Practical Village Planning Strategy of Different Types of Villages—A Case Study of 38 Villages in Shapingba District, Chongqing

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Abstract: Practical village planning is not only an important guide for implementing the rural revitalization strategy but also an important support for building a sustainable rural development model. The scientific measurement of rural development potential to effectively identify the future development direction and mode of rural areas is of great significance to realize the implementation of "hierarchical and key points" of village planning. Taking 38 villages in Shapingba District of Chongqing as the study area, this study comprehensively measures the rural development potential from four dimensions: location advantage, resource endowment, economic vitality, and development constraint. Results reveal the following: (1) the spatial distribution pattern of rural development potential in the study area is centered on the central and southern urban development area, gradually decreasing toward the peripheral area. The village development potential tends to be balanced overall, but differences are observed in advantage and development obstacles of villages in the district, and the four sub-dimensions show a large spatial heterogeneity;(2) the 38 administrative villages were divided into four types, namely, core planning area, important planning area, general planning area, and basic control area. Their percentages were 13.16%, 52.63%, 23.68%, and 10.53%, respectively; (3) differentiated planning contents and strategies for different types of areas are adopted to prepare well-detailed and clearly focused village plans to promote sustainable rural development.

Keywords: rural areas; village planning; potential assessment; village classification; planning strategy

1. Introduction

As a traditional agricultural country, China still has approximately 600,000 administrative villages, which bear the development and change of agricultural production, rural life, rural landscape, and local culture [1]. Village planning is an important guarantee to guide rural development and construction, which is separated from village construction. The earliest village construction can be traced back to the rural reconstruction movement in the early 20th century when the concept of village planning was not clearly proposed [2]. Village planning was put on the agenda not until the reform and opening up and then gradually standardized. In 2008, the Urban–Rural Planning Law was promulgated. This law elevated the legal norms of rural planning to the level of the "basic law" of the country, established the legal status of the village planning system, and clarified its planning content, mainly including the village construction planning and the overall planning of village land use [3]. The former focused on the specific arrangement of village construction land layout, whereas the latter focused on land use control [4]. Although the contents of the two types of planning were related, they were different and were managed by different departments. Coordination between departments is lacking, making it difficult for traditional village planning to play a practical role by ignoring the different needs of

different villages and adopting a "one-size-fits-all" planning approach in the planning process [5]. To strengthen the leading guidance role of village planning and to promote its implementation, in May 2019, the Ministry of Natural Resources issued the "Notice on Strengthening Village Planning for Rural Revitalization," which explicitly proposed to focus on the preparation of practical village planning with multiple rules and regulations. In this issue, village planning is required to tailor to local conditions, not be greedy for large and comprehensive, and promote the preparation of classification. Practical village planning is the detailed planning outside the boundaries for urban development. Moreover, practical village planning is the legal basis for carrying out national land use development and protection activities, implementing land space use control, issuing planning permits for urban and rural construction projects, and carrying out various constructions in the rural area. This planning has become an important public policy tool for guiding and regulating village construction and governance and an important regulatory tool for achieving sustainable rural development [6]. Under the background of establishing the territorial spatial planning system, village planning is not only a pioneering and basic work for implementing the rural revitalization strategy but also the most basic and microscopic planning unit for implementing the control of all elements of territorial spatial planning in rural areas [7].

Under the guidance of the rural revitalization strategy, the trickle-down effect of industry-feeding agriculture is gradually formed, which brings new development opportunities to the countryside [8]. The vast rural villages in China are undergoing drastic changes and transformations [9]. How exactly to support the implementation of rural revitalization strategy through practical village planning and realize a new pattern of rural construction with urban-rural integration has become an important issue for Chinese rural development. China has considerable villages with great regional differences, and the classification of practical village planning needs to be based on a scientific classification of village types. Therefore, the study of village classification is of great significance for village planning. As a research hotspot of rural geography, it has been of considerable concern to Chinese scholars [10,11]. They have mainly studied the reconstruction of rural settlements [12,13], the quality of rural settlement [14,15], rural resilience [16], and rural development potential [17–19]. Scholars in other countries have mainly conducted studies on rural evaluation based on rural geography and regional economic theories, and most of them are functionally oriented to classify rural areas into types. Among developed countries, British scholar Crook proposed to construct a rurality index based on rural geography, evaluated the rurality of England and Wales, and classified them into five types: extremely rural, moderately rural, moderately non-rural, extremely non-rural and urban [20]. Terry, M. outlined four ideal types of rural space based on the social resource heterogeneity of villages, namely, protected villages, competitive villages, patriarchal villages, and proxy villages [21]. Ian H. and Sarah M classified the countryside into tourism-protected, competitive, large-farm, and dependent countryside based on the performance of various characteristics of the countryside [22]. Among the less developed countries, Indian scholar Sharma R.L. measured the level of economic diversification in India based on the percentage of rural non-farm population and used it as a criterion to classify villages into four categories: very high economic diversification villages, high economic diversification villages, low economic diversification villages, and extremely low economic diversification villages [23]. It is increasingly focused on the improvement of rural living conditions and sustainable development, and the trend of multidisciplinary integration is gradually emerging [24]. With the enrichment of basic data and the rapid development of GIS and RS technologies, the village classification methods have gradually changed from qualitative description and field survey to evaluation model construction [25,26], spatial clustering [27,28], and others. To sum up, relevant research on village classification had a variety of perspectives and methods, but the research scale mostly focused on the county and town scales, which can serve for the micro-scale research with more practical guiding significance and need to be further discussed. On the basis of existing research, this

study measures village development potential from four aspects, that is, location, resource, economy, and development constraint. The future development direction of villages is precisely identified and scientifically classified to provide a basis for the classification and promotion of practical village planning.

2. Data and Methods

2.1. Study Area

　　Shapingba District is located in the west of Chongqing (106°14′36″–106°31′35″ E, 29°27′13″–29°46′36″ N) (Figure 1). This district belongs to the parallel ridge and valley area of the east Sichuan basin, showing a combination of hills, terraces, and low mountains. The complex landform structure is the main reason for its internal administrative boundary and its irregularity. Its climate belongs to the subtropical monsoon humid climate zone. After the adjustment of the administrative jurisdiction in 2019, the area is approximately 276 km^2, with 22 towns (streets) and 49 administrative villages under its jurisdiction. The urbanization rate of the resident population is over 90%. In recent years, the urban expansion of Shapingba District has been rapid, and the rural space has been continuously squeezed. Considerable rural population flows into the city, and the problem of hollowing out of the countryside has become prominent. In the meanwhile, the deteriorating living conditions of rural houses and lagging infrastructure caused by early rapid urbanization have also constrained the development of the rural area.
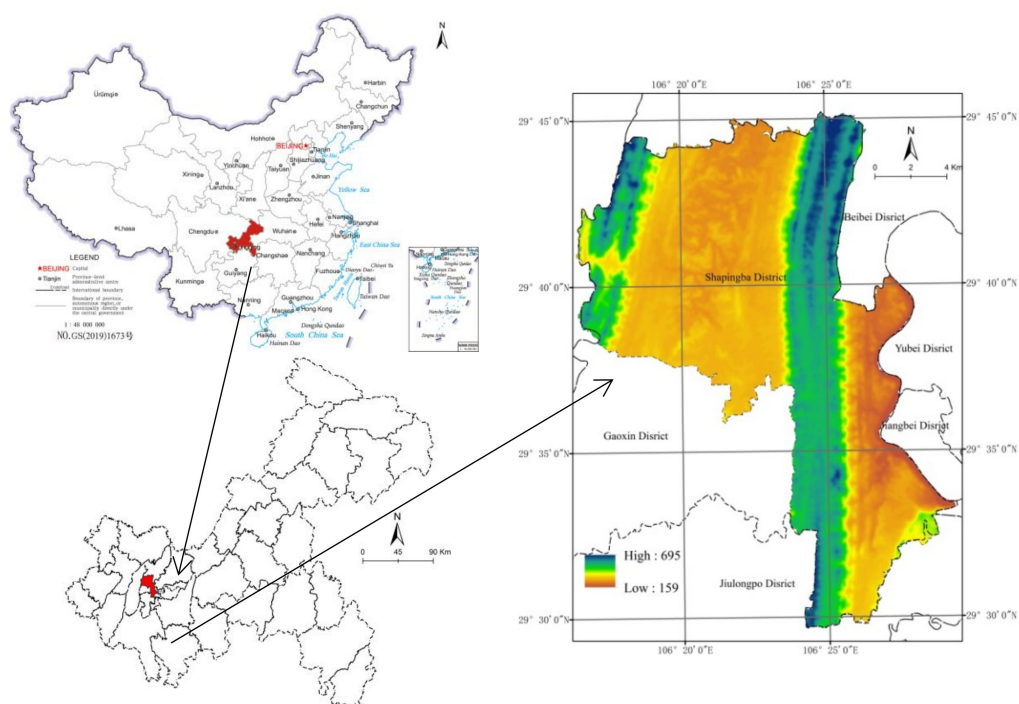

Figure 1. Study area.

2.2. Case Selection and Data Sources

2.2.1. Case Selection

　　According to the demand for the preparation of practical village planning, administrative villages with more than 80% of land requisitioned or included in the boundaries for urban development are not required to prepare a separate village plan. After excluding these two types of administrative villages, the administrative villages in Shapingba District that need to prepare planning include 38 administrative villages under the jurisdiction of nine towns (streets), which are the objects of evaluation in this study (Table 1).

Table 1. Administrative villages requiring planning in Shapingba District.

Town (Street)	Administrative Village under Jurisdiction
Fengwen street	Sanhe, Renhemen
Fenghuang town	Baziqiao, Fenghuangqiao, Hunanba, Weilingsi, Wufu, Yangjiamiao, Zaojueshu
Geleshan town	Geleshan, Jingang, Shandong, Tianchi, Xinkaishi
Huilongba town	Daqiao, Huilongba, Liangtanqiao, Qinglongmiao, Silong, Wuyunshan, Xixiqiao
Jingkou street	Jingkou, Nanxi, Shuangbei
Qingmuguan town	Guankou, Guanjiaqiao, Qingmuhu, Shinianqiao
Qinjiagang street	Lishuwan, Shangqiao, Xinqiao
Tuzhu town	Mingzhushan
Zhongliang town	Longquan, Maoshanxia, Qingfengshan, Shiyuan, Xinfa, Yongningsi

2.2.2. Data Sources

We have been cooperating with the Planning and Natural Resources Bureau of the Shapingba District for more than ten years on various projects, and have accumulated a large amount of data, which has laid a solid data foundation for this study. The data used in this study include spatial and attribute data. The spatial data come from three ways. The digital elevation model data (DEM, 30 m × 30 m) come from the Resources and Environmental Science Data Center (https://www.resdc.cn/, accessed on 25 September 2021). The township points come from Autonavi POI data (2019). Geological hazard data (2019), redlines for protecting the ecosystems data (2019), land acquisition data (2019), and land use vector data (2019) come from the Planning and Natural Resources Bureau of the Shapingba District. We extracted village-scale data, such as areas of the high-prone region of geological disaster, areas of redlines for protecting the ecosystems, areas of land acquisition, areas of cultivated land, areas of garden land, areas of construction land, and length of railway from them. We also calculated the total value of each administrative village using the ArcGIS zoning statistics module.

The attribute data come from field research and interviews. A total of 47 interviews were collected. The interviewees were the staff of township people's governments (sub-district offices) in nine towns (streets) and the village branch secretaries and relevant grass-roots staff in 38 administrative villages. We collected demographic data (total resident population, number of Communist Party members, number of migrant workers, number of people over 65 years old) and economic data (output value of primary, secondary, and tertiary industries and the area of machine-cultivated land) for each administrative village. We collected the number of township enterprises and family workshops including the number of natural and cultural landscape resources in each administrative village through the survey. For the few administrative villages with missing data, the data of the adjacent years were substituted.

2.3. Methods

2.3.1. Evaluation of Rural Development Potential

① Establishment of an index system

Rural development potential is a comprehensive reflection of the interaction of many factors, such as resource endowment, functional positioning, location conditions, development policies, and the historical background of each region [29]. Rural resources and their ability to use resources are of great significance to their development and revitalization [30,31]. Current studies on rural development potential are mostly focused on the potential for intensive rural land use [32], rural tourism development [33], and rural settlement improvement [34,35]. For the selection of indicators, this study extensively referred to the research literature related to rural evaluation. Zhang R.T. et al. selected three indicators of population development, industrial development and land use to construct the evaluation system of rural development level [36]. In the study of comprehensive evaluation and classification of rural development, Han X.Y. et al. selected seven categories of elements for evaluation, including agricultural production, non-farm economy,

daily life, social management, facility services, natural conditions, and human resources, according to three major functions: living, production, and ecology [37]. In evaluating the characteristics of rural transformation, Long H.L. et al. constructed an evaluation system from three dimensions: rural economic development, agricultural production development, and rural social development [38]. The core elements of rural development potential evaluation through literature research should include location, resource conditions, and socio-economic development status. Rural development potential represents the ability to attract people, capital, and technology in the future. Therefore, the attraction of internal and external powers constitutes the main support of its development potential. The internal power is determined by the location of the village and its resource endowment. By contrast, external power refers to the support of external resources for rural development. This notion indicates that further opportunities for development resource elements can be obtained to accelerate the contribution of external resources to its construction, reflecting the industrial advantages of rural development and its ability to attract social capital. In addition, labor and productivity levels, including livelihood and production security and ecological security, pose obstacles to rural development. Such constraints are key factors affecting rural development potential.

The common indicators applicable to this study were sorted out by combing the relevant literature on village evaluation with high-frequency indicator screening. Then, through field research, individual indicators were screened out considering the objectives and characteristics of village development in Shapingba District. Finally, the evaluation index system of rural development potential including four dimensions and 18 specific indicators is established (Table 2). The indicators comprehensively reflect the rural development potential and conform to the principles of scientific method and operability. The indicators of location advantage measure the accessibility of villages to the outside world from the aspects of the average elevation, topographic relief, distance to the nearest township, and road network density. Resource endowment includes the connotation of natural and human resources. Thus, the indicators of per capita construction land area, per capita cultivated land area, per capita garden land area, the number of natural and cultural landscape resources, and the percentage of communist party members in the village are selected for characterization. Economic vitality is an important factor in attracting social capital and technology. We select indicators, such as the proportion of the output value of three types of industries, the number of township enterprises and family workshops, and the level of agricultural mechanization to characterize the development of village industrial structure and productivity level. The aging level of the population, the proportion of migrant workers in the total population, the proportion of the area of the high-prone region of geological disaster, and the proportion of redlines for protecting the area of the ecosystem in village area were selected to represent the degree of construction in village development. The consistency reliability (Cronbach's alpha) value of the rural development potential measurement index system established was tested to be 0.786, which is greater than the empirical threshold of 0.7 and meets the requirements of index representation and consistency.

Table 2. Evaluation index system of rural development potential.

Target	Indicators	Calculation Methods	Attribute	Entropy Weight Method	AHP	Final Weight
Location advantage	Average elevation (X1)	Calculated by ArcGIS zoning statistics module	-	0.0387	0.0418	0.0403
	Topographic relief (X2)	Maximum–minimum elevation	-	0.0287	0.0310	0.0299
	Distance to the nearest township (X3)	ArcGIS average nearest neighbor module statistics	-	0.0485	0.0524	0.0505
	Road network density (X4)	Length of railway/total area of the village	+	0.0692	0.0748	0.0720
Resource endowment	Per capita construction land area (X5)	Area of construction land/total village population	+	0.0630	0.0644	0.0638
	Per capita cultivated land area (X6)	Area of cultivated land/total village population	+	0.0576	0.0591	0.0584
	Per capita garden land area (X7)	Area of garden land/total village population	+	0.0420	0.0431	0.0424
	Number of natural and cultural landscape resources (X8)	Obtained from field research	+	0.0523	0.0537	0.0530
	Percentage of Communist Party members (X9)	Number of Communist Party members/total village population	+	0.0775	0.0795	0.0785
Economic vitality	Proportion of output value of primary industry (X10)	Output value of primary industry/gross value	+	0.0698	0.0641	0.0669
	Proportion of output value of secondary industry (X11)	Output value of secondary industry/gross value	+	0.1031	0.0919	0.0975
	Proportion of tertiary industry output value (X12)	Output value of tertiary industry/gross value	+	0.0540	0.0496	0.0518
	Number of township enterprises and family workshops (X13)	Obtained from field research	+	0.0475	0.0463	0.0469
	Level of agricultural mechanization (X14)	Area of machine-cultivated land/total cultivated land area	+	0.0525	0.0482	0.0503
Development constraint	Aging level of population (X15)	Number of people over 65 years old/total village population	-	0.0695	0.0711	0.0703
	Proportion of the area of the high-prone region of geological disaster (X16)	Area of the high-prone region of geological disaster/total area of the village	-	0.0296	0.0303	0.0299
	Proportion of migrant workers (X17)	Number of migrant workers/total village population	-	0.0574	0.0587	0.0581
	Proportion of the redlines for protecting the ecosystems area (X18)	Area of the redlines for protecting the ecosystems/total area of the village	-	0.0391	0.0400	0.0395

② Data standardization

Range standardization is a method to standardize positive and negative indicators in economic statistical analysis, which is a linear transformation of original data. The range is obtained by calculating the difference between the maximum and minimum values of the index. All index values are mapped to [0, 1]. The calculation formulas are as follows:

When X_{ij} is a positive indicator,

$$Z_{ij} = \frac{X_{ij} - \min X_{ij}}{\max X_{ij} - \min X_{ij}}, \tag{1}$$

when X_{ij} is a negative indicator,

$$Z_{ij} = \frac{\max X_{ij} - X_{ij}}{\max X_{ij} - \min X_{ij}}, \tag{2}$$

where Z_{ij} denotes the standard values for raw data, and X_{ij} denotes the specific index value of a sub-item.

③ Indicator weight set

The entropy weight method is an objective weighting method, which overcomes the subjectivity and randomness brought by the subjective weighting method. The application of the entropy weight method can make the evaluation result more in accord with the actual situation. To avoid the disadvantage of the insufficient scientific meaning of the weight results brought by objective assignment, we use Analytic Hierarchy Process to revise the weight results and comprehensively determine the weight. The steps are as follows:

First, the translation of dimensionless data is coordinated,

$$X\prime_{ij} = Z_{ij} + C, \tag{3}$$

where X'_{ij} is the index value after data standardization and translation, and C is the translation amplitude (in this study, $C = 0.0001$).

Second, the information entropy of the index is determined,

$$e_j = -\left(\frac{1}{\ln n}\right) \times \sum_{i=1}^{n} Z_{ij} / \sum_{i=1}^{n} Z_{ij} \ln\left(Z_{ij} / \sum_{i=1}^{n} Z_{ij}\right), \tag{4}$$

where e_j is the information entropy of the j-th evaluation index, and n is the number of evaluation units (n = 38 in this study).

Third, the index weight is determined,

$$Q_j = 1 - e_j / \sum_{j=1}^{m} (1 - e_j), \tag{5}$$

where Q_j is the weight of the j-th evaluation index, and m is the number of evaluation indexes ($m = 18$ in this study).

Finally, according to analytic hierarchy process, all indicators are divided into groups according to the correlation and affiliation. Each group is defined as a layer, and finally, a hierarchical system structure model associated with a combination of the highest, middle, and lowest layers is created (Figure 2). The consistent matrix method is used to compare the evaluation factors of the same layer from the second layer to compare their importance relative to the previous layer. Generally, the 1~9-bit scale method is used to construct the judgment matrix. The maximum characteristic roots and the corresponding eigenvectors of the above judgment matrix are calculated, and then the consistency of the matrix is tested using the consistency index, the average random consistency index and the consistency ratio. Referring to existing studies and consulting with experts, we constructed judgment matrices and past consistency tests [39]. The above steps are realized by YAAHP software to realize the calculation process. Then we obtain the weight F_i of each index. The indicator weights were revised using the preference coefficient μ to derive the final weight.

$$W_j = \mu F_i + (1 - \mu)Q_i, \tag{6}$$

where W_j is the final weight of the j-th evaluation index, and F_i is the weight calculated by Analytic Hierarchy Process. μ is the preference coefficient (μ = 0.5 in this study).
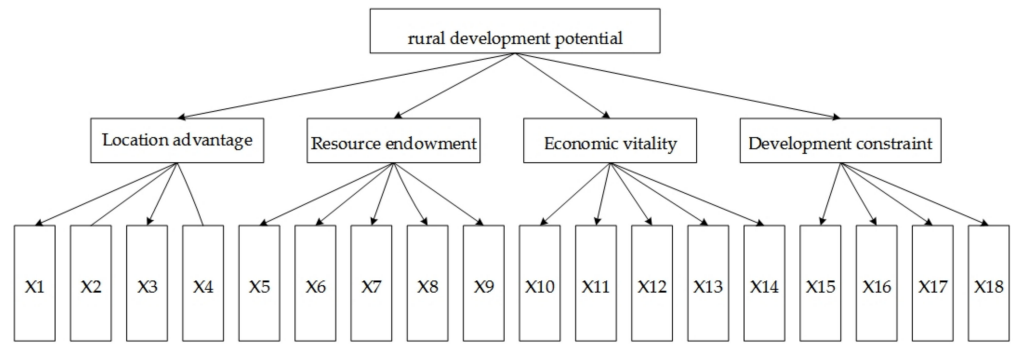
Figure 2. Hierarchical structural mode.

④ Evaluation model of rural development potential

Combined with the standardized value and weight of each evaluation index, the rural development potential in each evaluation unit is calculated. The calculation formula is as follows:

$$D_i = \sum_{j=1}^{m} W_j Z_{ij}, \tag{7}$$

where D_i is the score of the rural development potential.

2.3.2. Hierarchical Cluster

Cluster analysis is a method of classifying samples. The basic principle is to determine quantitatively the relationship between samples according to their attributes. The hierarchical cluster method is the most widely used clustering analysis at home and abroad. This method first regards the clustered samples or variables as a group, then determines the similarity statistics between classes, selects the closest two or several classes to merge into a new class, and calculates the similarity statistics between the new class and other classes. Then the closest two or several groups are selected to merge into a new class until all samples or variables are merged into one class. In this paper, the 38 administrative villages are taken as the basic units, and the research units are partitioned by hierarchical clustering. The specific steps of cluster analysis are as follows:

First, the Euclidean distance is selected to define the distance between samples:

$$d_{ij} = \sqrt{\sum_{k=1}^{m} \left(X_{ik} - X_{jk} \right)^2}, \tag{8}$$

where d_{ij} is the distance between samples i and j, m presents the number of dimensions, and X_{ik} and X_{jk} are the evaluation values of samples i and j on the k-th dimension, respectively.

Then, the distance coefficient d_{ij} between any two sample points can be calculated in turn to obtain a distance matrix between samples:

$$D = (d_{ij}) = \begin{bmatrix} d_{11} & d_{12} & \dots & \dots & d_{1n} \\ d_{21} & d_{22} & \dots & \dots & d_{2n} \\ \dots & \dots & \dots & \dots \\ d_{n1} & d_{n2} & \dots & \dots & d_{nn} \end{bmatrix}. \tag{9}$$

Finally, the longest distance method is used for clustering. If X_i is any sample in class G_p and X_j is any sample in class G_q, then the longest distance in classes G_p and G_q is as follows:

$$D_{pq} = \max_{X_i \in G_p, X_j \in G_q} d_{ij}, \tag{10}$$

among them, the smaller the D_{pq} is, the smaller the distance between samples is. The closer the properties of samples i and j are, the more they can be divided into the same type.

3. Result and Analysis

3.1. Analysis of Rural Development Potential

3.1.1. Spatial Distribution Characteristics of Rural Development Potential

To clearly demonstrate the spatial distribution characteristics of rural development potential, the comprehensive scores obtained in Equation (7) were used. With Arcgis 10.2, the scores were spatially linked with each research unit in the form of vector data and partitioned using natural breaks [40]. We divided them into high, medium, and low levels and plotted the spatial distribution (Figure 3).
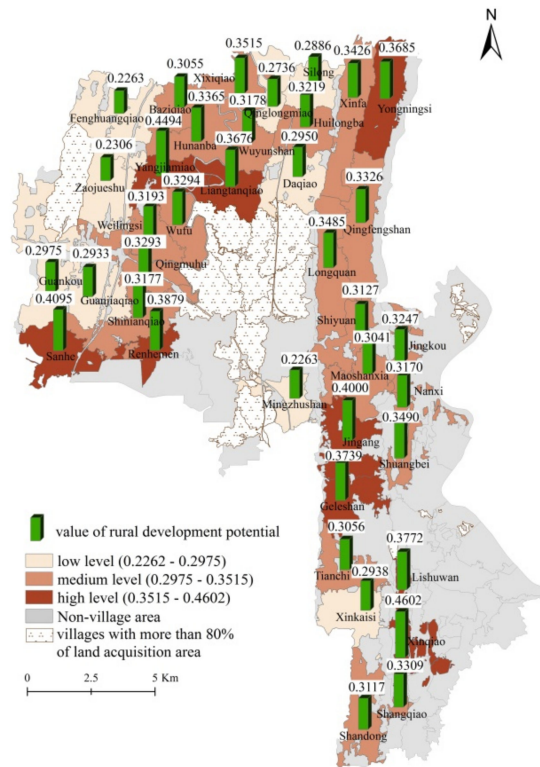

Figure 3. Spatial distribution of rural development potential in Shapingba District.

According to the calculation results, the average, minimum and maximum values of the rural comprehensive development potential are 0.2263, 0.3312, and 0.4602, and the proportion of the number of administrative villages in high, medium, and low levels is 13.16%, 73.68%, and 13.16%, respectively. Villages with medium development potential have a clear numerical advantage. The spatial distribution pattern of the rural development potential is centered on the central and southern urban development areas, gradually decreasing toward the peripheral area. The villages with a high potential value of rural development are mainly distributed in the south and central regions, whereas those with a low score are mainly concentrated in the northern fringe region. The overall development potential tends to be balanced, but the advantages and development obstacles of villages in different regions vary. The southern villages are close to the regional development center, with evident location advantages, a high degree of urban–rural development integration, and greater economic development vitality, which largely compensate for the disadvantage of the shortage of background resources and thus present good development potential. The northern center of the Shapingba District is the second core area of its urban development. With the strengthening of land acquisition, the urban area has been expanded, and the advantage and obstacles of village development at its edge are evident. In terms of development advantage, the villages in the region are rich in land resources and have a high number of natural and humanistic landscapes. The obstacle to development mainly

comes from the strict control of redlines for protecting the ecosystems, making it difficult to meet the basic demand for construction land. The villages in the northern periphery are far away from the urban centers. The infrastructure construction is relatively backward, and the large influx of rural population into the cities has led to the phenomenon of the hollowing out of villages.

3.1.2. Characteristics Analysis on the Sub-Dimension

To better portray the spatial pattern of rural development potential in each sub-dimension and its divergent characteristics, we used the same method to divide the scores of each dimension into high, medium, and low levels and plotted the spatial distribution of the sub-dimension (Figure 4).

Figure 4. Distribution of rural development potential.

Location advantage (Figure 4a): On the whole, the location pattern of all villages is good, the average score of location advantage is 0.0967, and the proportion of the number of administrative villages in high, middle, and low levels is 39.47%, 42.11%, and 18.42%, respectively. The spatial distribution shows the trend of taking the north center as the core and gradually decreasing around. High-level areas are concentrated in the suburbs of the two town development centers in Shapingba District. The reason contains two aspects, one is that the area receives strong radiation from the urban transportation network, has good road facilities, and has good external connection conditions; the other is that 69% of the villages in the high-level area have a gentle average elevation and topographic relief, making village construction less difficult, which is also a key reason for its good performance in terms of coordination of location pattern. The medium-level villages are located on the periphery of the high-level ones, with the largest number of villages and slightly poorer external connections. The low-level areas are mainly located at the edge of Shapingba District, mainly because of the weak external communication due to the underdeveloped transportation network.

Resource endowment (Figure 4b): Its average score was 0.0528, with significant village differences, and the proportion of the number of administrative villages in high, medium, and low levels is 13.16%, 36.84%, and 50.00%, respectively. Spatially, the distribution trend of "high value in the north and low value in the south" is observed. The high-level areas are scattered in a dotted pattern in the south of the district. These villages have abundant land resources and good resources and conditions for tourism development. The medium-level villages are mainly distributed in a contiguous manner in the northern part of the region. The villages in the low-level areas are mainly located in the southern district. Considering their proximity to the town centers, land urbanization is developing rapidly. The loss of cultivated and garden land is serious, and the agricultural production capacity is low.

Economic vitality (Figure 4c): Its average score was 0.0351, and the proportion of the number of administrative villages in high, medium, and low levels is 15.78%, 42.11%, and 42.11%, respectively. The spatial distribution shows a trend of decreasing from south to north. All of the high-level areas are located in the southern part of Shapingba District, where rural enterprises are well developed, and the location advantage of being close to the urban makes them closely connected to the needs of urban residents and the development of urban industries. The industrial structure is dominated by the secondary and tertiary industries. The medium-level areas are mainly distributed in the northern part of the region. The villages in the low-level area are mainly located in the southern fringe area, where the poor foundation of industrial development and low productivity and organization levels are important development obstacles in the area.

Development constraints (Figure 4d): The higher the score of this dimension, the smaller the resistance to the spatial development of the village. Its average score was 0.1466, and the proportion of the number of administrative villages in high, medium, and low levels is 34.21%, 44.74%, and 21.05%, respectively. The spatial distribution is most widely distributed in the high and medium-level areas. The two main reasons are as follows: (1) population loss is relatively small; and (2) ecological control is moderate, and relatively free space is available for development.

3.2. Classification of Village Types

The spatial clustering function of SPSS Statistics 26 software was used to realize the calculation process of Equations (8)–(10) and output the system clustering results. Based on the clustering results, a total of 38 administrative villages in the district were divided into four types, namely, core planning area, important planning area, general planning area, and basic control area. The spatial visualization results were realized using ArcGIS 10.2 (Figure 5).

(1) Core planning area: The village type has five administrative villages, that is, Sanhe, Renhemen, Yangjiamiao, Xinfa, and Yongningsi. These villages have excellent geographical locations, mostly located in suburban integration areas or township centers.

They have evident advantages in the four sub-dimensions and have great potential for comprehensive rural development. They should have priority in the rural revitalization strategy in order to develop as a regional growth hub. They must also lead the surrounding villages to develop together. The villages in the core planning area should be given the highest level of attention and detail in the preparation of practical village planning to support of their scientific and orderly development.

(2) Important planning area: This area includes 20 administrative villages, such as Mingzhushan, Qingmuhu, Xinqiao, Lishuwan, and Nanxi. The villages in the important planning area are the highest proportion of the four types, and their comprehensive rural development potential is second only to that of the Core Planning Area, with some dimensions scoring even higher. The development of such villages aims to expand the impact of the strengths dimension while compensating for the weaknesses of development. Therefore, their village planning should be sufficiently oriented.

(3) General planning area: This area includes nine administrative villages, such as Huilongba, Guankou, Silong, Daqiao, and Shiyuan. Compared with the first two types, their comprehensive development potential is lower because of two main reasons. First, these villages are mostly located in mountainous areas with high altitudes and undulating terrain, which translates to high construction costs. Second, these villages involve a wider area of redlines for protecting the ecosystems, and the production and living are more restrictive. Therefore, the preparation of village planning in general planning areas should pay more attention to the balance between ecological protection and village development, and prevent the behavior of obtaining economic benefits at the expense of ecological environment through the strict control of village planning.

(4) Basic control area. This area includes four administrative villages, namely, Maoshanxia, Xinkaisi, Zaojueshu, and Fenghuangqiao. The villages in the basic control area have the worst performance in terms of comprehensive development potential and can be implemented as the lowest level of detail in the village plan. The implementation of land use control of the master planning is used as the main basis for village construction and development.
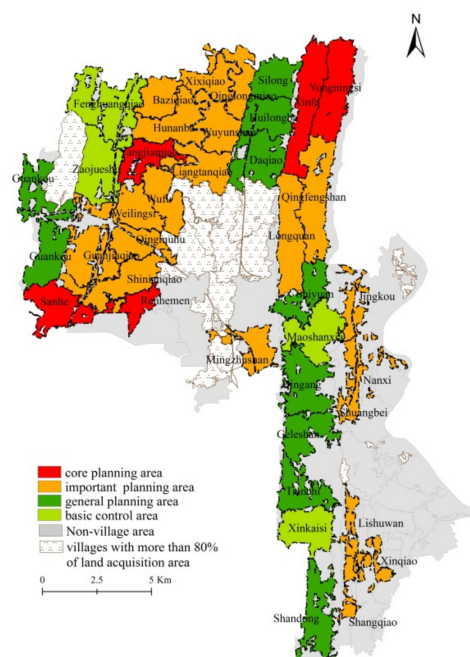

Figure 5. Results of village type.

4. Differentiation Strategies for Practical Village Preparation

According to the positioning of villages and the actual needs of national space development and protection, the level of the development potential of villages should be considered, and the preparation requirement of practical village planning must be reasonably determined. Combined with the requirements of the latest technical specifications for the preparation of practical village planning in Chongqing, the planning requirements should include nine items: development orientation and objectives, territorial space control and layout, industrial development layout, rural residential area planning, infrastructure and basic public service facilities layout, ecological protection and land consolidation, historical and cultural preservation and heritage planning, rural style guide, safety and disaster prevention and mitigation planning (Table 3). However, these requirements are not mandatory for all village plans, and each village can choose the necessary contents and expanded contents in a scientific and reasonable way according to its development type and need, where the former is mandatory for the village plan, whereas the latter is selected in conjunction with the actual needs of the village. According to the basic requirements of the technical specifications, the first two planning requirements shall be necessary for all villages, and the rest shall be selected according to different types of villages. This paper classifies the villages into four types: core planning area, important planning area, general planning area, and basic control area, based on the level of rural development potential. With reference to the current content selection of village planning in Chongqing, this paper identifies the necessary and expanded planning content for different types of villages and proposes corresponding planning strategies based on the authors' field project experience. The level of detail required by the four types of village planning varies, and the corresponding plan content should also make a difference. To clearly demonstrate the study, we selected one case village in each of the four types for illustration. The case villages were Sanhe, Qingfengshan, Shiyuan, and Maoshanxia (Figure 6). The village plans shown in Figure 6 are all projects undertaken by our research team in 2019.

4.1. Core Planning Area

The core planning area is in the urban–rural transition zone, receiving stronger radiation from urban resources, and generally has the advantages and potential to become a back garden of the city. This area also has the conditions to transform into a city. To a certain extent, the core planning area has the ability to serve urban development, undertake urban function spillover, and meet urban consumption demand [41,42]. This area is the front-runner of urban–rural integration development. In terms of the level of detail, the core planning area has the highest requirements for the content of the practical village plan, which should meet the nine requirements. In terms of planning strategies, we use the land layout planning of Sanhe Village as an example (Figure 6a). First, priority is given to guaranteeing the demand for land for the construction of public service facilities, such as education, culture, and medical care, improving their construction level and service quality, forming a public service network with villages in the core planning area as the central nodes, and improving the attractiveness of the countryside. Second, the construction of a railway network is focused to deepen regional connections, to attract external resources into the countryside, and to help rural revitalization. Third, this planning also focuses on improving the efficiency of rural construction land use, effectively developing unused land, and stimulating rural development while safeguarding land for the development of rural advantageous industries.

Table 3. Contents of practical village planning.

No.	Planning Contents	Village Types			
		Core Planning Area	Important Planning Area	General Planning Area	Basic Control Area
1	Development orientation and objectives	⊙	⊙	⊙	⊙
2	Territorial land control and layout	⊙	⊙	⊙	⊙
3	Industrial development layout	⊙	⊙	⊙	○
4	Rural residential area planning	⊙	⊙	○	○
5	Infrastructure and basic public service facilities layout	⊙	⊙	○	○
6	Ecological protection and land consolidation	⊙	⊙	⊙	○
7	Historical and cultural preservation and heritage planning	⊙	⊙	○	○
8	Rural style guide	⊙	○	○	○
9	Safety and disaster prevention and mitigation planning	⊙	○	○	○

Note: ⊙ Necessary content ○ Expanded content.

4.2. Important Planning Area

The important planning area is the main area to support district development and the area to guarantee ecological security. The latest functional positioning of Chongqing has positioned the rural area of Shapingba District as the "Western International Slow City" and the "Beautiful Back Garden for Citizens' Leisure". Vigorously developing modern urban agriculture in urban suburbs will become the main direction of agricultural and rural reform in the Shapingba District and the important direction of its village planning. The village planning of the important planning area includes seven necessary contents. In terms of planning strategies, we take the village of Qingfengshan Village as an example (Figure 6b). First, we can plan and implement high-quality projects for leisure agriculture and rural tourism and build a number of leisure and tourism parks with complete facilities and diverse functions, forest homes, recreation bases, rural bed and breakfast, and small towns with special features. Second, to form a development model integrating humanities and ecology into cultural tourism, we consider the following: inheriting local culture, identifying the core cultural elements of rural regional space, discovering cultural tourism resources with uniqueness and attractiveness, using traditional villages, scientific and technological agriculture, idyllic scenery, agricultural production landscape, green ecological resources, and other elements. Third, we aim to deeply improve road networks, water and drainage networks, power grids, and communication networks, including other infrastructure construction to provide a good development environment for industries in the district.
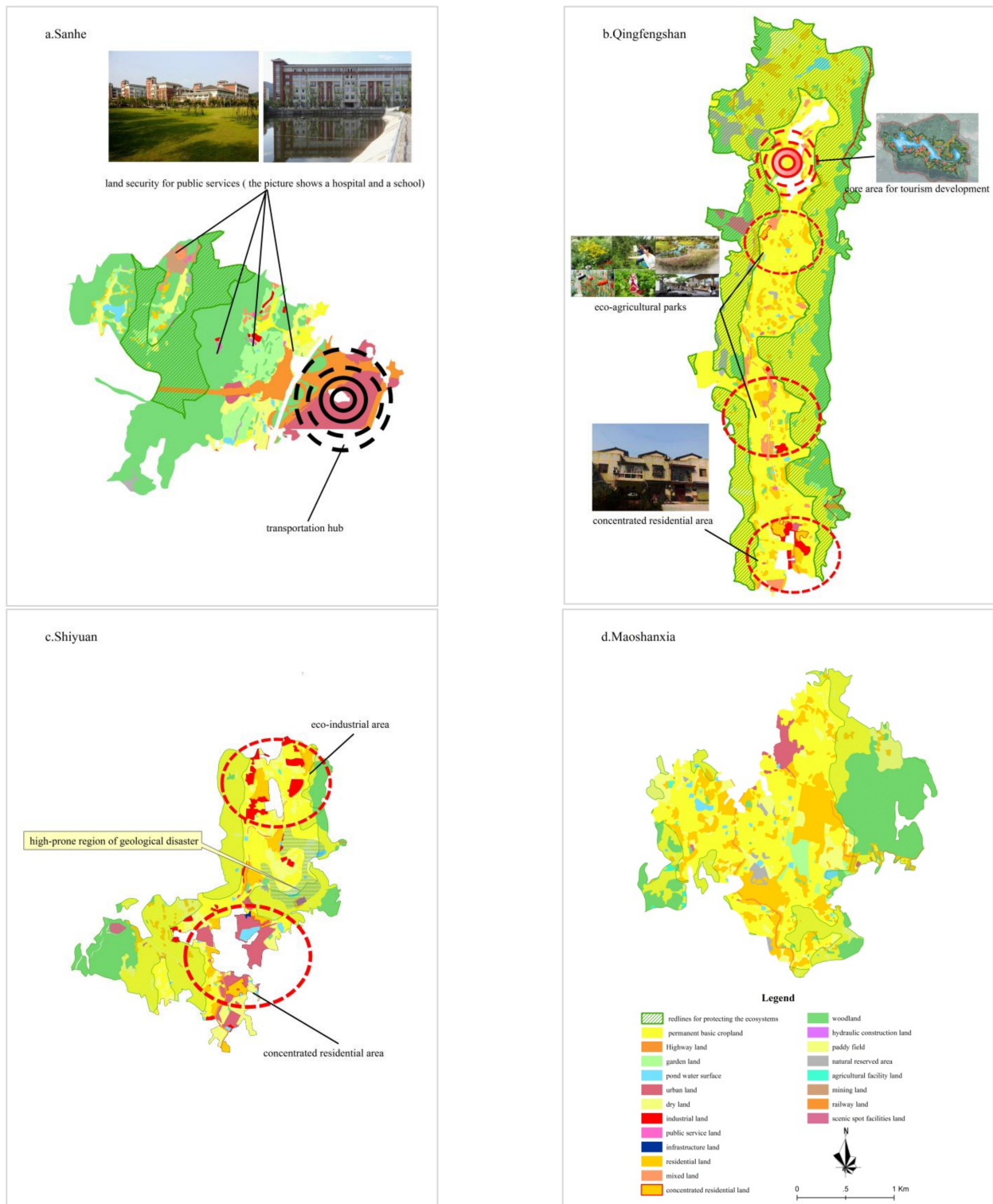
Figure 6. Land use layout planning for different types of villages.

4.3. General Planning Area

The general planning area is a key area for ecological protection, and the necessary content of its village planning should contain four basic contents, namely, development orientation and objectives, national land control and layout, industrial development layout, and ecological protection and land consolidation. In terms of planning strategies, we take the village of Shiyuan Village as an example (Figure 6c). First, we strengthen the protection

of ecological land, guide the gradual withdrawal of environment-consuming industries, and develop ecological industries. Second, we focus on ecological safety restoration and reduce the adverse impact of geological disasters on the production and life of villagers. Third, a certain percentage of construction land is reserved for mobile indicators to support scattered rural cultural and tourism facilities and new rural industries.

4.4. Basic Control Area

The background conditions and economic development environment of the basic control area are relatively backward, and its village planning requires the lowest level of detail. The necessary content only needs to cover two items, that is, development orientation and objectives, and national land control and layout. Taking Maoshanxia Village as an example (Figure 6d), in terms of planning strategy, the first point is to strictly implement spatial use control and strictly control the phenomenon of illegal land use. The second one is to inherit vernacular culture, including vernacular landscapes, humanistic and historical relics, and traditional farming implements, and to protect traditional vernacular architecture and prevent major demolition and construction. Finally, efforts should be made to enhance the infrastructure construction in farmers' clusters, improve the efficiency of public services, and meet the basic needs of residents for water, electricity, transportation, and communication.

5. Discussion

A village is the basic unit of social and economic activities in rural China and is the basis for guaranteeing the ecological security of land and maintaining the harmonious relationship between man and land [43,44]. Owing to China's early implementation of the development strategy of "industry and city first," the relationship between urban and rural areas presents evident "dual" characteristics [45]. The development of China's rural areas has shown great imbalance and inadequacy [46], and the problems of rural environmental pollution, lagging public service facilities, and disorderly village construction have become more prominent. In the international arena, rural decay is also an area of research focus [47]. After experiencing urbanization and reverse urbanization, developed countries have taken a series of measures to narrow the urban-rural gap and promote rural development, such as the "New Town Construction" in the United States [48] and the suburban rural development plan in France [49]. However, rural revitalization is not a revitalization of all existing villages but rather targeted support for development. Based on the real situation of village areas, this paper establishes a scientific index system to measure their development potential in four dimensions: location advantage, resource endowment, economic vitality and development limitation, and uses them as a basis for classifying types to guide the hierarchical implementation of village planning. We can solve the problem of inadequate rural development with more pertinence only by scientifically identifying village types and using limited financial and material resources where they are really needed. Starting from the practical problems faced by rural decline, this study comprehensively considers the current situation, direction and law of rural development, and constructs a set of scientific and reasonable evaluation index systems. On the one hand, we hope that its evaluation results can be used as an important basis for judging the development potential of villages and for identifying and analyzing the problems and shortcomings of village development. On the other hand, it is applied to guide local village planning practice, improving local government service management, and providing a reference for the scientific and reasonable formulation of optimal strategies for rural revitalization. This study provides a new idea and path for the revitalization of the world's villages and further enriches the research content of rural geography.

China's vast territory and the large geographical differences in the physical geography of different regions, including the spatial patterns and constraints of urban and rural development in each region, also determine the diversity and complexity of rural types [50]. This study analyzes and discusses the rural types in the southwestern hilly mountainous

areas and does not cover other areas, such as highlands and plains. In addition, considering the limitation of basic data and research scale, this study did not regard rural areas from the perspective of long-term series, and the constructed index system also has room for further improvement. Subsequent studies will further optimize the classification method of rural potential types, refine the evaluation index system, consider the stage changes of rural development from the perspective of long-term series, and further explore the rich connotation of rural development potential to optimize the zoning results.

6. Conclusions

The spatial distribution pattern of rural development potential in the study area is centered on the central and southern urban development areas, gradually decreasing toward the peripheral areas. Villages with higher potential values are mainly located in the south and central parts of the district, whereas those with lower scores are mainly clustered in the northern fringe of Shapingba District. In the four sub-dimensions, a significant pattern of regional differentiation was observed. Based on the comprehensive development potential of villages, a total of 38 administrative villages in the district are divided into four types, namely, core planning area, important planning area, general planning area, and basic control area, with the proportion of the four types of areas being 13.16%, 52.63%, 23.68%, and 10.53%, respectively. Based on the completed village planning projects, our group draws experience from practical work, clarifies the development characteristics and directions of different types of villages, and implements differentiated development strategies. In village planning, the villages are divided by development potential. The different types of villages should contain different planning contents. The core planning area with the highest village development potential should contain the most comprehensive planning contents, and the village planning of the important planning area, the general planning area and the basic control area have gradually decreased in detail, in order to realize the effective gathering and optimization of elements and promote the orderly development of villages.

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