–term sustainable management of urban–rural land resources.

6.3.3 Land Use Regulations

Land–use regulations, usually through zoning laws and planning guidelines, establish binding principles that dictate how land may or may not be developed or transformed (ESPON, 2020a). The regulations specified in this section are important legal frameworks for ensuring that land use and transformation in Guangdong Province are consistent with broader sustainable development goals and community needs.

1) Guangdong Province Land Management Regulation

This regulation is the refinement and specific implementation of the Land Administration Law made by the Guangdong Provincial People's Congress in the light of the actual situation of land use in Guangdong, which serves as the guidelines and basic provisions for land use planning and development in the province. As one of the characteristics of land use in Guangdong is regional imbalance, with construction land mainly concentrated in economically developed areas, such as the Pearl River Delta, while arable land concentrated in less developed areas, the regulation thus focuses on rational planning of agricultural, ecological, urban and other functional spaces, emphasising intensive land use to balance the demand and supply across different areas and reduce regional disparities.

In accordance with the principle of intensive land use, a key feature of the

regulation is the emphasis on the importance of regenerating old towns, old factories, and old villages. This has been elevated to a local legislative level, requiring local governments to prioritise the redevelopment of abandoned and inefficiently used land by means of tax incentives and financial subsidies.

2) Green Living Action Plan

This national action plan covers various aspects to promote low–carbon and sustainable lifestyles. Key measures include improving energy–saving infrastructure, increasing public green spaces, and constructing ultra–low energy consumption green buildings as part of green community development. It also emphasises the promotion of urban mobility, focusing on improving road accessibility and strengthening public transit systems, alongside promoting walking and cycling networks. These initiatives play a crucial role in advancing the sustainability of China's land management and development.

Guangdong Province has actively promoted the plan's implementation, with notable achievements in green community development. The province has integrated intelligent systems for security, vehicle management, and waste disposal, while enhancing community infrastructure through digital transformation. Specifically, Guangdong has aligned green community development with urban renewal projects, particularly focusing on neighbourhoods in need of regeneration. The green community coverage in areas like the Pearl River Delta has reached a high level, making these areas exemplary in driving sustainable living initiatives across the province and the nation.

3) The Redevelopment Management Measures of Old Towns, Old Factories, and Old Villages in Guangdong Province ("Three Olds" Redevelopment)

As one of the first regions in China to pilot "Three Olds" redevelopment projects, Guangdong officially implemented the Management Measures in March 2021. This regulation is the first of its kind in China regarding the redevelopment of underutilised land and serves as the country's first provincial government rule on the "Three Olds" redevelopment, which plays a significant role in urban renewal by setting guidelines and outlining three main land types requiring redevelopment: old towns, old factories, and old villages.

The Management Measures also define three ways of redevelopment: comprehensive redevelopment, which involves demolition and reconstruction, or the

implementation of ecological restoration and land reclamation; micro–redevelopment, which refers to improvements through function change, repair, and the enhancement of public facilities while maintaining the current structure; and mixed redevelopment, which combines comprehensive and micro–redevelopment. Additionally, to ensure effective redevelopment projects operated on a market–oriented basis, Guangdong has improved institutional system in areas such as planning management, land approval, revenue distribution, and supervision.

Despite certain achievements since the Management Measures have been implemented, Guangdong's "Three Olds" redevelopment still faces a series of challenges, including uneven policy implementation, insufficient funding and resources, difficulties in coordinating interests, imbalances between returns and risks, as well as environmental and sustainability pressures. These issues result in slow project progress, high costs, low enthusiasm from private investors, and potential conflicts over interests and mismatches in market returns. Addressing these challenges requires policy optimization, financial support, and innovative mechanisms for coordinating interests.

6.3.4 Programmes

Guangdong has been implementing economic programmes that contribute to both economic growth and sustainable development through the coordination of resources, policies, and investments. According to the ESPON SUPER Project, programmes generally refer to comprehensive policy packages designed to create economic and social conditions to support sustainable urbanisation and land use (ESPON, 2020a).

1) The Guangdong–Hong Kong–Macao Greater Bay Area Development Plan

The Guangdong–Hong Kong–Macao Greater Bay Area (GBA) development plan is a long–term strategy aimed at coordinating the sustainable development and economic integration of nine cities in Guangdong province, Hong Kong, and Macao. It focuses on technological innovation, industrial transformation and upgrading, as well as infrastructure interconnectivity in areas such as transportation and energy. To achieve the objectives, a series of actions that provide financial support for the project have been implemented, including establishing funds such as the Technology

Innovation Fund and Infrastructure Construction Fund, and creating cross–border free trade zones to further facilitate economic collaboration within the regions.

In terms of infrastructure, the GBA plan emphasises the construction of large–scale transportation networks that aims to strengthen the connectivity between different cities, such as the Hong Kong–Zhuhai–Macao Bridge, high–speed rail networks, and airport expansions. The GBA also involves multi–level cooperation between central, local governments, and the Hong Kong and Macao Special Administrative Regions, ensuring that policies and strategies are effectively implemented through this layered governance structure.

The GBA plan has significantly driven urban renewal and spatial optimisation in Guangdong. To improve land use efficiency, the plan integrates with the "Three Olds" redevelopment policy; for instance, in cities like Guangzhou and Shenzhen, former industrial districts have been transformed into innovation hubs, greatly boosting the economic output of these areas. Additionally, cities such as Zhuhai have promoted green communities, green mobility, and other low–carbon initiatives to foster sustainable urban development as outlined in the development plan.

2) China (Guangdong) Pilot Free Trade Zone

In 2015, the Free Trade Zone in Guangdong was officially designated to contribute to regional integration and economic development, including Nansha New Area in Guangzhou (mainly develops shipping logistics and advanced manufacturing), Qianhai–Shekou Area in Shenzhen (focuses on financial services, modern logistics, and cross–border innovation), and Hengqin New Area in Zhuhai (promotes cultural tourism, healthcare, and education industries). The FTZ greatly contributes to trade and investment by offering liberalised market access for foreign business, preferential tax policies, and streamlined administrative processes, making it attractive for multinational corporations and startups.

The FTZ has facilitated the formation of new urban economic centres and multi–centred urban structure, with the expansion of the transportation networks that has promoted the growth of core cities in the Pearl River Delta. From the perspective of economic development and land use patterns, these transformations are generally positive. Industrial restructuring and the renewal of old urban areas have brought greater economic benefits and promoted environmental harmony to some extent. However, some issues cannot be overlooked, such as the exacerbation of population

outflow from the rural areas and the urban–rural development imbalances. Additionally, regions like Nansha New Area have implemented land reclamation projects to meet the land demands for industrial development, which has damaged the marine ecosystem in the Pearl River estuary, leading to the loss of habitats for certain marine species.

3) Revitalisation Plan for Eastern, Western, and Northern Guangdong

The Revitalisation Plan for the regions in Guangdong outside of the Pearl River Delta is another economic programme that promotes regional integration and reduces regional disparities within the province. Since 2005, the government has encouraged the gradual transfer of labour–intensive industries from the PRD to less developed regions in Guangdong. Following the introduction of the Revitalisation Plan in 2015, larger industrial clusters in these regions have been formed, such as Zhanjiang Lingang Industrial Park and Maoming Industrial Transfer Industrial Park. The Plan has also facilitated the construction of motorways and high–speed rails that connect the PRD to other regions, which accelerates the flow of resources and promotes the development of tourism.

In general, the Revitalisation Plan has boosted economic growth in these regions to some extent by outlining development strategies tailored to the unique characteristics of each region, for instance, leveraging the petrochemical industry advantage in western Guangdong, and introducing innovative financial models, such as public–private partnerships (PPP). However, the regional imbalances in economic scales and overall development, along with the management problems in policy implementation remain significant and should not be underestimated.

6.3.5 Projects

This subsection explores transformative projects in Guangdong that aimed at improving land use sustainability through renovation and urban renewal. According to the ESPON SUPER project, projects are unique initiatives designed to transform lands with the objective of promoting sustainable development within a given timeframe.

1）Restoration of South China Historical Trail

The historical trails in Guangdong were used in ancient times as routes for

transmitting official documents, transporting goods, and facilitating movement of people. These trails are important cultural heritages and preserve a continuum of historical significance and cultural value. Overall, the restoration strategy for the historical trails focuses on preservation and adaptive reuses, connecting remnants of ancient post roads, historical towns, cultural relics, and natural landscapes through pathways, greenways, waterways, and other linear connections. This approach aims to restore these cultural heritage corridors by creating cohesive cultural routes. At present, Guangdong has planned six main cultural routes (figure 42) based on the identified 171 historical trails, linking over 1,000 significant nodes.

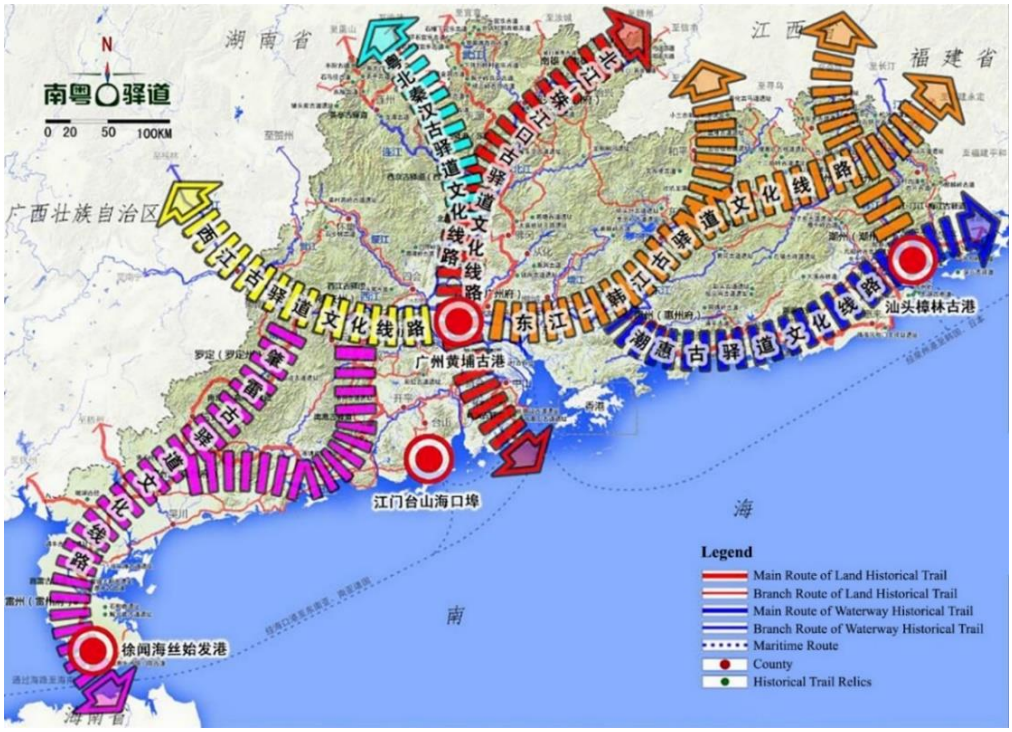

Figure 42 –Main cultural route of South China historical trail

Source: Translated from the Guangdong Provincial Department of Housing and Urban–Rural Development, 2017.

Figure 43 – Significant nodes of South China historical trail

Source: South China Historical Trail. Available at: http://www.infonht.cn/map.aspx

The restoration project for these trails is also an important strategy to revitalise the economy of eastern, western, and northern Guangdong, and reduce regional disparities between these regions and the PRD. As the historical trails are mostly concentrated in less developed regions, the project combines local cultural and tourism resources with these ancient post road routes, promoting cultural tourism, eco–tourism, and outdoor recreation industries to stimulate development and regional revitalisation.

According to a 2021 report from the Guangdong Forestry Bureau, the restoration of historical trails also assumes part of the function of an ecological corridor connecting various ecological elements across the province. In planning the routes, the project emphasises connections with nature reserves to form systematic and continuous ecological corridors. For instance, the historical trails in Jiangmen and Shanwei are close to the coast and backed by mountains, serving as vital routes connecting terrestrial and marine habitats; the preservation and restoration of historical trails like Luofu Mountain Road in Huizhou and Yinna Mountain Road in Meizhou link these routes with nearby villages, establishing a seamless connection between natural landscapes and rural communities.

2）Renovation of Urban Villages in Guangzhou

Urban *villages*, as known as “chengzhongcun” in China, refer to some of the traditional villages left behind in urban areas during the rapid urbanisation process in mainland China. These areas are often surrounded by high–rise buildings, characterized by their lack of urban planning, chaotic spatial layouts, densely packed informal constructions, and inadequate infrastructure. They frequently lack integration into urban management systems and attract low–income residents due to their low rental costs, such as migrant workers and recent graduates, with a ratio of non–local to local populations often exceeding ten to one. Urban villages are therefore regarded as informal settlements with Chinese characteristics and require urgent solutions for achieving sustainable urbanisation and land use.

Since Guangzhou’s successful bid to host the Asian Games in 2004, the city has closely integrated the urban village renovation project with the preparations for the Games. During this phase, the renovation has focused on large–scale demolition and reconstruction, with priority given to increasing land value and improving economic efficiency, such as for real estate development. According to data from the Guangzhou Municipal Government, as of 2018, the city has approved 43 urban village redevelopment projects covering an area of 19.52 square kilometres. The massive reconstruction brought significant community changes, including gentrification in areas dominated by real estate developers, which increased housing prices and forced some low–income residents to relocate due to financial pressures.

In early 2024, the Guangzhou Urban Village Renovation Special Plan (2021–2035) was officially announced, outlining a comprehensive plan for urban renewal and redevelopment of urban villages in Guangzhou for the next decade. This plan introduced enhanced management mechanisms and innovative policy systems, aiming to shift the redevelopment model toward "micro–renovations" and "conservation–based redevelopment", which emphasise preserving original structures and cultural heritage while improving infrastructure. Additionally, the plan aims to protect original residents’ housing rights and interests by offering 10% of the social housing. In the same year, the Guangzhou Urban Village Renovation Regulations were approved, regulating aspects including the objectives of urban village renovation, renovation methods, compensation and resettlement programmes, land acquisition and dispute resolution. As the first regional regulation on urban village renovation in China, the

Regulation provides strong legal support to further promote the renovation projects.

The renovation of urban villages is a complex issue that requires balancing the interests of the government, cultural preservation, market value, and low–income housing needs. Although Guangzhou still has a large number of urban villages remaining due to insufficient investment and a relatively slow transformation process, its experience explored in the past two decades of transitioning from full–scale demolition to a combination of demolition and preservation and social housing provision, offering valuable insights for other cities undertaking similar projects.

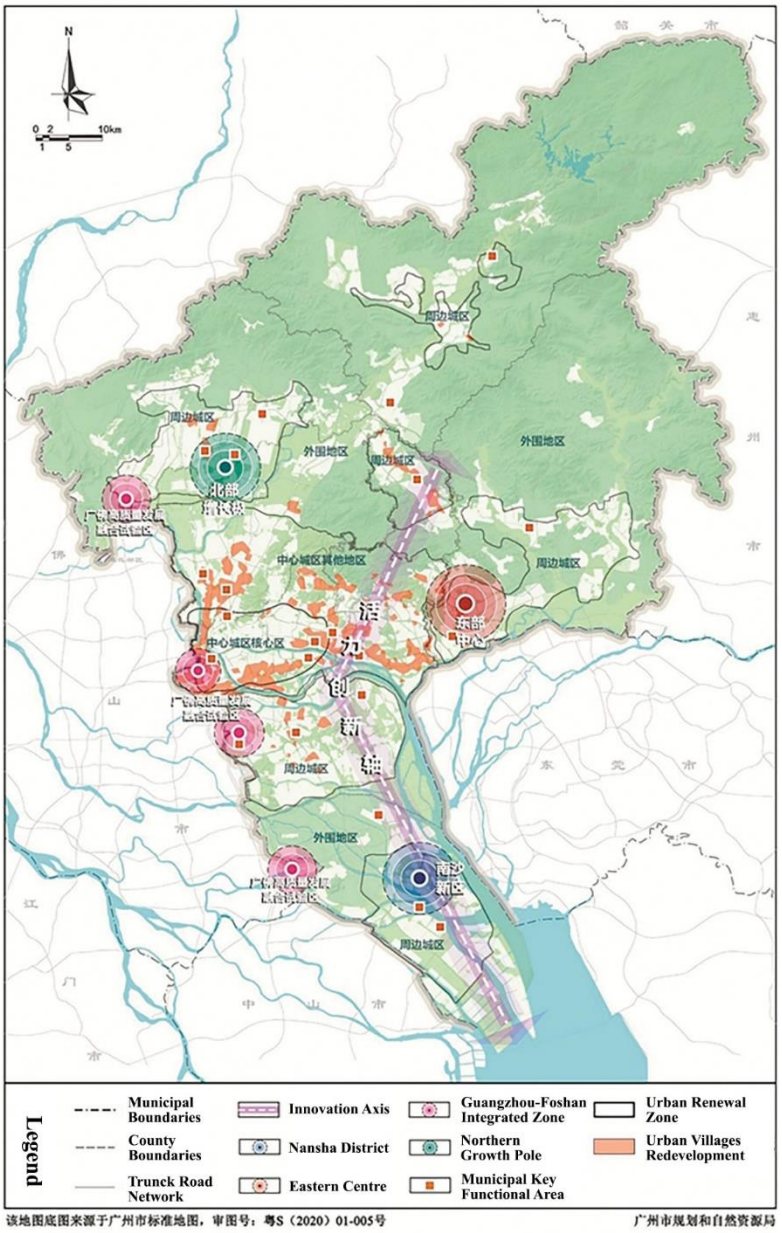

Figure 44 – Redevelopment of urban villages in Guangzhou, Guangdong Province

Source: Translated from the People's Government of Guangzhou Municipality, 2024. Available at: https://www.gz.gov.cn/zwfw/zxfw/gysy/content/post_9464878.html

3) OCT–Loft Project

OCT–Loft is a creative cultural park located in Nanshan District, Shenzhen, developed from the former Eastern Industrial Zone of OCT, and serves as a significant case of the integration of urban renewal and industrial transformation in China. Guided by government policies promoting cultural and creative industries, the once–abandoned factories and warehouses in OCT have been gradually transformed into creative industrial parks since the early 2000s. Various creative industries such as design and art have been introduced, which not only preserves the architectural form and historical traces of the old factories, but also facilitates the formation of a more vibrant industrial economy, leading to a more efficient use of land resources.

The transformation process of OCT–Loft has demonstrated the principle of sustainable development of land use and provided a reference for the redevelopment of old industrial areas in other cities. However, it is undeniable that this transformation has brought about a certain degree of gentrification in this area, raising the area's socioeconomic level and resulting in challenges in balancing commercial and residential spaces due to high levels of commercialisation.

4) Zhuhai Traffic Control Project

The development stage in Guangdong requires it to reach carbon peak targets earlier than other provinces in China, and the transportation sector is one of the main sources of carbon emissions in the province. The Zhuhai Traffic Control Project serves as a significant case in urban carbon reduction by improving the city's transport structure and promoting urban mobility. In addition to alleviating congestion pressure on key roads by optimising the road system and facilities, the Control Project also puts emphasis on constructing and refining the slow–moving system.

The slow–moving system is categorised into 'slow–moving community development axis', 'coastal landscape development axis', 'urban mountain development axis', and 'road development axis', forming an integrated slow–moving network that connects the entire city. Specific measures include optimising the pathways and cycle paths, and expanding public transport service coverage, along with added accessibility facilities and pedestrian rest areas. These improvements encourage residents to choose greener travel modes such as cycling and walking and contributing to Zhuhai's sustainable urban development.

5) Haizhu Wetland Project

The Haizhu Wetland in Guangzhou is a successful example of combining urban ecological restoration and green space development, providing a valuable model for the enhancement of the living environment in large cities. Before the renovation, this area was primarily an orchard, dominated by agricultural activities. With the industrial expansion of the city, the economic benefits of the orchard were no longer enough to support local livelihoods, while issues like ecological degradation, water pollution, and disorderly land use worsened. In 2012, the Guangzhou Municipal Government initiated a rehabilitation project, turning the orchard into an ecological wetland park through wetland restoration and urban greening. The project included water quality improvements, ecological restoration, landscaping, and the addition of leisure and recreational facilities, which not only improved the local environment and offered research resources, but also provided public space for city residents.

The success of the wetland restoration project lies in the implementation of a distinct approach to land acquisition. Rather than altering the land's classification, only usage rights were obtained, ensuring efficient land management while preventing the wetland from being converted for commercial or residential development. Furthermore, a unified plan was implemented after the acquisition to foster industries development making use of the wetland's ecological benefits. Measures were also put in place to support the livelihood of local residents, such as purchasing social insurance and offering job opportunities for farmers whose lands have been expropriated. These initiatives have played a key role in the project's success.

6.3.6 Evaluating the Interventions Based on the Sustainability Indicators

The ESPON SUPER project has developed a framework for assessing the sustainability of land use interventions. Considering that no intervention is entirely sustainable or unsustainable, each identified intervention impacting urbanisation and land use patterns in Guangdong is evaluated using the sustainability indicators outlined in the SUPER project.

The sustainability assessment framework covers a range of indicators, including economic, ecological and social aspects (ESPON, 2020f). The economic dimension of sustainability takes into consideration: the GDP and wealth, the public finance, jobs, accessibility, the development of business areas, the quality of housing

demand, the transportation costs, and the energy consumption. The ecological dimensions consider the following indicators: reduce mobility (by car), reduce pollution (including CO^2), provision of green urban areas, biodiversity, land consumption, natural hazards, climate change, consumption of resources, renewable energy, space for future water retention and circular economy. The indicators used for assessing the social dimension of sustainability include health, affordable housing, equity/inclusion, public and recreational space, variety (high–rise, suburban, etc.), mixed–use areas and satisfaction with home environment. Applying the assessment principles and criteria from the SUPER project, along with the research and expert opinions, the sustainability performance of each identified intervention in Guangdong is evaluated across economic, ecological, and social dimensions, using a five–level rating system as follows:

- Strongly positive impact (++)
- Positive impact (+)
- Conflicting impact (+/–)
- Negative impact (–)
- Strongly negative impact (—)
- Not applicable / Insufficient data to evaluate (n.a.)

Furthermore, it is important to note that urban development patterns are influenced by multiple factors, requiring consideration of the interactions and cumulative effects among these factors. Consequently, assessing the sustainability of land use interventions is respectively complicated. As highlighted by the SUPER project (ESPON, 2020f), any judgments on specific issues are influenced by the perspective of the individual making the recommendation, meaning that evaluation results may vary from person to person. For this reason, it is essential to consider the specific conditions of different regions and diverse viewpoints to conduct context–based assessments that enhance the accuracy and relevance of sustainability evaluations.

Table 5 – Evaluation of economic sustainability

Source: Author's Elaboration

Interventions	Economic Sustainability							
	GDP / Wealth	Public finance	Jobs	Accessibility	Business areas	Housing demand	Transportation costs	Energy consumption
Territorial Spatial Planning of Guangdong Province	+ Emphasise economic growth and regional integration	+/– Significant infrastructure investments are made, but require improved and long–term sustainability	+ Focus on balanced industrial layout and job opportunities	+/– While transportation networks have improved, accessibility in some areas remains limited	+ Support concentrated development of business areas	+/– New construction is made but property prices in PRD remain high	+/– Public transportation has improved, but long–distance travel costs between different regions remain high	+/– Energy efficiency has improved, while the dependence on fossil fuels remains great
Territorial Spatial Master Planning of Shenzhen	++ Promote the development of high–tech industries and finance	+ Tax revenue is stable	++ Diverse and vibrant industries, high employment rate	+ The metro network and public transit system are well developed	++ Business areas are developed in a compact manner	+/– Land resources are limited, and housing prices are high	+ Public transportation is well developed, with low commuting costs	+ High energy efficiency
Land Administration Law	+ Industrial clustering promotes economic growth	+ Improving land expropriation compensation system is beneficial for stable public	n.a.	+ Infrastructure development enhances urban accessibility	+ Promote the development of commercial and industrial areas	+ Land supply and planning promotes housing construction	n.a.	n.a.

		finances						
Urban and Rural Planning Law	n.a.	+ Local governments are entitled to legally collect related fees	n.a.	+ Integrated layout of urban and rural transportation networks	+ Rational planning of industrial and commercial areas	+ Rationally designate residential construction	+ Public transportation planning reduces commuting costs	n.a.
Guangdong Province Land Management Regulation	+	+	n.a.	n.a.	+	+	n.a.	n.a.
Green Living Action Plan	n.a.	n.a.	+ Create jobs in green infrastructure construction and environmental protection	+/– Promote green transportation but have limited impact on the overall network	+ Encourage low–carbon business district	+/– Support low–carbon communities but doesn't address housing demand	+ Encourage the use of public transit and new–energy vehicles	++ Promote energy–saving technologies and low–carbon practices
"Three Olds" Redevelopment	+ Improve property value	++ Generate revenue from land sales and taxes and attracts private investment	++ Provide jobs in planning, construction, management, and service sectors.	+/– Partially improves the infrastructure but the impacts are limited	++ Support new business and industrial clustering	+ The regulations increase housing supply and improve living conditions	n.a.	+/– The impact on energy consumption reduction is moderate

The GBA Development Plan	++ Major economic growth due to regional integration	+ Attract investment and boosts tax revenue	++ Support growth of sectors such as manufacturing, technology, and finance	++ Integrated transportation, such as high–speed rail and port development	++ Industrial expansion and collaboration	+ Alleviate housing pressures in some cities through regeneration	+ Compact urban patterns reduce transportation costs	+ Green, innovative and low–carbon technologies are developed
Pilot Free Trade Zone	++ GDP growth due to increased trade activities	+ Tax revenue is generated by the FTZ	++ Create employment in trade, logistics, and finance	++ Optimised transportation networks within and beyond the region	++ Attract new business in logistics, finance, etc.	+/– Limited support for housing supply	+ Improve facilities and logistics efficiency	+/– Limited energy efficiencies
Revitalisation Plan for Eastern, Western, and Northern Guangdong	+ Economic growth has been driven in these regions	+/– Fiscal health depends on regional economic growth	+ Receive industrial transfer from PRD and constructs industrial parks	++ Infrastructure upgrades improve accessibility, such as rails.	+ Development of business and industrial parks	+/– Limited support for residential supply	+/– Transportation networks are improved but long–distance costs remain high	+/– Limited impacts on energy consumption
Restoration of South China Historical Trail	+/– Promote cultural tourism, though the contribution to GDP is limited	+/– Government investment in the project places pressure on public finances	+ Tourism–related job opportunities	+ Infrastructure improvements along the trails	+/– Scattered and spatially limited	n.a.	n.a.	n.a.

Renovation of Urban Villages in Guangzhou	+ Urban regeneration facilitates economic activity	+ Increase land values and tax revenue	+ Create jobs in construction and services	++ Improve roads and public facilities within the communities	+ Introduce new services	+ The redevelopment increases high–density housing supply	+ Public facilities reduce households travel costs	+ Introduce green buildings and energy–saving technologies
OCT–Loft Project	+ Attract creative and cultural industries	+/– Limited impacts	+ Job opportunities in the fields of creativity and arts that attract young talent	+ Located with accessible and complete facilities	++ Diversified business growth	n.a.	+	+ Incorporate eco–friendly and energy–efficient designs
Zhuhai Traffic Control Project	+/– Overall impacts on GDP are moderate	+/– Initial costs are high; long–term returns are possible	n.a.	++ Enhance urban mobility by alleviating congestion and developing slow–moving system	+ Improved traffic conditions make business areas more attractive	n.a.	++ Optimise traffic flow and reduces congestion, lowering travel costs	+ Decrease energy consumption and carbon emissions
Haizhu Wetland Project	+/– Contribute to GDP growth indirectly by supporting research and tourism	+/– The ongoing maintenance remains a financial challenge	++ Job opportunities for landscape workers, gardeners, and researchers	+ Metro planning has incorporated the wetland to enhance access	– Construction lands are limited	– New housing supply is insufficient and not economic	+ Promote local transit access and reduces household transportation costs	+ Reduce local energy consumption due to the cooling effect

Table 6 – Evaluation of ecological sustainability

Source: Author's Elaboration

Interventions	Ecological Sustainability										
	Reduce mobility (by car)	Reduce pollution (including CO^2)	Green urban areas	Biodiver–sity	Land consumption	Natural hazards	Climate change	Consumption of resources	Renewable energy	Space for future water retention	Circular economy
Territorial Spatial Planning of Guangdong Province	n.a.	+ Industrial upgrades and clean energy usage	+ Urban green belts and ecological corridors	+ Conserve wetlands and establishes ecological reserves	+/– Promote intensive land use under rapid urbanisation	+ Flood and disaster control	+ Enhance coastal protection and urban greening	+/– Resource consumption remains high in certain sectors	+ Solar and wind energy are promoted across urban–rural areas	+ Wetland protection	n.a.
Territorial Spatial Master Planning of Shenzhen	+ Slow–moving system	+	++ Shenzhen mountain–sea corridor; 43.56% of green coverage	+ Protect and restore natural habitats	+/–	+ Assess risks and manage hazards	+ Green infrastruc–ture and coastal protection	n.a.	+	+ Sponge city	n.a.
Land Administration Law	n.a.	n.a.	+/– Limited measures	n.a.	+ Emphasise intensive	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

			on balancing develop–ment and greening		land use						
Urban and Rural Planning Law	+ Improve public transport system	+/– Reduce potential pollution	+ Integrate green spaces in urban and rural planning	+/– Limited measures on protecting ecosystems	+	+/–	+ Climate change adaptation planning	n.a.	n.a.	n.a.	n.a.
Guangdong Province Land Management Regulation	n.a.	+/– Land use control and pollution prevention	+/– Specific measures are limited	+/– Limited measures	+	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Green Living Action Plan	++ Green travel modes, public transport, cycling, and walking	++ Promotion of low–carbon lifestyles	++ Develop green spaces and urban greenery	n.a.	+	n.a.	+	+ Energy conservation	+ Support the use of clean energy	n.a.	+ Waste sorting, reuse, and sustainable consump–tion
"Three Olds" Redevelopment	n.a.	n.a.	+ Transform	n.a.	+ Minimise	n.a.	n.a.	+ Recycling of	n.a.	n.a.	+ Support

			into urban green spaces		new land consumption through renewal			building materials			construction waste recycling
The GBA Development Plan	+ Integrated public transport systems reduce dependence on cars	+ Improve air quality and reduce emissions	+ Increase urban parks and forest coverage	+ Ecological corridors	+	+ Ecological barriers	+ Energy–efficient technologies	+/– Limited consumption targets	+ Clean energy used in public facilities	n.a.	+/– Partially promote waste recycling
Pilot Free Trade Zone	n.a.	+ Raise environmental standards for companies	n.a.	– Land reclamation, loss of certain marine habitats	+/– High demands for industrial development	– Lack resilience to climate change impacts, such as sea level rise	+/–	n.a.	n.a.	n.a.	+/– Waste recovery in manufacturing
Revitalisation Plan for Eastern, Western, and Northern Guangdong	+/– Improve public networks, though car usage remains high	+ Industrial pollution control	+ Eco–parks	+/– Lack specific conservation measures	+/–	n.a.	n.a.	+/–	+	n.a.	+/–

Restoration of South China Historical Trail	n.a.	n.a.	+ Preserve green spaces along the trails	+ Protect local species	+ Restore historical lands and avoid new construction	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Renovation of Urban Villages in Guangzhou	n.a.	+ Reduce waste and sewage discharge	+ Add parks and green areas through renovation	n.a.	++ Redevelop and improve existing urban spaces	n.a.	n.a.	+/– Lack of specific consumption control targets	n.a.	n.a.	+ Recycling of building materials
OCT–Loft Project	+/– Involve walkways and public transit links but lack systemic measures	+ Transform into green buildings, and reduce operational pollution	+ Expand green and recreation spaces	+/– Landscape design partially maintains habitats for certain species	++ Redevelop industrial areas and optimise land use	n.a.	n.a.	+/–	– Primarily relies on conventional sources of energy	n.a.	n.a.
Zhuhai Traffic Control Project	++ Improve public transit networks and non–motorised	++ Reduce emissions by enhancing urban mobility	+ Coastal landscape and urban mountain development	+ Green infrastructure	+ Optimise existing road systems	n.a.	+ Carbon emission reduction	n.a.	n.a.	n.a.	n.a.

	pathways										
Haizhu Wetland Project	+ Encourage cycling and walking	++ Improves air and water quality	++ Eco–buffer and carbon sink	++ Provides habitats for numerous species	++ Minimises new land development	++ Mitigates urban flooding through storm water retention	++ Reduces impacts of extreme weather	++ Utilises energy–efficient infrastructure	+/– Lacks large–scale solar and other clean energy installations	++	+ Eco–friendly agriculture and recovery from organic waste

Table 7 – Evaluation of social sustainability

Source: Author's Elaboration

Interventions	**Social Sustainability**						
	Health	Affordable housing	Equity / Inclusion	Public and recreational space	Variety (high–rise, suburban, etc.)	Mixed–use areas	Satisfaction with home environment
Territorial Spatial Planning of Guangdong Province	+ Construct community health facilities	+/– Provisions of affordable housing are insufficient	+/– Current balanced measures are insufficient to reduce urban–rural disparities	+ Involve public spaces to improve quality of life	+/– Offer various residential zones though diversity could be further improved	+ Multifunctional areas facilitate integration of work, living, and leisure	+/– Efforts have been made to improve living environments, yet urban areas remain overcrowded
Territorial Spatial Master Planning of Shenzhen	+ Walkable neighbourhood;	+/– The efforts to increase affordable	++ Configure public service facilities	+/– Distribution of recreational spaces	+ Increase diverse building types,	+ Mixed–used development,	+ Emphasise high quality living spaces

	development of healthcare facilities	social housing are relatively great though high housing prices remain an issue	based on social life circle and equalise access to education	remains uneven	including high–rises, suburban areas, and mixed–use buildings	integrating residential and commercial spaces	
Land Administration Law	n.a.	+/– Rational planning of residential land partially supports housing supply	+/– Partially support balanced regional development	n.a.	n.a.	n.a.	n.a.
Urban and Rural Planning Law	+ Reasonable layout of public facilities; improve public transit	+/–	++ Promote coordinated development between urban and rural areas and inclusion across different regions	+ Rational division and preservation of public spaces	n.a.	+/– Enhance urban functionality to some extent	+ Coordinating urban and rural spatial layout to improve living environment
Guangdong Province Land Management Regulation	n.a.	+/– Allocate residential land reasonably	+ Promote coordinated development between urban and rural areas	+	n.a.	n.a.	+ Emphasise the protection and management of green spaces
Green Living Action Plan	++ Green lifestyles, eco–friendly community	n.a.	+/– Partially promote inclusive approach	+ Enhance access to urban greening	n.a.	n.a.	++ Promote low–carbon lifestyle, integrating the

	activities		to green living				concept of green development into community design
"Three Olds" Redevelopment	+ Enhance the environment by upgrading infrastructure	+/– Provide more housing options, yet increase housing prices	– Insufficient relocation compensation and gentrification might burden the low income	+ Public spaces are often included in redeveloped zones	+/– Varied building types are not applied in all redevelopment projects	++ Multifunctional spaces in redeveloped factory and village areas	++ Living conditions in redeveloped areas are improved
The GBA Development Plan	+ Enhance medical services	+/– Some houses are available, yet high demand increases cost	– Rising living costs for lower–income residents	+/– New parks are added but concentrate in business zone	+ A variety of districts	++ Highly concentrated mixed–use areas	– High costs and housing pressures
Pilot Free Trade Zone	+	+/–	–	+/–	+	++	–
Revitalisation Plan for Eastern, Western, and Northern Guangdong	+/– Partially reduce urban–rural healthcare disparities	n.a.	+ Reduce regional disparities and increase incomes for population in less developed regions	+/–	n.a.	+/– Efforts made to develop industrial parks and economic corridors	n.a.
Restoration of South China Historical Trail	+ Increase opportunities for	n.a.	+ Increase economic income in	++ Increase recreational spaces	n.a.	+/– Incorporate cultural tourism	+ Improve living conditions by

	outdoor activities; natural landscape		underdeveloped areas through tourism	along the historical trails		and commercial functions in only certain areas	restoring heritage and adding social spaces
Renovation of Urban Villages in Guangzhou	+ Increase public facilities	+/– Improve residential quality and involve social housing, yet housing prices remain high	– Certain residents, especially low–income residents might be excluded	+ Some projects incorporate public spaces, though size and accessibility vary across cases	+ Involve different building types	+ Mixed–use areas with residential and commercial spaces are common	+/– Satisfaction improves due to better environment, though rent increase might be an issue
OCT–Loft Project	+ Incorporate walking paths and green areas	– Rise in local property prices	+ Multicultural activities are accessible to the public	++ Extensive public and recreational spaces, such as art exhibition areas	++	++ Diversified functions, including creative, commercial, and leisure areas	+ Provide recreational and outdoor activity areas for local residents
Zhuhai Traffic Control Project	++ Walkable environment contributes to physical activity; less air pollution	n.a.	++ Public transit promotes travel equity across groups with different incomes	+ Improve recreational spaces along different pathways	n.a.	n.a.	++ Improve travel convenience and living environment
Haizhu Wetland Project	++ High quality natural space; encourage outdoor activities	n.a.	+ Accessible to the public	++ Extensive public green spaces and recreational facilities	n.a.	n.a.	++ Enhance environmental quality for local residents

6.4 Selecting Relevant Interventions from the ESPON SUPER Database

Through the comprehensive analysis of territorial and institutional context elaborated in the previous chapters, as well as the assessment of Guangdong's land use interventions in terms of sustainability, it is evident that Guangdong has made progress toward promoting sustainable land use, yet there are still improvements can be made. According to the objectives established in the Territorial Spatial Planning of Guangdong, a major priority for the province's territorial development is to achieve sustainable and resilient land use. In view of the overall objective and current challenges, Guangdong should put the emphases on:

- Promoting regional integration to promote economic growth and reduce economic, environmental, and social disparities between regions and between urban and rural areas;
- Increasing urban density as well as regenerating and reusing underused areas (such as old town districts, urban villages, abandoned industrial sites, etc.) to improve land use efficiency;
- Further advancing land use policies and initiatives to protect the ecological environment;
- Enhancing the attractiveness of agricultural land and preventing the farmland from being converted into construction land;
- Providing affordable houses to meet housing demands and improving public infrastructure to support social inclusion.

Based on these specific development needs, this section explores the experiences related to territorial governance and land use practices provided by the ESPON SUPER project from various European regions and selects 20 examples (shown in table 8). These examples could offer valuable insights and recommendations for fostering Guangdong's sustainable development through containment, densification, regeneration, governance, and spatial quality.

Considering the significant differences between China and Europe in social systems, territorial context, cultural value, and all other aspects, it is essential to not only systematically organise these insights but also critically evaluate their feasibility and potential outcomes when applying European experiences to Guangdong.

Furthermore, a long–term and effective policy transfer framework should be established, which should align with China's unique national conditions and development needs.

Table 8 – Selected relevant interventions

Source: Author's elaboration based on the SUPER intervention database

Type of instrument	Name	Country	Type of intervention
Visions and Strategies	Vision Rheintal of Vorarlberg	AT	Containment
	Stockholm Urban Containment Strategy	SE	Containment
	Tri–City metropolitan area planning	PL	Governance
	High urban density expansion in Amsterdam	NL	Densification and Regeneration
	Brownfield development target in the United Kingdom	UK	Regeneration
Legal Devices	Resolution on construction fee in Emilia Romagna Region	IT	Regeneration and Containment
	Revision of the Spatial Planning Law, Canton of Aargau	CH	Containment
	Vorarlberg Land Transfer Law	AT	Containment
	Law on protection of agricultural land Czech Republic	CZ	Containment
Land Use	Municipal Structural	IT	Containment

Regulations	Plan of the Union of Municipalities of Bassa Romagna		
	Territorial Action Plan of the Huerta de Valencia	ES	Containment
	Province of Utrecht	NL	Containment
	'Regionaler Leit–plan – Bezirk Mödling' (Regional Master Plan of 20 communities of Mödling)	AT	Containment
Programmes	Incentives to increase roof greening in Linz	AT	Regeneration
	22@Barcelona programme	ES	Regeneration
	Piano Periferia 1 and 2	IT	Regeneration
Projects	Dublin Docklands	IE	Regeneration and Densification
	South Harbour in Copenhagen	DK	Regeneration and Densification
	Eco–Viikki in Helsinki	FI	Spatial Quality
	Mini–Holland in Waltham Forest	UK	Spatial Quality

6.4.1 Visions and Strategies

In response to Guangdong's land development needs, several European visions and strategies can be referred to support sustainable regional integration across the province. The **Vision Rheintal of Vorarlberg (AT)** has successfully fostered an interconnected polycentric region by promoting cross–border cooperation and

creating interconnected living space. Another example is **Tri–City Metropolitan Area Planning (PL)** that harmonises the growth of Gdańsk, Gdynia, and Sopot through coordinated land use planning while preserving the unique identities of each city. Implementing similar strategies in Guangdong could facilitate connections across neighbouring cities and support densification along public transportation networks.

In terms of urban regeneration, strategies like **Stockholm Urban Containment Strategy (SE)** could be applied to promote compact, high–quality urban spaces that curb urban expansion while enhancing the sustainability of existing areas. This also provides experiences in strengthening public–private partnerships and reaching consensus between different stakeholders, while Guangdong is exploring strategies to balance the needs of multiple stakeholders in taking forward urban renewal projects. **High Urban Density Expansion in Amsterdam (NL)** is a relevant example promoting land use intensification and improving land use efficiency that serves Guangdong well in densely built environment. By adding building volume through measures like infilling and topping up existing structures, and transforming the existing urban sites, Amsterdam has been able to increase urban density while maintaining open spaces. Additionally, the **Brownfield Development Target in the United Kingdom (UK)** provides successful experiences in transforming brownfield sites, mainly through the construction of new housing and the improvement of mixed–use developments.

Table 9 – Selection of visions and strategies

Source: Author's elaboration based on the SUPER intervention database

Name	Country	Type of intervention	Main scope	Relevance
Vision Rheintal of Vorarlberg	AT	Containment	Promotes and supports the creation of an inter–connected polycentric region.	The collaborative planning model, which includes stakeholders from various sectors, could inspire Guangdong to adopt an integrated governance.

Stockholm Urban Containment Strategy	SE	Containment	Promotes brownfield development and environmental sustainability. Its eco–districts are considered as a best practice.	Contributes to economic and social competitiveness while preserving natural ecosystems and encourages cooperation between different stakeholders.
Tri–City metropolitan area planning	PL	Governance	Its objective is to have a complete, harmonious, and dynamic development of the of Tri–City metropolis.	This can offer insights to help Guangdong foster regional integration and sustainable development across neighbouring cities.
High urban density expansion in Amsterdam	NL	Densification and Regeneration	It aims to reduce soil consumption and enhance high density urban development.	Guangdong could benefit from similar intensive urban patterns to manage land use efficiently, reduce commute times, and minimise environmental impacts.
Brownfield development target in the United Kingdom	UK	Regeneration	The UK Government set a target that by 2008 at least 60% of all new housing should be built on brownfield land.	This could be beneficial in revitalising industrial and urban sites and thus address urban sprawl, especially in rapidly urbanising areas like the PRD.

6.4.2 Legal Devices

Most regions in China, including Guangdong province, have been experiencing a significant loss of agricultural land. Although the Land Administration Law emphasises the protection of farmland by restricting its conversion for other uses, there is lack of firm and detailed implementation standards and measures. Some agricultural land is being converted into forests or wetlands to support ecological construction projects or being left fallow by farmers because the economic appeal of agricultural land is relatively weak. The fee policy from the **Resolution on Construction Fee in Emilia Romagna Region (IT)**, which doubled charges for converting agricultural land and reduces fees by 35% to 100% for developing abandoned sites, could be considered as a specific measure for Guangdong to protect agricultural land and restrict construction land development.

Another example related to land transfer is the **Vorarlberg Land Transfer Law (AT)**, which regulates the transferability of agricultural land to ensure its continuity. **The Law on Protection of Agricultural Land in the Czech Republic (CZ)** categorised soil quality into five grades, allowing high–quality soil to be used for construction only when other public interests override the public interest in protecting fertile soil, thus avoiding the use of valuable agricultural land for construction.

Increasing construction density within existing urban areas can help curb urban sprawl, thus preventing the encroachment on farmland and natural environments. Similar measures are included in the **Revision of the Spatial Planning Law in the Canton of Aargau (CH)** to promote sustainable land use. Additionally, its success lies in the application of a new fiscal compensation tool, which requires landowners with development rights to pay a value–added tax to compensate those whose land has been deprived of development rights. By ensuring transparent information and adopting a long–term perspective, this initiative has increased public awareness, making it a valuable reference for sustainable land use in Guangdong.

Table 10 – Selection of legal devices

Source: Author's elaboration based on the SUPER intervention database

Name	Country	Type of intervention	Main scope	Relevance
Resolution on construction fee in Emilia Romagna Region	IT	Regeneration and Containment	The initiative doubling urbanisation fees for projects that convert agricultural land into built–up areas and decreases these fees by 35% to 100% for projects aiming to rehabilitate abandoned areas.	This detailed measure can help to reduce agricultural land consumption and facilitate urban regeneration.
Revision of the Spatial Planning Law, Canton of Aargau	CH	Containment	Its aim is to control urbanisation by promoting compact settlement development.	The specific measures and tools (i.e., new compensation mechanism) can be applied to contribute to sustainable land use at the regional level.
Vorarlberg Land Transfer Law	AT	Containment	Maintains the functional continuity of agricultural land. It does so by regulating the transferability of agricultural land.	This approach could add more specific implementation measures for Guangdong's farmland protection and transfer regulations.
Law on protection of agricultural land Czech Republic	CZ	Containment	It mandates that high quality soil can only be used for building only if other public interest prevails above the public interest.	Guangdong could adopt similar rules to limit farmland conversion and the compensation mechanisms.

6.4.3 Land Use Regulations

As previously mentioned, Guangdong's current land use practices face certain restrictions, including imbalances in regional and urban–rural development, homogenisation of land use regulations in some areas, and limitations in addressing multiple issues. These challenges often lead to wasted land resources and increased environmental burdens. At the same time, regional planning is also exploring various approaches to promote intercity collaboration. The SUPER database contains a number of relevant cases that can serve as references for the province's land use and regional development.

The Municipal Structural Plan of the Union of Municipalities of Bassa Romagna (IT) improved integrated spatial planning and addresses sustainable land use through intensive cooperation between municipalities that helped to achieve consensus among various interests. Similarly, **the Regional Master Plan of 20 communities of Mödling (AT)** also looked for collaboration between various municipalities through unified regional development framework, addressing multiple issues including economic growth, green areas protection, and sustainable transport.

The Territorial Action Plan of the Huerta de Valencia (ES) provides an example of limiting metropolitan expansion by designating protected agricultural zones, which can address similar pressures faced by metropolitan areas like the Pearl River Delta in Guangdong. Besides, improving the efficiency of the use of vacant sites can likewise alleviate the pressure on mega cities and limit expansion. **The Province of Utecht (NL)** deprived the development rights of designated unbuilt spaces and replaced with an enforced land use plan to improve land use efficiency.

Table 11 – Selection of land use regulations

Source: Author's elaboration based on the SUPER intervention database

Name	Country	Type of intervention	Main scope	Relevance
Municipal Structural Plan of the Union of Municipalities of Bassa	IT	Containment	It seeks to limit competition between municipalities for development by building a	Inter–municipal coordination could help Guangdong's cities work together on shared infrastructure and

Romagna			common strategy. Using a cooperative approach, 9 municipalities worked together to draft planning tools to better address sustainable land use.	transportation networks.
Territorial Action Plan of the Huerta de Valencia	ES	Containment	Reducing or limiting expansion of the metropolitan area by preserving agricultural land.	Applying such an urban–rural integration initiative in Guangdong could balance urban growth and agricultural land preservation.
Province of Utrecht	NL	Containment	It removes development rights for zoned urban land (primarily unbuilt office space) via an imposed land use plan.	Vacant commercial areas in mega cities like Guangzhou and Shenzhen could be repurposed or limited to improve land use efficiency.
'Regionaler Leit–plan – Bezirk Mödling' (Regional Master Plan of 20 communities of Mödling)	AT	Containment	A Regional Master Plan was prepared with the support of experts and local community representatives. It was based on: (1) controlling and steering growth (2) protecting, using, connecting and designing green areas and (3) sustainable transport.	This is a referable regional planning approach that addresses multiple issues across different municipalities, including urban growth, public services, and transportation.

6.4.4 Programmes

Several programmes in Europe have promoted sustainable and balanced land use practices, often through regeneration projects that focus on enhancing spatial quality and repurposing urban areas. For instance, the **22@Barcelona Programme (ES)** transformed 20 hectares of industrial land in Poblenou into a vibrant district, providing spaces for commercial and knowledge–based activities. This programme created a system that combining public and private initiatives that Guangdong could consider when addressing its own programmes of industrial transformations. Similarly, the **Piano Periferia 1 and 2 (IT)** prioritises the transformation of neglected spaces, such as abandoned and deprived areas, through investments in environmental, social, and economic sustainability.

In addition, **incentives to increase roof greening in Linz (AT)** have successfully enhanced environmental quality in built–up areas by promoting green infrastructure, which could be applied in Guangdong to encourage greening and mitigate air pollution in densely populated urban zones.

Table 12 – Selection of programmes

Source: Author's elaboration based on the SUPER intervention database

Name	Country	Type of intervention	Main scope	Relevance
Incentives to increase roof greening in Linz	AT	Regeneration	Incentives to increase greening in built–up areas to reduce air pollution.	Guangdong could adopt similar incentives to encourage green infrastructure development in densely populated urban areas.
22@Barcelona programme	ES	Regeneration	Rehabilitation 200 ha of industrial land into an urban district offering modern spaces for commercial and knowledge–based activities.	The redevelopment model and the public–private cooperation initiative can be applied to the process of transforming abandoned

				industrial areas in Guangdong.
Piano Periferia 1 and 2	IT	Regeneration	Aims to recover abandoned and deprived areas by investing in environmental, social, and economic sustainability.	Offers insights in improving housing quality in Guangdong while ensuring affordability.

6.4.5 Projects

The quality and means of implementation of successful projects can complement sustainable land use objectives (ESPON, 2020e), with different projects focusing on various aspects such as regeneration, densification, and spatial quality. These approaches can provide diverse perspectives and recommendations for advancing sustainable projects in Guangdong.

The Dublin Docklands (IE) is a project aiming to revitalise the vacant urban spaces impacted by industrial decline and shifting economic activities. Another valuable regeneration project is the **South Harbour in Copenhagen (DK)**, which converted extensive industrial areas into liveable public spaces, focusing not only on spatial redevelopment but also on enhancing social inclusion.

From an environmental perspective, **Eco–Viikki in Helsinki (FI)** offers a compelling case for improving living conditions while protecting the environments. This project integrates minimal environmental impact by limiting sealed surfaces and reducing energy consumption per household, making it a reference project for eco–friendly urban design.

Finally, the **Mini–Holland Initiative in Waltham Forest (UK)** demonstrates the potential of rethinking urban mobility through infrastructure adaptation. By connecting segregated cycle lanes and upgrading the transport networks, the project has successfully promoted non–motorised transportation and supported active travel, which could complement Guangdong's development of slow–moving transportation systems.

Table 13 – Selection of projects

Source: Author's elaboration based on the SUPER intervention database

Name	Country	Type of intervention	Main scope	Relevance
Dublin Docklands	IE	Regeneration and Densification	Aimed at reusing urban resources left vacant from the shifting dynamics of port facilities, deindustrialisation, and the emergence of a services–based economy.	Guangdong could adopt these measures to redevelop the vacant urban spaces into thriving public spaces that support community engagement and economic growth.
South Harbour in Copenhagen	DK	Regeneration and Densification	It has contributed to the conversion of hectares of industrial area into liveable public space.	This could inspire Guangdong's revitalisation of coastal industrial or low–density areas and engaging local communities to enhance social cohesion.
Eco–Viikki in Helsinki	FI	Spatial Quality	Sought to reduce the human footprint and promote an environmentally oriented approach	The way how new living standards are combined with minimal environmental impacts can be applied in Guangdong's sustainable development.
Mini–Holland in Waltham Forest	UK	Spatial Quality	It aims to connect the segregated cycle lanes on the model of Dutch–style infrastructure and enhance urban mobility.	Specific measures such as "Filtered Neighbourhood" can be applied to Guangdong's development of slow–moving system.

Chapter 7
RECOMMENDATIONS ON PROMOTING SUSTAINABLE URBANISATION

7.1 Introduction

The findings of the study on Guangdong indicate that the province's urbanisation and land use trends reflect the broader patterns of land use in China to some extent. Guangdong's urbanisation is characterised by significant regional disparities, and the current land use practices have incorporated sustainable strategies, which, however, remain relatively inefficient. Nevertheless, given the diverse contexts and development needs of various regions, this case study does not entirely represent the characteristics of Chinese urbanisation.

Therefore, this chapter provides more comprehensive recommendations for China's sustainable urbanisation across national, provincial, and local level, based on the findings of the case study as well as the overall situations in China. The development focus varies by level, with the national level setting the overall direction and framework, the provincial level taking over national policies and formulating objectives and strategies tailored to regional characteristics, and the local level translating national and provincial policies into implementable plans to address unique local challenges. By proposing recommendations at these three levels, it is possible to more comprehensively reflect the characteristics of land use in China, achieving effective coordination of policies formulation and implementation.

7.2 National Level

The policies, mechanisms, and objectives set by the national government serve as the guiding framework for sustainable development across the country. To further compliment this framework, recommendations are made based on the current state of land development in China.

1) Clarify national land use development objectives

There is no doubt that changes in institutional, social, and economic environments lead to evolving land use scenarios that represent certain life cycles (Adam, Prtzsch and Darr, 2015). To ensure coherence in urbanisation and land use policies, it is necessary to set future–oriented, nationwide, long–term goals as a development guide. Meanwhile, specific land use objectives should be established, focusing on short–term goals that align with spatial and temporal context,

characteristics of different regions, and the needs for regional integration.

2) Establish a comprehensive and unified land use implementation mechanism

While China is actively pursuing spatial planning and territorial governance, current land–use policies often focus on addressing specific issues. Therefore, a unified guiding framework should be established to consider these issues comprehensively. In addition, central and local government coordination should be strengthened to improve implementation of the spatial planning system, clearly define land management responsibilities across different levels of government and departments, ensure inter–departmental collaboration and transparency, and avoid inefficiencies arising from contradictions in the implementation of the different countermeasures taken by the various departments.

3) Enhance land resource management systems

After the unified framework is set up, further clarification of various land management systems is needed, including the detailed standards and implementation methods for land use regulation, land acquisition compensation, land circulation, and allocation. In particular, with regard to the protection of agricultural land, which continuously declines year by year and the issue of food security has begun to emerge, it is essential to improve land use efficiency, strengthen the procedures for approving the conversion of farmland into construction land, increase compensation standards for land acquisition, and guide sustainable land allocation.

4) Optimise urban forms and land use patterns

Accordingly, China's urban land expansion rate has far exceeded population growth (World Bank and Development Research Center of the State Council, 2014). To effectively limit urban expansion, China has set goals for intensive land use and farmland protection. To achieve this, the policymakers can consider integrating strategies from Europe's urban development practices, such as promoting high urban density and a multi–cantered urban development model, while adapting to China's specific conditions. Successful practices such as converting industrial land to commercial and residential use, imposing fees on newly developed areas, and implementing effective tax incentives and disincentives can be applied. These measures would address issues in urban regeneration projects such as the redevelopment of urban villages, where land acquisition processes are often rigid, progress is slow, and infrastructure is inadequate. All these approaches can help to

reduce the need for new area development.

5) Strengthen land use monitoring and evaluation mechanisms

Given the significant disparities in development levels and resource allocation across regions and cities in China, national–level authorities should set feasible goals and a unified monitoring and evaluation framework that includes qualitative and quantitative indicators. Local governments can then develop locally specific regulatory systems in accordance with their respective situations to ensure that local implementation is effective and consistent with the country's development goals. At the same time, the linkage between spatial data and policies should be strengthened so that monitoring data can be directly reflected in policy assessment and adjustment. To implement this measure, the technical capabilities and data management levels of all governments should be systematically enhanced, enabling them to better follow up and assess the progress.

6) Strengthen systematic ecological planning and green governance

In the process of urbanisation, China faces resource and environmental problems such as land resource scarcity, water pollution, high energy consumption and low efficiency, which significantly constrains the sustainability of urbanisation. Therefore, on the basis of strict adherence to existing major functional zoning and ecological protection red lines, it is also necessary to establish systematic and long–term ecological planning objectives and execution strategies at the early stages of the planning process. This includes comprehensive environmental impact assessments, which can be used to formulate strict ecological protection measures, preventing ecological planning processes from being simplified or becoming a formality. Moreover, strengthening the execution and transparency of ecological protection policies can prevent conflicts between certain development projects and ecological conservation efforts.

7) Promote urban–rural integration

An important strategy for promoting urban–rural integration is to optimise the layout of urban and rural land use and to improve property rights protection for agricultural land, as well as to comprehensively promote the modernisation of agriculture and rural areas, and to increase agricultural productivity and production income through mechanisation. In addition, China's current household registration system contributes to an urban–rural dual structure by separating urban and rural

residents into two social groups in terms of their identities, which is also a major obstacle to the integration of urban and rural development (Xinhua, 2013). Therefore, reforming the household registration system is essential to remove barriers created by this dual structure, easing the flow of rural labour into cities and among cities, and ensuring labourers are not limited in terms of income and access to public services. Providing equal opportunities for sharing urbanisation benefits would greatly enhance social inclusiveness.

7.3 Provincial Level

Provincial planning serves as an important transition between national planning and local implementation, which is responsible for setting provincial objectives and providing guidance and implementation plans for local governments based on the specific local context. The recommendations for this level primarily focus on how to enhance the effectiveness of land use planning, and further facilitate regional integration and intercity cooperation to promote collective development.

1) Establish development objectives based on provincial and local context

Given the significant differences in economic structures, industrial bases, and infrastructure development levels between different regions of China, as well as variations in land and natural resources, successful experiences and good practices may not necessarily be directly and effectively implemented in other areas. Therefore, provincial governments need to carefully consider local characteristics, refine national policies in alignment with local needs, and develop specific land use plans that establish clear, locally adapted objectives. For example, each region can develop tailored indicators in terms of economic growth, resource use, and environmental protection to promote sustainable development, while continuously adjusting these targets based on evaluation results.

2) Strengthen regional integration and intercity cooperation

According to the World Bank's overview, regional integration can help overcome barriers to the flow of goods, services, capital, and other aspects of the economy, which can otherwise limit economic growth particularly in developing countries. It also helps enhance market efficiency and share the costs of public goods or large infrastructure projects. China has already made considerable efforts to promote industrial collaboration and infrastructure connectivity between regions, such

as the Greater Bay Area plan to integrate Guangdong, Hong Kong, and Macau. However, at the national level, challenges remain in terms of balanced regional development, intra–regional industrial division, and resource allocation. To further strengthen regional integration, local governments can establish cooperative frameworks and quantitative targets through legislation or agreements. They should also promote intercity sharing of public resources and spatial data and provide financial subsidies and tax incentives based on local needs to ensure coordinated cross–regional development.

3) Strengthen provincial legal support for land resource management

Provincial governments can align the land management system with the principles of national land resource management while considering local development needs. This includes timely revisions of Land Administration Law, and formulation or improvement of local regulations tailored to the province's characteristics, which should define the management standards and procedures for different types of land, such as urban construction land, agricultural land, and ecological protection areas, ensuring the rational use of land resources. For example, the Guangdong Province Land Management Regulation can be adjusted to reflect the development characteristics of different areas within the province. In highly urbanised areas like the Pearl River Delta, the regulation should emphasise measures for increasing urban density and promoting compact land use, while in relatively less developed areas, the focus should be shifted to promote the sustainable land development and agricultural protection.

4) Optimise provincial development of land use patterns

To optimise spatial layout in provincial planning, measures should be designed based on local conditions to improve land use efficiency. In this case, provincial government can outline the overall objectives and strategies, guiding the local governments in effectively implementing projects such as promoting the compact development of urban centre areas, the regeneration of old urban districts, and the transformation of industrial land into commercial and residential spaces. For vacant or inefficiently used land within the province, tax incentives should be introduced to encourage land redevelopment, and market–based approaches should be used to enhance resource allocation efficiency. Furthermore, to promote urban–rural integration, provincial governments can optimize the spatial layout between urban and

rural areas, which includes rationally delineating urban–rural functional zones, supporting the coordinated development of urban–rural junction areas, and constructing more convenient transportation networks between urban and rural areas.

5) Promote comprehensive sustainable development

The previous analyses of land interventions show that China has achieved some success in promoting sustainability, particularly in economic sustainability. However, some interventions have yet to incorporate ecological and social sustainability indicators comprehensively. To achieve comprehensive sustainable development, provincial governments can widely apply sustainable development principles by adopting rational land planning and strict implementation of ecological protection policies to reduce waste of non–renewable resources such as land, water, and energy, and to address climate change. Additionally, provincial governments play an important role in improving residents' quality of life and social inclusiveness, so that factors such as the equity of public services, housing affordability, living conditions, and the accessibility of transport between urban and rural areas can be taken into account when arranging the general development plans for the regions.

7.4 Local Level

When formulating and implementing land use planning at the local level, it is essential to ensure alignment with national and provincial development objectives while establishing rational strategies that address local needs in accordance with local conditions. The following are recommendations to improve the effectiveness and efficiency of strategies and land use practices.

1) Enhance inter–departmental and intercity collaboration

To improve the effectiveness of local governments in formulating detailed planning and the efficient and rational implementation of provincial planning, it is useful to strengthen coordination and information sharing among various departments, especially considering that land use planning is a complex process involving multiple administrative authorities. There are multiple measures can be considered, including establishing a digital platform that is accessible to all departments, regularly updating progress reports, and holding inter–departmental meetings for sharing information. For large metropolitan areas and regional integration development, local governments

can also enhance cooperation with neighbouring cities to promote joint planning and implementation across cities.

2) Encourage effective public participation

Land use decision–making process involves multiple stakeholders, including governments at various levels, private organisations, as well as local residents who are directly affected. As summarised by Delgado–Matas et al. (2015), effective land management requires diverse approaches to harmonise different interests, with public participation being a significant way for resolving land use conflicts, and different types of land use conflicts must be addressed through different customary or legal systems. Thus, local governments should ensure information transparency in land planning projects, ensuring that citizens and communities have full participation and supervision in the planning and management process through public consultation and community meetings. The process of participation helps to build consensus among stakeholders, thereby fostering social harmony.

3) Enhance institutional and technical capacity of local governments

Localised data collection and monitoring systems should be established to track policy implementation in real time. Moreover, sustainable development goals should be translated into specific, quantifiable indicators to clearly define evaluation and execution standards for each government, with regular evaluations of these indicators to encourage local governments to fulfil policy commitments.

Chapter 8
CONCLUSION

8.1 Concluding Remarks

Rapid urbanisation has been taking place across the world, with increasing numbers of people living in cities and the built–up areas expanding both in scale and density, leading to worldwide issues such as urban poverty and environmental degradation (Zhang, 2016). In response to these challenges, sustainable urbanisation has become one of the important parts of sustainable development, which requires to incorporate sustainability components into urban development process, ensuring economic sustainability and social equity while reducing resource consumption and environmental impacts (Lu, Wu and Yan, 2015). Furthermore, related practices have emerged on the international stage, with the ESPON SUPER project being one of them. The SUPER project aims to provide policymakers and land use practitioners with a guide to promoting sustainable urbanisation and land use (ESPON, 2020a). To this end, it has established a conceptual framework and methodology for comprehensively analysing and evaluating urbanisation and land use dynamics that can improve the transferability of knowledge (Berisha et al., 2024), based on which it has also made efforts in providing contextualised recommendations for actual projects such as Lithuania (ESPON, 2020e).

In this context, this study takes Guangdong province as a case study and explores the sustainability of urbanisation and land use in China through applying the evidence and methodology of the ESPON SUPER project. The main research methodology involved a comprehensive investigation of China's territorial and institutional context, applying the SUPER project's framework to evaluate the land use interventions from Guangdong in terms of economic, ecological, and social sustainability. The results indicate that Guangdong's urbanisation process resembles the overall situation in China, characterised by rapid urban growth and significant regional imbalances. While current land use practices in Guangdong still prioritise economic growth, they have begun to incorporate sustainable strategies such as regional integration, urban renewal, and ecological preservation. However, the lack of efficient implementation measures continues to hinder the development progress, reflecting long-standing challenges in China's land use governance.

Additionally, this study examines the adaptability and relevance of land use practices from the ESPON SUPER project to the Chinese context, using Guangdong

as an example, and selects relevant interventions aligned with the country's long-term development needs. Key practices include enhancing urban density and revitalising underused urban sites to curb urban sprawl, protecting agricultural land through different incentive systems, and improving the living environment and urban mobility, etc. Based on China's unique territorial and institutional structures, the study also offers contextualised recommendations to promote the country's sustainable development, emphasising the importance of multi-level governance, which includes clarifying comprehensive sustainable objectives at the national and provincial levels and translating these objectives into implementable actions at the local level.

By providing an alternative perspective and methodology for studying urbanisation and land use, this research offers a connection between theories and practices, and a structured framework for examining sustainable urbanisation in China. Conceptually, the findings lay a foundation for future comparative studies to evaluate the adaptability of similar European frameworks in regions outside Europe facing comparable challenges. Practically, the recommendations proposed in this study can serve as references for the design and implementation of sustainable urbanisation policies across multiple governance levels. Furthermore, the study highlights that while international best practices can provide valuable insights, their success depends on adaptation to local conditions, reflecting the importance of detailed studies of local contexts and tailored solutions to address specific challenges.

8.2 Research Limitations

While this research has provided alternative insights in the sustainable and land use dynamics in China, several limitations remain that might hinder the validity and applicability of the research.

First, this study examines the dynamics of urbanisation and land use within a certain timeframe. However, urbanisation in China is a continuous process, and its long-term impacts remain uncertain, especially those of recently implemented policies, such as the Outline of National Territorial Spatial Planning with objectives extending to 2030. The lack of a longitudinal perspective limits the ability to assess the evolving impacts of land use strategies and interventions.

Second, while Guangdong serves as a valuable case study representing broader

land use trends in China, the study is limited by its focus on a single province. China's vast territory encompasses diverse economic, ecological, and social conditions, and the challenges faced by northern, central, or western regions may differ significantly from those in Guangdong. As a result, the findings may not fully reflect the variety of issues encountered across the country.

Third, this study mainly interviews experts from planning disciplines and relevant government departments, which narrows the range of perspectives. While their expertise provides valuable macro-level views on planning and land use practices, the limited involvement of professionals from other relevant disciplines, such as ecology, sociology, and economics, may result in an insufficient evaluation of sustainability indicators. Furthermore, the lack of engagement with local stakeholders, such as local communities directly affected by land use decisions, may restrict the understanding of how policies and interventions are perceived and experienced at the local level.

Last but not least, while this study extensively draws on insights from the ESPON SUPER project and applies European best practices to the Chinese context, it lacks a direct comparative analysis of urbanisation dynamics and land use indicators between Europe and China. Key quantitative metrics, such as economic scale and urban population density, were not systematically compared. Such comparisons could reveal critical similarities and differences, offering a more detailed understanding of the applicability and adaptability of European practices in the Chinese context.

8.3 Future Research Perspectives

Based on the limitations identified, this research suggests several future directions for further investigations to enhance the understanding and practice of sustainable urbanisation and land use in China.

1) A long–term perspective

The research should continuously track the long-term impacts of policy implementation, particularly in areas such as curbing urban sprawl, promoting regional integration, and advancing ecological preservation. By conducting analysis of long-term trends, future studies can gain deeper insights into the overall adaptability and effectiveness of land use policies and strategies.

2) Diverse case studies

To offer a more comprehensive understanding of China's land use dynamics and provide more tailored recommendations for sustainable urbanisation, future research could incorporate multiple case studies, each of which represents distinct conditions and requirements of other regions. For example, comparing the rapid urbanisation of eastern coastal regions with the slower development of western regions could help identify diverse challenges and tailored solutions.

3) Involving experts from different fields

Future research should put greater emphasis on interdisciplinary collaboration and stakeholder engagement, considering that urbanisation and land use are complex issues that intersect with various fields. Engaging experts from different disciplines can facilitate more detailed assessments of sustainability indicators, such as biodiversity, social equity, and economic resilience. Additionally, involving local stakeholders, such as residents and community leaders, would provide critical insights into the implementation of land use policies and strategies, offering valuable perspectives that enrich the research.

4) Facilitating comparative studies between Europe and China

The research should also include comparative studies between Europe and China, particularly regarding transferability and the applicability of best practices. Such comparative analyses could help identify key factors that influence the success or limitations of policy transfer, providing valuable lessons to strengthen sustainable urbanisation in both regions.

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