

## Article

# The Governance Path of Urban–Rural Integration in Changing Urban–Rural Relationships in the Metropolitan Area: A Case Study of Wuhan, China

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**Abstract:** Since the founding of the country, China’s urban–rural relations have experienced four stages: differentiation, opposition, coordination, and equivalence. The scope of rural research has expanded from individual villages to group relations, and the research content also tends to the urban–rural integration trend of factor flow. In the context of New Urbanization and the Rural Revitalization Strategies, urban–rural integration is an important starting point to solve urban–rural contradictions, and the metropolitan area is an important spatial carrier to achieving urban–rural integration. Based on investigating the key issues of urban–rural integration and metropolitan governance, this paper constructs a “place function” cognitive framework of urban–rural space in the metropolitan area, and takes Wuhan metropolitan area with its dense rural distribution as an example to recognize the urban–rural spatial characteristics of the metropolitan area scale from six dimensions: spatial structure, land use, settlement distribution, scenic spots, agricultural enterprises, and service facilities. Then, it proposes a spatial development model of the Wuhan metropolitan area of the “point axis structure-, functional area-, resilient network”, and further explores the urban–rural integration path of “planning guidance, policy promotion, and spatial support”.

**Keywords:** urban–rural integration; metropolitan area; space governance



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## 1. Introduction

With the development of urbanization and industrialization in the west, the development model based on urban–rural dualism has gradually become the mainstream. Several theoretical models, such as the concentric-zone model [1], the sector model [2], and the multiple-nuclei model [3] are widely used in developing countries as the path to urbanization development. However, with the continuous advancement of urbanization, the problems of marginalization, gentrification, and stratification are gradually emerging. Spatial geometric models with clear boundaries such as the central place theory can no longer fully explain the problems of urban and rural spatial social differentiation and isolation. It is worth mentioning that “local contextualities” are increasingly involved in influencing the urbanization process [4].

Especially in urban and rural peri-urbanized areas of large cities, the traditional planning paradigm cannot work against the context of peri-urbanization areas [5]. After American anthropologist George William Skinners performed an investigation in China, he proposed the concept of the urban–rural continuum to describe the borderless but economically and functionally connected areas between urban and rural areas [6,7]. Some scholars also view similarities with densely populated countries in South Asia [8] and Asian monsoon countries [9,10]. The urban–rural continuum is neither rural nor urban, but a mixed model without differentiated boundaries [11,12]. In view of this special phenomenon

in the urbanization process of developing countries, McGee coined it as Desakota. These areas are mainly distributed around metropolitan areas. Relying on major cities and interregional transportation networks, they mainly undertake agricultural production and some urban functions with a mixture of agriculture and manufacturing activities [13]. As the transition zone between urban and rural areas, capital, information, the population, and other flows in these areas are actively flowing, including regional transactions and transactions between big cities, they are part of the internal circulation of the country and an important part of regional participation in globalization [14].

With the development of regional theory and the requirements of New Urbanization, the research interests in urban–rural areas continue to increase, and the research field gradually expands to the regional level of urban–rural integration. On the one hand, the concept of urban–rural integration first appeared in the idea of a utopia, and then in classical theories, such as the Garden City and Organic Evacuation. The theory also paid attention to the development of urban–rural integration [15]. Theories such as human–land relationship theory, Planet Urbanization, and New Regionalism believe that the process of globalization and urbanization blurs the urban–rural boundary [16–21]. The village is no longer a concept opposed to urban areas. It is an equivalent part of the urban–rural regional system that is different from the urban function. The urban and rural areas together make a regional system that is composed of the interaction of humanities, the economy, resources, and the environment. The essence of urban–rural integration is the coordinated and integrated development of urban and rural areas based on free flow, fairness, and coordination. On the other hand, the metropolitan area is the advanced form of the regionalized development of big cities [22,23]. It is a regional platform to promote the free flow of urban and rural factors, to facilitate the equal exchange and rational allocation of public resources, and to build coordination and guarantee mechanisms [24].

Especially in East and Southeast Asian countries, the characteristics of urbanization are significantly different to those in the West. First, the urbanization of these countries is not a relationship of urban–rural dichotomy. Rather it is the integration of agricultural and non-agricultural activities with breaking the boundaries of administrative divisions. Second, the population growth in these areas is not driven by suburbanization, but by manufacturing and public transport. Third, the mixed and diverse types of land use are also different from the Western suburban model, which is mainly residential [13,25].

In Indonesia, China, Japan and other Asian regions, metropolitan areas have become a new urban spatial form of urbanization development. The metropolitan area is an integrated functional area in which a large city with comprehensive functions drives surrounding small and medium-sized cities, which in turn drive villages [26]. In this functional area, the two-way flow of high-quality public service resources such as education, medical care, social security and labor employment between urban and rural areas is conducive to the realization of urban and rural spatial governance. “Governance” is an institutional concept of power balance and redistribution between the government and the market. Spatial governance is to achieve effective, fair, and sustainable utilization of land space and relatively balanced development of various regions through multi-party participation in resource allocation. Spatial governance is considered as the adjustment and reconstruction of spatial planning, but its connotation is not limited to spatial planning, but also emphasizes the different roles of the government, market, society and the legal system in the management mechanism [27]. Since the 1980s, economic globalization and regional integration have triggered competition and cooperation between geographically adjacent cities [28]. The United States, Japan, South Korea, Germany, Britain, and other countries have explored targeted strategies for spatial governance in rural areas [29–31]. They solved the problems of urban–rural polarization through information and cultural exchange, infrastructure service sharing, economic integration, and political integration [32]. However, due to the uneven opportunities for rural areas to participate in decision-making in metropolitan governance, rural areas are still in a relatively weak and neglected position. Harrison and Heley [33] pointed out that the hierarchical system of economic nodes in

metropolitan areas weakens the status of rural areas, and the multi-level governance model of metropolitan areas from the perspective of regional priority needs to be further explored. Especially in Asian countries, the urbanization process will continue in the vast rural areas for a long time. The urban-prioritized urbanization strategy is less effective when dealing with rural development. More targeted urban–rural integration policies should be adopted to achieve the coordinated and integrated development of urban and rural areas in the metropolitan area.

China is one of the countries with the fastest urbanization process [34], and the urban–rural integration in China’s metropolitan areas has extensive discussion value. The relationship between urban and rural areas has experienced four stages: differentiation, opposition, coordination, and equivalence. For a long time, urban prioritized urbanization has widened the gap between urban and rural development and exacerbated the decline of rural areas [35]. Promoting the strategy of New Urbanization and Rural Revitalization and accelerating the coordinated development of urban and rural areas have become the practical demands of China’s high-quality development stage [36–38]. Urban–rural integration is the key to solving the imbalance and disharmony of urban and rural development in China at the present stage. It is an optimized method to promote the free flow of urban and rural factors, eliminate the obstacles of urban and rural development, and then realize the complementary and interactive functions of urban and rural areas, balanced spatial development, and the diversity and equality of society [39].

The U.S. Census Bureau first defined metropolitan areas in 1910, referring to single built-up areas composed of large central cities and their adjacent suburbs [40]. With the development of regional theory, the scope of the metropolitan area is expanding. The metropolitan area mentioned in this paper refers to the urban and rural regional system composed of large central cities, their neighboring small and medium-sized cities, and rural areas. Since the National Development and Reform Commission issued the *Guiding Opinions on the Cultivation and Development of Modern Metropolitan Areas* in 2019, Nanjing, Fuzhou and Chengdu metropolitan areas have successively received national replies, marking China’s New Urbanization entering a new development stage with metropolitan areas as the main body. Urban–rural integration is an important starting point of New Urbanization. The metropolitan area is an essential spatial carrier to achieving urban–rural integration. The development demands of urban–rural integration are highly consistent with the characteristics of the metropolitan area.

At present, many scholars such as Xie [41] and Sui [42] have conducted in-depth research on the urban–rural integration in the southeast coastal areas of China, but the research in the central and western regions is relatively scarce. The urban–rural integration of metropolitan areas in the central and western regions also has typical research significance. Therefore, this paper is based on investigating the changes in urban–rural relations in China, taking the Wuhan metropolitan area, where rural settlements are densely distributed, as an example. The paper investigates the regional urban–rural spatial characteristics of the placement space and function space, puts forward the spatial structure mode of urban–rural integration in the Wuhan metropolitan area and then explores the spatial governance path of urban–rural integration in the metropolitan area.

## 2. Evolution of Urban–Rural Relations and Regional Development Trends in China

### 2.1. Evolution of Urban–Rural Relations since the Founding of the People’s Republic of China

With the progress of institutional shifts, development of academic theories, and planning practice, the role of urban and rural areas in China has changed significantly and has experienced four development stages: differentiation, opposition, coordination, and equivalence (Table 1): (1) In the early days of the founding of the People’s Republic of China, under the background of the financial system on the verge of collapse, allocated urban and rural factor resources according to the plan and implemented the urban industrialization mode while sacrificing agriculture based on the theories of growth pole and central place. The primary task of this period was to transform China from a backward agricultural

country into a developed industrial country. Despite certain economic achievements, it has created an unbalanced urban–rural relationship of “giving priority to urban security and ensuring the minimum level of rural relief” [43]. (2) Since the Reform and Opening Up, with the introduction of the market mechanism and the implementation of the household contract responsibility system, the constraints of the planned economy on agriculture, farmers and rural areas have been gradually broken, and township enterprises have gradually developed and expanded. Farmers have realized the non-agricultural transfer of rural surplus labor by “leaving the land but not leaving the countryside, entering the factory but not entering the city” [44]. However, compared with township enterprises, cities and towns have greater demand and attraction. “Leaving the soil and leaving the hometown” has become a rapid development model of “promoting the city with the township”. The gap between urban and rural areas has widened rapidly [38,45]. The dualistic opposition between urban and rural areas is reflected to varying degrees in economy, society, culture, and other aspects. Rural areas are considered to be opposed to cities, backward and undeveloped areas [46]. (3) With the proposal of the New Urbanization strategy, there are some new ideas, such as urban–rural comprehensive planning, urban–rural public service equalization, agricultural modernization, and ecological civilization construction for urban–rural development. This facilitates “promoting agriculture with industry” and “leading the township with the city” to narrow the gap between urban and rural areas [47,48]. It has guided the construction of new rural areas, the improvement of rural human settlements, and the construction of beautiful villages. (4) The *Rural Revitalization Strategy* issued by the State Council in 2018 means that China has officially entered the integrated development stage of urban–rural equivalence. With the rise of the concept of “post rural” and the criticism of the concept of urban–rural development [49], an increasing number of scholars realize that the countryside has the same value as the city. The triple value, triple space, multiple functions, and multiple connotations of rural areas have been constantly explored and studied by scholars [50,51]. Especially in the background of the information age, mobile Internet and intelligence have subverted the traditional organizational form of spatial relations and reshaped the conceptual connotation of spatial accessibility. The “central flow theory” complements the traditional “central place theory”, shortens the space–time distance between urban and rural areas, and enables the development of the “spatial dispersion and factor flow” model, which conforms to the spatial characteristics of rural areas.

**Table 1.** Development stages, main measures, and theoretical support of urban–rural relations in China in 1949.

Development Stage	Iconic Policy Guidelines	Main Means and Measures	Representative Theory
Differentiation (1949–1977)	Planned economic system	The industrialization mode of sacrificing agriculture, allocating urban and rural factor resources according to the plan, implementing the construction investment mechanism that is biased towards cities, and establishing a welfare system with urban–rural differences	Central place theory [52]
Opposition (1978–2002)	The household contract responsibility system	The model of empowering farmers and promoting market-oriented reform, the rise of township enterprises “leaving the land but not the hometown”, the “scissors gap” of industrial and agricultural products, agricultural taxes, and fiscal transfer payments	Dual economic theory [53]

Table 1. Cont.

Development Stage	Iconic Policy Guidelines	Main Means and Measures	Representative Theory
Coordination (2003–2017)	New Urbanization	The equalization of urban and rural public services; the citizenization of migrant workers; the “low emission, low pollution, low energy consumption” of agriculture, industry, and modern service industry; the concentration of agriculture on large-scale operations; industrial concentration on parks; modern service industry is concentrated in urban centers at all levels	Man–land relationship theory [54]
Equivalence (2018–up to now)	Rural vitalization	Reshape urban–rural relations, implement urban–rural integration and development, consolidate and improve the basic rural management system, carry out common prosperity, deepen the structural reform of agricultural supply side, rejuvenate agriculture by quality, adhere to the harmonious coexistence between man and nature, implement rural culture prosperity, innovate the rural governance system, implement good rural governance, fight the battle of targeted poverty alleviation, and reduce poverty with Chinese characteristics	point axis theory [55] urban–rural integration theory [56,57]

Compiled and drawn using the references [42–56].

## 2.2. Development Trend of Urban–Rural Integration Guided by Factor Flow

The development of urban–rural integration has been recognized by academics. In practice, however, there are still several problems such as the poor circulation of elements and the obstruction of regional integrated planning. On the one hand, the rural characteristic advantages are not strong. Labor loss, insufficient land use quotas, and weak industrial linkage make it difficult to change the current situation of strong cities and weak villages. On the other hand, how to devise an effective transmission planning system is unclear. Township-level planning is diverse. Additionally, the village planning between regions lacks comprehensive planning. The urban–rural integration construction system has not yet been formed. Based on this, the *Strategic Plan for Revitalization of Rural Areas (2018–2022)* points out that Rural Revitalization should be promoted by classification according to the concepts of agglomeration and upgrading, integration into cities and towns, and characteristic protection, demolition, and mergers. Among them, integration into urban villages refers to urban–rural integrated villages, which are mainly distributed in semi-urbanized areas, retain the rural style in form, reflect the urban level in governance, interconnect infrastructure and co-construction and share public services [58]. Ma, Li, Yan, Chen, and other scholars have studied urban–rural integration strategies in semi-urbanized areas of large cities [59–62].

Urban and rural integration mainly focuses on the two-way flow of the population, land, and industry. In the urban–rural regional system, the three core elements of “population land industry” correspond to social space, material space, and economic space, respectively, which complement and restrict one another. The land is the material space carrier of urban and rural economic development. The sustainable and intensive utilization and optimal allocation of land resources are conducive to the extension of population nonagricultural majors and industrial chains; the industry is the core driving force of development, and a reasonable industrial layout and mode are conducive to the inflow of talents and the appreciation of land; the population is the main body of development. The outflow of rural surplus labor and the inflow of urban talents play a vital role in the

vitality of the countryside. Therefore, the development of urban–rural integration should be guided by the two-way flow of the core elements of “people, land and industry”, the scientifically and reasonable division of the urban–rural regional space, and the innovation of the system and mechanism through zoning and classification, to promote the spatial integration with planning integration, industrial integration with industrial restructuring, and urban–rural social integration with the co-construction and sharing of public services and infrastructure, to form an urban–rural regional system with the mutual intersection and penetration of towns and rural areas [63].

### 3. Cognition of Urban and Rural Spatial Characteristics in the Wuhan Metropolitan Area

#### 3.1. Spatial Cognitive Framework Based on “Place-Function” Feature

A metropolitan area is a geographical space concept with a clear spatial structure, complementary urban functions, an orderly flow of elements, coordinated industrial division, smooth traffic, balanced public services, and a harmonious and livable environment. Therefore, the metropolitan area is a regional space conducive to the integration of urban and rural areas. Population, land, and industry are the core elements of Rural Revitalization and development, and there is a mutual feeding relationship of promotion and coordination between them (Figure 1). The agricultural production space between cities in the metropolitan area is used to develop urban agriculture that serves urban consumer groups; activates the key elements of rural development, such as population and land; and promotes the non-agricultural transfer of the rural population and the transformation of land use mode [64]. In the context of the policy drive of the metropolitan area and the promotion of urban and rural demand, realizing the organic interaction of elements, structures, and functions between urban and rural areas will help to promote the integration of resources, capital, and assets, thus cultivating rural development momentum and solving the “three rural” problems [39].

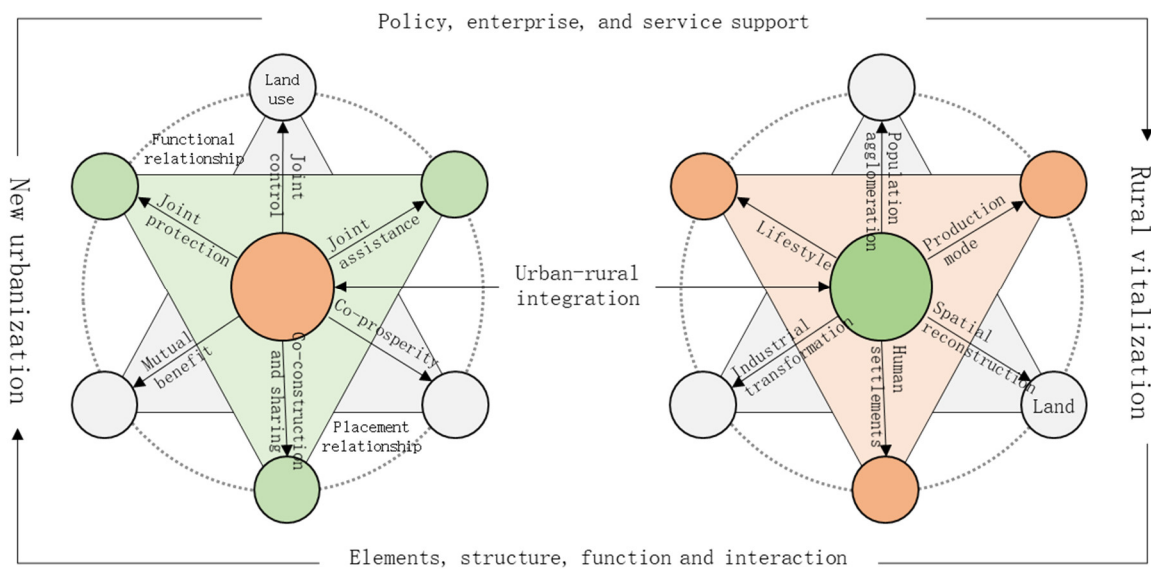


Figure 1. Schematic diagram of urban and rural elements in the metropolitan area.

Based on this, the urban–rural integration research of metropolitan areas can be recognized from two aspects: functional space and placement space. Placement space refers to the distribution space of urban and rural settlements, mostly in a point structure. Urban settlements have significant agglomeration characteristics, and there is a hierarchical relationship between cities; the spatial distribution of rural settlements tends to be characterized by a “large dispersion and small settlement”, and the relationship between settlements is flat. Functional space is the expression of the economic industry, ecological environment,

policy, and system in the material environment in the metropolitan area, which is reflected in the obvious boundary and difference between regions, and the continuity and hierarchy within the metropolitan area. By constructing an index system of the population, economy, infrastructure, resources, etc. [65,66], its main functions, leading types, and main uses can be separated [67], and then its internal functional relationship. Due to the difficulties in obtaining rural spatial data and the low accuracy, this paper selects three site spatial indicators of land use, spatial structure, and settlement distribution, and three functional spatial indicators of scenic spots, agricultural enterprises, and spatial structure to recognize the spatial characteristics of urban–rural integration in the Wuhan metropolitan area.

### 3.2. Case Selection, Data Sources, and Research Methods

On the basis of the “1 + 8” Wuhan city circle, the Wuhan metropolitan area comprehensively evaluates the commuting scope, urban population size, regional economic ties, urban spatial pattern, and other indicators of the “one-day life circle” by considering the regional and functional spatial connections, and then delimits the regional spatial scope through qualitative calibration, including the whole region of Wuhan and its 11 surrounding county and city (districts) units, with a total area of approximately 21,000 square kilometers, which is a good development condition in the central region; adjacent to the Dabie Mountains in the north, Mufu mountains in the south, and the Yangtze River and Han River in the east–west direction (Figure 2). At the same time, the Wuhan metropolitan area is also located in one of the four major areas where villages are concentrated throughout the country—the Hubei Henan Anhui junction area [68]; the regional connotation covers plains, hills, mountains, water networks, and other geographical types. Wuhan is an important transportation hub in China, with perfect public transport facilities and close links between villages and towns. The Wuhan metropolitan area has high-density village distribution, high-frequency urban–rural connection, and multi type village morphology. Therefore, it is a typical sample case for urban–rural integration research. Among them, the township level administrative region boundary, water system, and traffic vector data were obtained from the National Earth System Science Data Center (<http://www.geodata.cn>, accessed on 8 December 2021) The grid and POI data of the natural environment such as urban and rural construction land, cultivated land, and ecological land were obtained from the resource and environmental science data center of the Chinese Academy of Sciences (<http://www.resdc.cn>, accessed on 8 December 2021) The source of the statistical data is the *Statistical Yearbook of Hubei Province*, the *Statistical Yearbook of Wuhan* and the statistical yearbooks of counties and cities.

### 3.3. Placement Space: Point Axis Spatial Structure of Regional Differences

#### (1) Central radial urban spatial structure.

The “Point axis system” reflects the objective process and law of social and economic spatial organization and is also the most effective regional development mode [69]. The Wuhan metropolitan area is a typical single-center metropolitan area, with the main urban area of Wuhan and the three sub-cities of Linkong, Chedu, and Optics Valley as the core group. It is planned to form four urban development corridors, namely, Hanxiao, Wuxian, Wuxian, and Wuehuanghuang. At this stage, the urban development corridor of Wuehuanghuang has taken shape (Figure 3). However, the situation of “one city dominating, strong cadres and weak branches” in the Wuhan metropolitan area is difficult to break, and the support and driving energy levels of regional node cities are insufficient.



Figure 2. Map of Wuhan metropolitan area.

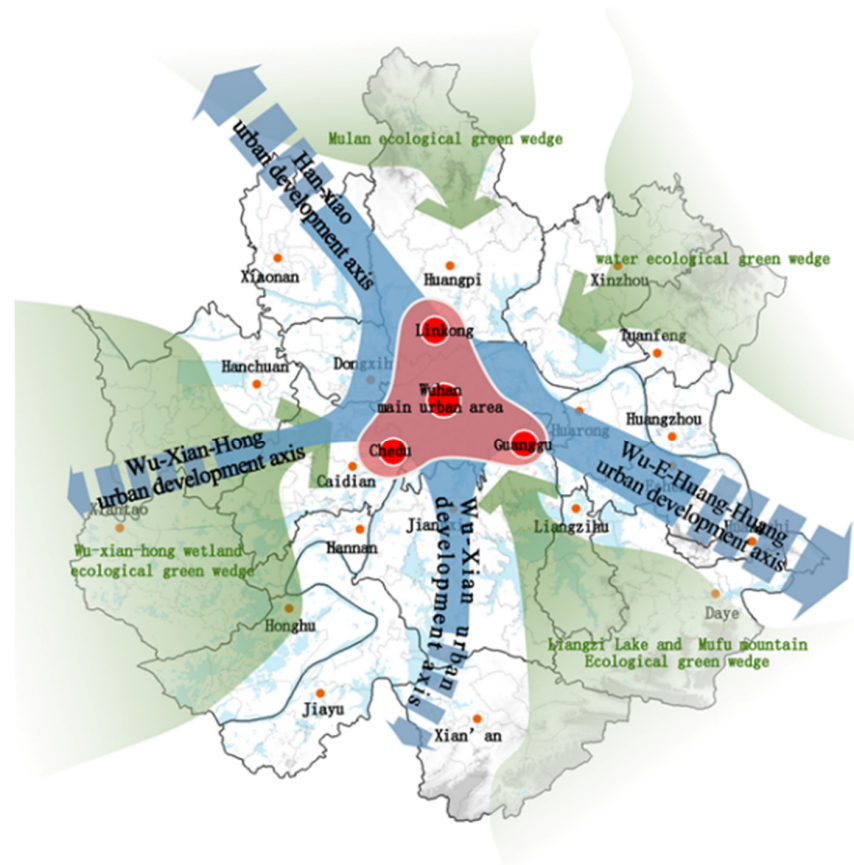
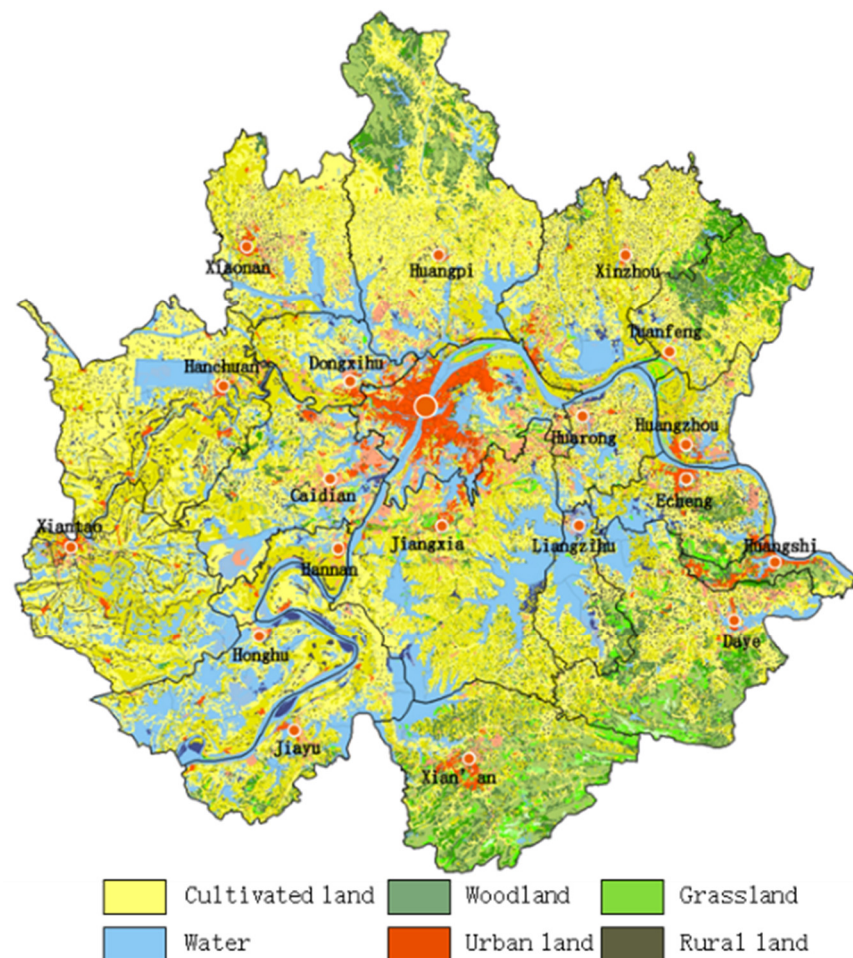


Figure 3. Spatial pattern of the Wuhan metropolitan area.



(2) Landscape pattern with dense water network.

The overall spatial pattern of the Wuhan metropolitan area is “one mountain, two rivers, and five fields”. The Wuhan metropolitan area is located in the hinterland of Jiangnan Plain, with good, cultivated land resources and with a cultivated land area of approximately 11,000 square kilometers, accounting for 53.9%. The forest land covers an area of 25,000 square kilometers, mainly distributed in Huangpi District, Tuanfeng County, Xian’an district, and Daye City, including Mulan mountain, Dabie Mountain, and Mufu Mountain, respectively. The water network is densely covered with lakes, covering an area of 3900 square kilometers, mainly distributed in the Yangtze River, Hanjiang River, Honghu Lake, Liangzi Lake, etc. (Figure 4). Strictly adhering to the ecological red line and the permanent basic farmland red line within the metropolitan area is the bottom line to ensure the sustainable development and regional resilience of the Wuhan metropolitan area.



**Figure 4.** Current situation of land use in the Wuhan metropolitan area.

(3) Distribution of rural settlements with regional differences.

Rural settlements are mainly scattered in the northeast, east, and west of the metropolitan area, showing obvious regional differences. In terms of the number of settlement patches, a ring-shaped dense settlement distribution area is formed in the north and east of the main urban area of Wuhan, including three high-value distribution areas in Xiaonan District, Xinzhou District, and Huarong District. In terms of the settlement patch area, with Xiaonan District and Xian’an District as the boundaries, the east is the low-value agglomeration area of the settlement patch area, and the west is the high-value agglomeration area. Combined with the topographic characteristics of the metropolitan area, it can be considered that the settlements in the northern hilly areas have a mostly small-scale and

high-density distribution, and the Jiangnan Plain in the southwest has a large-scale and low-density distribution (Figures 5 and 6).

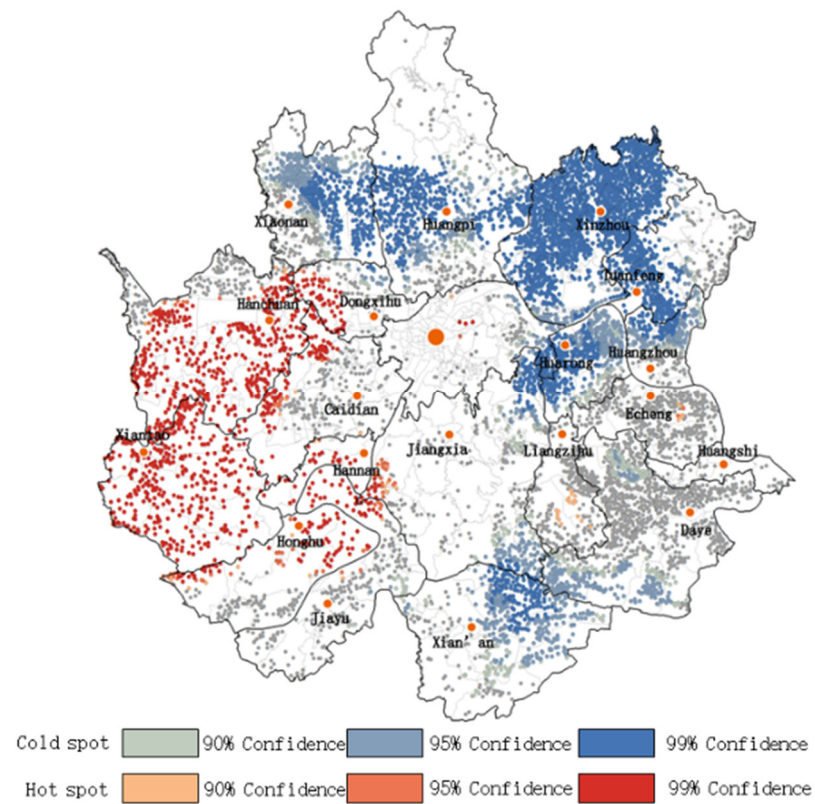


Figure 5. Analysis of the scale of rural settlements in the Wuhan metropolitan area.

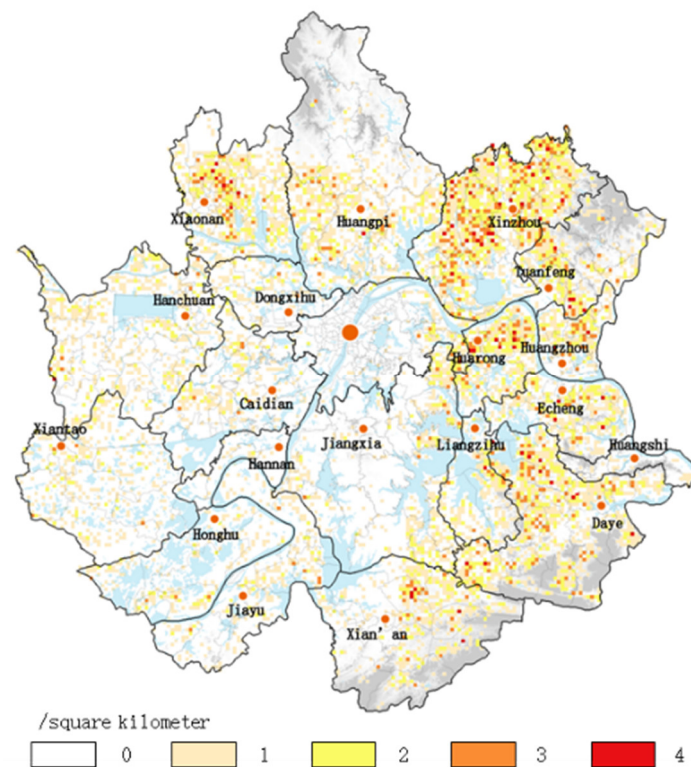


Figure 6. Analysis of rural settlement density in the Wuhan metropolitan area.

At present, against the background of rural population outflow, the characteristics of rural settlement dispersion make it difficult to form a scale effect. At the same time, scattered settlements have fragmented cultivated land and hinder the process of agricultural modernization and mechanization. There are great differences in the spatial distribution characteristics of settlements and agricultural production modes between northern mountainous and hilly areas, southwestern plain areas, and suburban areas. Therefore, it is urgent to explore the spatial development mode of regional differentiation.

#### 3.4. Functional Space: Layout of Service Facilities around Towns

##### (1) Agricultural model dominated by small farms.

The agriculture, forestry, animal husbandry, and fishery industries in the Wuhan metropolitan area are vegetables, fruits, breeding, flower nursery bases, farms, tea farms, forest farms, etc., with a total of 879 POI point data. Most of them are small farms such as family farms, private breeding farms, and professional cooperatives, which are mainly distributed in Huangzhou District, Echeng District, and Daye City (Figure 7a). Affected by geographic environmental factors, Wuhan, Huanggang, and Xianning have comparative advantages in agriculture. The forest farms are mainly distributed in Huanggang, Xianning, and other places. In terms of fisheries, Ezhou, Xiantao, Wuhan, and Honghu are densely covered with lakes and rivers, which have natural geographical advantages. In terms of animal husbandry, there is no more prominent area in the metropolitan area. On the whole, the primary industry in the Wuhan metropolitan area has certain characteristics and advantages, but the regional division of labor is not clear, and the differentiation characteristics are not obvious. Most small farms in villages are the main businesses, and the scale effect has not yet formed.

##### (2) Tourism resources with both human and nature.

The Wuhan metropolitan area is rich in tourism resources, with a total of 1218 scenic spots according to the POI data, including 13 national scenic spots and 9 provincial scenic spots. These include Mulan Mountain, Tuancheng Mountain, Daoguan River, and other natural landscapes, which are distributed in Huangpi District, Yicheng District, Huangzhou District, Tieshan District, and other places (Figure 7b). Cultural landscapes are mostly red culture memorial halls, religious sites, historical sites, etc., which are concentrated in Huangzhou District, urban Hubei, Tieshan District, Daye City, and other places. Wuhan, Ezhou, and Huanggang have outstanding tourism resources and are regions with strong tourism development paths in the metropolitan area. However, at this stage, the mode of the node city population in the metropolitan area converging to Wuhan in one direction is significant, and the agricultural tourism development path with regional characteristics still needs to be strengthened.

##### (3) Layout of service facilities around the city.

The New Urbanization public service facilities and infrastructure are allocated equally. According to rural daily lifestyle and needs, medical and health facilities and primary school and kindergarten education facilities were selected for analysis (Figure 7c,d). The results show that the public service facilities in Wuhan metropolitan area have not yet reached the level of equalization. Clinics, specialized hospitals, general hospitals, primary schools, kindergartens, and other service facilities are mainly distributed in cities and towns, especially in central urban areas such as Xiaonan District, Huangzhou District, Huangshi City, and Xian'an District, forming high-density points. However, the layout of rural areas is lacking, and the integration of urban and rural service facilities requires attention and improvement.

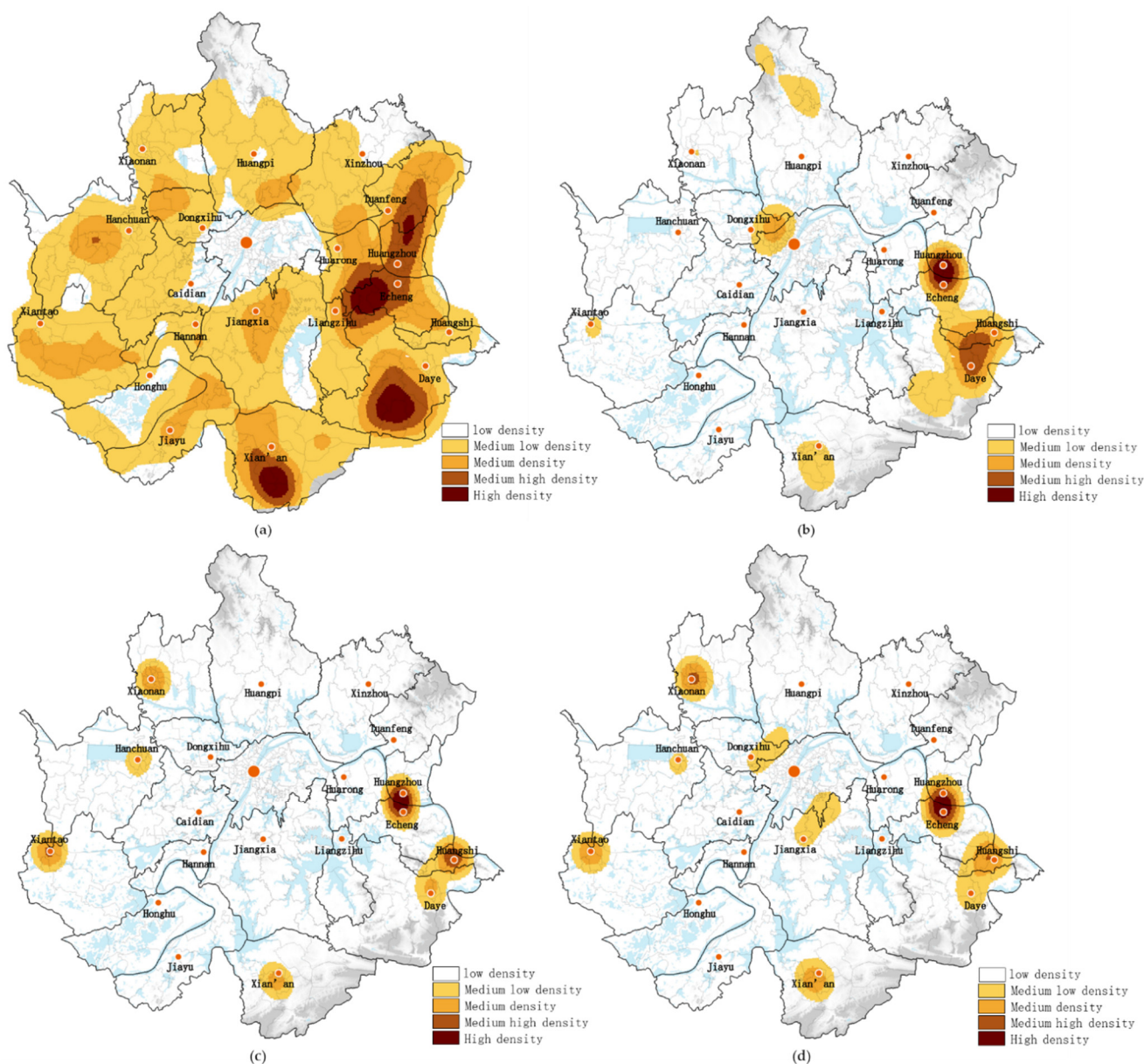


Figure 7. Nuclear density analysis of agricultural enterprises (a), scenic spots (b), medical facilities (c), and educational facilities (d) in the Wuhan metropolitan area.

#### 4. Construct the Spatial Model of the “Point Axis Structure Functional Area Resilience Network” in Wuhan Metropolitan Area

The OECD has put forward some valuable suggestions and put them into practice in the sustainable development model of rural areas. As early as 2006, in the face of the decline of the traditional agricultural production mode and the rise of rural tourism, the OECD put forward the policy guidelines for comprehensive and balanced development [70]. The policy points out that the ecological environment, community vitality, and industrial diversification require more attention. At the 10th OECD Conference on “rural policy and national prosperity” in 2015, villages had become effective rural policies through partner driven development mechanisms [71,72]. In short, the goal of rural sustainable development is to improve residents’ quality of life by promoting income equalization [73]. In order to achieve this goal, various countries have adopted complementary policies and comprehensive investments. Encouraging the participation of multiple stakeholders, such as LEADER action, and implementing local strategies from bottom to top [74].

At present, there is no unified standard for urban–rural integration at the level of metropolitan areas, and there are also problems of urban bias in practice. It is urgent to improve the theoretical basis and refer to practical cases. At this stage, the urban–rural integration in metropolitan areas mainly faces three problems: the failure of spatial planning, the fuzzy division of regional functions, and the limited potential of rural domestic demand.

First, the development planning of metropolitan areas focuses on the guidance of systems and policy, but the spatial guidance is not strong. On the one hand, the spatial planning of the metropolitan area at the regional level is not perfect. The traditional urban system planning only involves the scale and nature of urban settlements and lacks the spatial coordination of urban–rural integration at the regional level. On the other hand, the overall land spatial planning at the county level has not been approved yet, and the overall land spatial planning at the township level has various forms, is not well connected with the regional scale strategy, and lacks clear upper level planning guidance.

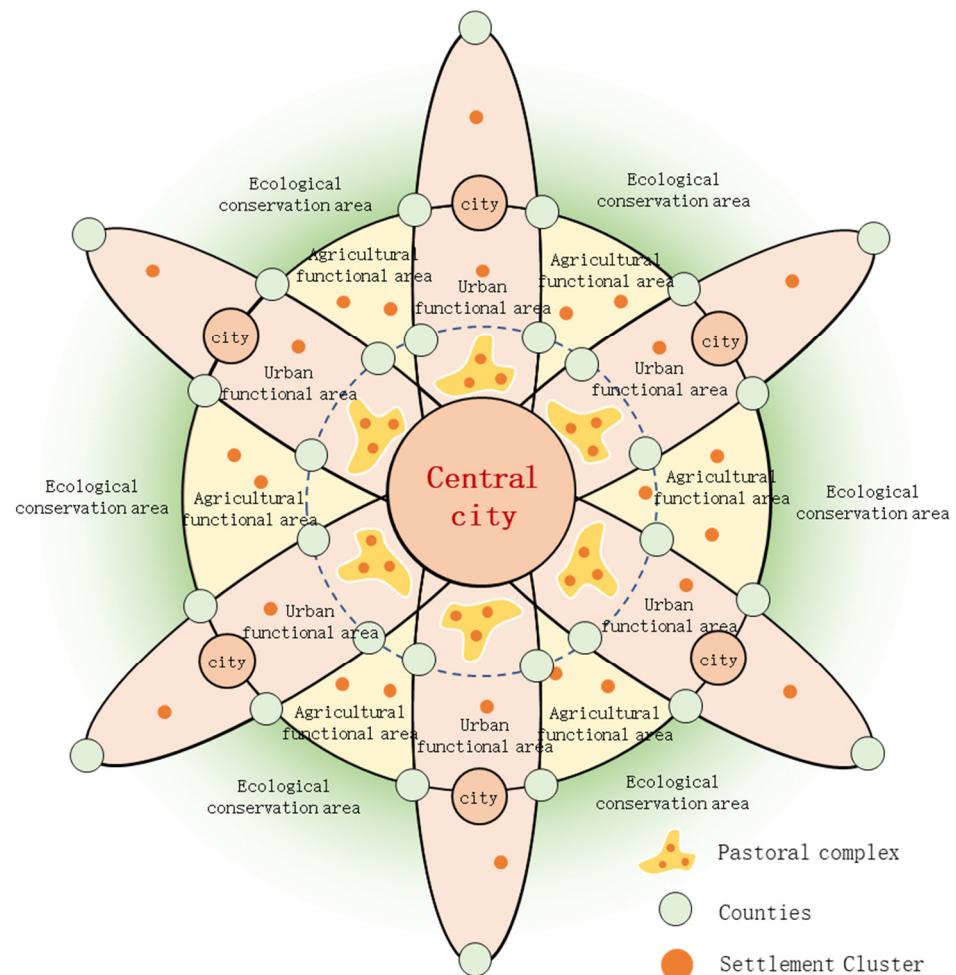
Second, the traditional concept of urban–rural integration refers to the process of rural urbanization in suburban areas, which is more like the extension and expansion of urban space. The urban function replaces the rural function, and the continuity, difference, and hierarchy of the geographical units within the region have not been reflected. At the same time, the disorderly expansion of cities has caused the homogeneity of regional industries, low level of division of labor, large gradient difference between urban and rural industries, and the siphoning effect of cities on rural areas is far greater than the radiation drive, further intensifying the one-way flow of urban and rural factors.

Third, in the process of urban biased urbanization, the traditional rural population is lost, the land is idle, and the industry is single, which leads to small market volume, shrinking economic activities, being disconnected from urban development, and a low energy level of infrastructure and public service facilities. The potential of rural domestic demand is very limited. Even if Characteristic Towns and industrial projects are planned, it is difficult to attract people and logistics into the countryside. The integration of urban and rural areas in the metropolitan area also needs policy support tailored to local conditions.

#### *4.1. Central Radial Point Axis Spatial Structure*

The Wuhan metropolitan area is a typical single-center metropolitan area, and the urban space has initially formed the central radial urban space characteristics (Figure 8). According to the objective settlement development law and the “point axis” theory, the urban and rural spatial form of the Wuhan metropolitan area should form a hierarchical urban spatial structure radially around the center of Wuhan, and a flat rural settlement system locally gathered around node cities and functional areas. In terms of the spatial layout of urban and rural areas in the metropolitan area, we should fully understand the hierarchical attributes of the regional system and divide the regional functions of the metropolitan area into township units according to the hierarchical scale and development potential, bearing potential, functional suitability, regional connection, and evolution pattern. Additionally, village functional groups should be divided according to the spatial evolution law and distribution characteristics of township settlements, in order to form a regional functional connection and spatial organization system of “main function zoning–dominant type classification–main use classification” from county to town and then to the village so as to realize the regional spatial structure of “axis (multi city)–area (multi County collaboration)–node (multi Town joint)–cluster (multi village aggregation)”. At the same time, the organization of multi-level government collaborative governance can organize the preparation of spatial planning according to the functional zoning, break the boundaries of administrative divisions, and converge rural settlements to cities and towns or nearby villages, forming a central village community or agglomeration group with a certain scale. The integration of rural construction land can free up all farmland, on the one hand, which is convenient for the realization of agricultural modernization and mechanization. On the other hand, it is conducive to effectively using the service radius of public facilities and infrastructure, and then forming a rural life circle accessible on foot

or via non-motorized vehicles around multiple node towns, as well as building a land and space master planning system of the “metropolitan area–city and county level–district level (multi County collaboration)–node level (multi town integration)”, and combing the classification of clusters (multi village aggregation) to jointly implement village planning.



**Figure 8.** Spatial structure pattern of Wuhan metropolitan area.

#### 4.2. Regional Functional Zoning with Heterogeneity and Complementarity

The metropolitan area is a complex urban–rural regional system. It is necessary to fully understand the evolution stages, regional differences, and functional mechanism characteristics of urban and rural areas in the metropolitan area, and identify the functional divisions of cities, towns, agriculture, and ecology. On this basis: First, this can be carried out by taking the planned functional area as a unit; through the multi-dimensional coordination between urban and rural areas; by taking into account the coordination of agricultural production and the ecological environment; by promoting agricultural modernization, industrialization, intensification and scale; and by realizing the diversified and integrated development of industries in metropolitan areas. According to the characteristics of rural leading industries and land types, rural construction should be combined with ecological protection, agricultural production, and tourism development, and regional differentiated functional areas that break the boundaries of administrative divisions, including rural communities, functional towns, pastoral complexes, and country parks, should be divided. Second, the optimization and improvement of agricultural land and rural construction land should be achieved through land regulation, so as to increase the effective cultivated land area of agricultural land, improve the quality of cultivated land, and improve the conditions of agricultural production. It is necessary to optimize the layout of rural construction

land, promote the spatial agglomeration of rural settlements, and accelerate the equal development of public service facilities and municipal infrastructure [36]. Third, in the policy construction of zoning and classification systems, in terms of land, it is necessary to explore collective land in the market and cross-district construction land transfer schemes, implement the urbanization of the rural population, and the teaching of urban talents in villages, make use of the advantages of colleges and universities in central cities, establish a mechanism for in-depth cooperation between villages and colleges, and promote the practice and employment of talents in villages. In terms of industry, we take common prosperity as the program and carry out the action of “Prospering ten thousand villages with ten thousand enterprises”. This educates, guides, and helps enterprises to establish cooperative relationships with farmers, and build a long-term mechanism for the win-win cooperation between villages and enterprises. Enterprises with good cooperative operations should be encouraged to expand their scale, and enterprises with large-scale operations should be encouraged to help villages grow towards the integration of primary, secondary, and tertiary industries. Finally, with spatial planning as the guiding principle, the regional coordination organization will coordinate the implementation of regional construction projects to achieve the implementation of planning and policies.

#### *4.3. Multi-Dimensional Settlement Resilient Network*

The agricultural space in rural areas provides the metropolitan area with fruits, vegetables, grains, and other necessities of life. The ecological space provides a good ecological environment for the metropolitan area and ensures the resilience and elasticity of the regional space during sudden disasters. It is the bottom line and red line of the metropolitan area. First, food security and ecological security should be ensured in rural areas of the metropolitan area. The supply of food and important agricultural products, the protection of ecological barriers and ecological products, and the inheritance of national traditional culture are the main functions of rural heterogeneity from cities. Cities and villages are communities with different functions and interdependence. Rural resilience is an important part of regional resilience. Rural resilience is dealing with the continuous and sudden normalization of risks from inside and outside, using its system network system to resist, absorb, and mitigate disasters and interference; and finally achieving a new balance. Second, a multi-dimensional resilience network of regions, nodes, communities, and families must be ensured. To achieve an orderly coordinated division of labor between urban and rural areas, smooth cross-regional cooperation, efficient factor circulation, and an open and active network must be implemented, reflecting the hierarchy, matching, transmission, and agglomeration of regional wayward networks [75]. Third, a normalized coordination mechanism must be built for regional governance. Metropolitan governance emphasizes that multiple subjects have an equal voice and decision-making power under the premise of equal consultation. Central cities and peripheral cities are at different stages of development, and the development demands of different functional areas are also different. Therefore, the primary task is to establish a normalized coordination organization of the government at the same level, organize a professional research advisory team, and clarify the appeal list of functional areas.

## **5. Conclusions**

China’s metropolitan areas have a high degree of infrastructure construction, and the population, goods, and information are characterized by strong mobility. In addition to geopolitical needs, the objective needs of urban and rural population mobility are a major feature of urban and rural governance in China’s metropolitan areas that is different from other countries. At the same time, the villager autonomy system in China’s rural areas has existed for a long time. The villager autonomy from the bottom-up and the government governance from the top-down are the unique characteristics of China’s urban and rural governance. There are 22 metropolitan areas (Urban Agglomerations) in China [38], most of which are immature metropolitan areas. Wuhan is located in the central part of China

and is an important transportation hub. At the same time, it is located in the hinterland of Jiangnan Plain. The villages are widely distributed, and it has advantages in urban and rural governance of the metropolitan area. Moreover, Wuhan metropolitan area is in the development stage. Compared with Beijing Tianjin Hebei metropolitan area, Yangtze River Delta metropolitan area, Pearl River Delta metropolitan area, and other relatively mature metropolitan areas, Wuhan metropolitan area can provide demonstration and reference value for many development-oriented metropolitan areas in China.

### *5.1. Urban–Rural Equivalent and Integration Development Is an Important Part of Regional Integration Development*

Since the founding of new China, urban–rural relations have experienced four stages of evolution: differentiation, opposition, coordination, and equivalence. After years of exploration and practice, urban–rural integration development has become the consensus of Rural Revitalization and development, and equivalence and integration have also become an important part of urban–rural development in China. However, problems still exist, such as the one-way flow of labor, land, capital, and other factors caused by rapid urbanization; the loss of rural labor population; the insufficient indicators of construction land; and the weak degree of industrial linkage. The metropolitan area is a geographical space concept with a clear spatial structure, complementary urban functions, an orderly flow of elements, coordinated industrial division, smooth traffic, balanced public services, and a harmonious and livable environment. The metropolitan area constitutes an important stage of the regionalization development of big cities, which is conducive to promoting the free flow of urban and rural elements, equal the exchange and rational allocation of public resources, and building an urban–rural system with integrated functions and spatial integration. The metropolitan area is one of the key practice areas of urban–rural integration. The strong role of big cities in rural areas can provide new paradigms and ideas for Rural Revitalization in the new era.

### *5.2. Global Coverage, Zoning Guidance, and Collaborative Governance Are the Main Ideas for the Spatial Governance of Metropolitan Areas*

The metropolitan area planning is a development plan for the whole region and provides full element coverage. Urban–rural integration focuses on solving the conflicts of physical regional space development, the optimization and reorganization of the urban–rural structure, the guidance of functional development, the docking of infrastructure, the control of the bottom line of the whole region, and the collaborative development and protection of critical space. The development planning of the metropolitan area governs the territorial spatial planning and special planning at all levels in the whole region, realizes the multi-level goal of “axis area node cluster” development, guides the spatial development of different functional areas according to the main function of the development, and organizes multi-level government collaborative governance to connect the territorial spatial planning at all levels in all regions, so as to achieve the integration and connection of the planning system.

### *5.3. The Urban–Rural Integration of the Wuhan Metropolitan Area Adopts the Mode of “Zoning Planning—Normalized Governance”*

First, a zoning planning system must be built that goes beyond administrative divisions, take functional divisions as the main body, and establish an organizational structure of multi center collaborative governance to effectively solve the problem of cross regional development fragmentation. There are 307 functional groups in the Wuhan metropolitan area. Among them, there are 182 urban spaces, with an average size of 20–50 square kilometers, 74 ecological spaces, and 51 agricultural spaces. Second, a “normalized” space coordination mechanism and policy list must be built. A list of major projects should be proposed to ensure the policy guidance and implementation of the spatial planning of the urban region. It is important to establish a normalized coordination mechanism of the “one institution, one team, one system” for the integration of the metropolitan area planning



and construction, a Wuhan metropolitan area planning alliance and planning system. At the same time, taking advantage of the advantages of colleges and universities in Wuhan, we should establish a mechanism of in-depth cooperation between villages and colleges and universities to promote the practice and employment of talent in villages. We must implement a long-term mechanism of school enterprise cooperation and village enterprise cooperation; encourage enterprises with good cooperative operations to expand their scale; and guide enterprises with large-scale operations to help villages develop towards the integration of primary, secondary, and tertiary industries.

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