Research on the Establishment of Provincial Characteristic Scenic Lines Based on GIS

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Abstract: China is entering a stage of rapid development. To ensure strategic development, more regions have begun to integrate and reconstruct regional spaces by strengthening their regional cooperation and focusing on top-level design. The scenic line is a physical space that integrates ecological landscape resources, cultural carriers, and industrial foundations into regional spaces. Its construction is of considerable importance for aggregating functions and supporting regional integration. Sichuan, China, has some of the most abundant bamboo resources worldwide, and the bamboo scenic line has Chinese characteristics. This study takes 12 areas suitable for bamboo growth in Sichuan Province as research objects using GIS technology combined with methods such as suitability evaluation. An ecological base layer, landscape pattern layer, facility foundation layer, and industrial development layer were developed as the four element layers, along with their influencing factors. The weights of the factors were assigned using the entropy method, and the cost path was analyzed for the resistance side, branch point, and context. A suitability evaluation system was constructed for the scenic line, and a provincial organic development pattern of “one point, two axes and three belts” was formed for the bamboo scenic line, which can provide guidance for planning and design.

Keywords: scenic lines; GIS; organic

1. Introduction

1.1. Regional Integration Opens up a New Pattern of Organic Development

The uneven development of districts and counties, that are small and scattered, and the insufficient integration of resources can lead to separation between cities or between cities and villages (referred to as “urban (rural) separation”), which is a common social phenomenon in China. The connotation of urban (rural) fragmentation is highly complex, and the fragmentation of space is the most intuitive expression. Material space is the basic space for human activities, the material basis for ensuring the realization of all social and economic activities, and the key issue related to the life activities of urban and rural residents. To break the separation of cities (towns), we must first consider breaking the barriers of administrative boundaries and establishing an integrated urban and rural natural and social space system, reflecting the organic combination of different environmental spaces [1,2]. Based on this consideration, this study selects the scenic line as the “stepping stone” for theoretical research on regional spatial integration. The scenic line is one of the hottest planning and design propositions in China, especially in the Sichuan Province. Through a linear and continuous ecosystem, it connects core ecology, culture, the landscape, historical relics, and other spatial resources. It aims to achieve a series of composite functions such as ecological protection, cultural inheritance, leisure and entertainment, sports and fitness, beautification, and education [3]. At present, practice and theoretical exploration related to scenic spots have been carried out in most parts of China,
and industrial clusters with a certain development pattern radiating into surrounding areas have been formed through the integration of urban and rural resource elements [3].

1.2. Definition of the Relevant Concepts

1.2.1. The Scenic Line and the Characteristic Scenic Line

The scenic line refers to a narrow and long scenic area formed by mountains and rivers, as well as some natural and human phenomena, which is enough to cause people to appreciate it under certain conditions. In a narrow sense, the scenic line refers to a linear landscape form or series composed of a series of related scenic spots, also known as scenic lines. Scenery, a sense of scenery, and the associated conditions are the three basic elements of a scenic spot [4]. On this basis, a characteristic scenic line is a scenic spot that highlights local and regional characteristics such as ecological resources and cultural spirit. Sichuan Province is the main bamboo-producing province in China. According to data released by the provincial forestry and grass bureau, by the end of May 2021, the bamboo forest area in Sichuan Province had reached 1.21 million hectares, ranking first in the country [5]. Bamboo plants not only have good ecological, ornamental, and health benefits but they also have rich cultural connotations. Therefore, bamboo scenic lines have the characteristics of ecological protection, landscape leisure, traffic passage, social economy, and historical culture [4].

1.2.2. Organic Context of the Scenic Line

The theory of organic decentralization proposed by Saarinen in 1943 suggests that urban functions and the corresponding spaces should be integrated and reorganized. It further suggests that unnecessary function types should be relocated, so that the spatial and land values of the city can be used more efficiently, the accumulated advantages of the city can be played more effectively, and the internal functions of the city should be finely organized. It reduces the negative impact of unnecessary functions on the urban environment to a considerable extent. The organic decentralization theory can form an organic whole from areas that were originally fragmented and unbalanced with an insufficient development. Saarinen also believes that the composition of the transportation system in achieving an efficient regional connectivity and organic integration should be an effective and organic combination of the modern rapid transit system and slow traffic system based on the chronic ecological transportation system [6].

Based on the human settlement sciences proposed by famous researcher C. A. Dxoïdaïs in Greece, Mr. Wu Liangyong expanded and formed a discipline system that studied the relationship between people and their living environments and the science of human settlements, which emphasizes human settlement in its entirety. From the economic, social, cultural, and other aspects, systematic research has failed to study the human settlement system from a single field [7]. For the concept of the human settlement environment, Dxoïdaïs highlights that “the model of the future city will not cover the entire urban built-up area like a pie but will present a belt-shaped network structure, which will be combined with the original urban center and main traffic arteries” [8].

By understanding these theories, this study defines the organic context of a scenic line. It has a linear spatial form, connects the main cities, and interweaves and blends with rural space into a unified whole. It not only includes the composition of urban functions and their spatial characteristics but also has the simple natural style of the countryside. It also includes a rapid transportation system, a robust infrastructure system, and rich and diverse spatially advantageous resources. From the perspective of spatial composition, it is a multifunctional complex with a strong ecological immunity [9]. The organic context of the scenic line is not only a simple connection relationship but also emphasizes the ecological function of the spatial continuity so that it can connect various resources scattered in space. This means that all resources on the scenic line can maintain a continuous organic relationship with the surrounding environment (Figure 1). Its main purpose is to coordinate urban and rural spaces, integrate and protect spatial resources, and improve the balance
between people and the spatial environment to achieve a sustainable development for people and nature.

![Schematic diagram of the linear space and surrounding organic relationship of the scenic lines.](image)

**Figure 1.** Schematic diagram of the linear space and surrounding organic relationship of the scenic lines.

### 1.2.3. Organic Construction System of the Characteristic Scenic Line

Based on these concepts, the organic construction system of the scenic line is a spatial system that acts on the current situation of urban and rural areas and takes the organic context as the spatial medium to guide the transition of urban and rural space from a binary opposition to an urban–rural integration spatial system. The construction system includes three constituent structures: the resistance side, petiole, and vein. Among them, the “vein” element is divided into three levels of a relationship, including the main vein, branch vein, and the fine vein, according to the difference between the function and morphology, which forms the main spatial structures in the model [10]. The contents of each type of elements are as follows.

1. **Resistance side**

   The resistance sides are the foundation of the organic system, which means that the material and energy of the scenic line will slow down and expand under the forces of various elements when passing through the landscape unit. They constantly need to spend costs to overcome the resistance, with various regional elements being integrated to form different degrees of resistance. Here, the cost-resistance sides are formed using the cost path algorithm. The resistance coefficient reflects the difficulty of high-quality energy control and covering the base surface, with the cost of doing work being inversely proportional to the degree of habitat suitability. The higher the habitat suitability, the lower the cost value.

2. **Petiole**

   Petioles are determined by the patches on the resistance sides and are the source of power for the organic system. The role of petioles is to form the endpoint of the venation and the node of spatial extension, which play a key role in triggering venation and improving the venation system. Petioles are divided into primary and secondary petioles. Among them, the primary petioles are the patches with the largest low-resistance area and are often a collection of high-quality resources such as ecological resources, the industrial economy, and landscape aesthetics. These factors are essential in controlling the circulation of regional development. The secondary petioles are slightly lower than the primary petioles, which are patches with a low resistance area and play a vital role in the ecological, economic, and landscape effects [10].

3. **Vein**

   Veins are the most important constituent units in the organic system, which are triggered by different levels of branches as endpoints. Among them, the main vein is the primary space, which connects the primary and secondary petioles in the region and is the key pattern for regional development as an axial skeleton. It is characterized by concentrated regional functions, a dense population and industry distribution, and the frequent transmission of materials, information, and energy, and it is the most efficient and convenient transportation system for infrastructure for supporting the supply system. The branch vein is a secondary space, and the vein system connecting the secondary main and secondary branches is a supplement to the function and coverage of the main vein.
system. Its main function is to clarify the core advantages, allocate unique advantageous resources to the surrounding branch space, form a resource-oriented linear connection, and drive regional economic development with resource advantages. The fine vein is a three-level space, mainly in the direction of the end of the branch point, to further guide an appropriate quantity of valuable resources to move closer to local areas and liberate the internal space of the unit.

Veins have two main functions. One is to build an organic and unified connection with the characteristic scenic line and form an integrated basic spatial pattern. The second is to integrate the function and space of resources and disperse the resources overflowing in the accumulation process from bamboo forests into the secondary system, injecting kinetic energy into the development of the surrounding areas [10].

1.3. Suitability Analysis Combined with GIS Analysis Tool

At present, there are few construction methods for the “scenic lines”. The literature shows that we can refer to greenway planning and the design methods, because the concepts [11–15] and functions [16,17] of the two are similar. Suitability evaluation is among the most popular greenway planning and design [18–21]. The process is to determine the areas suitable for greenway incorporation by scoring and weighing many related factors. However, traditional suitability evaluations usually use small-scale spatial data collected manually, combined with a neural network model [22], and a fuzzy comprehensive evaluation [23]. These methods follow McHarg’s “thousand layer cake” analysis method, emphasizing the vertical process of ecology and excluding the horizontal process [24], and often fail to consider large-scale site factors. Therefore, using GIS for decision support has gradually been considered [25]. Its logic is to classify the suitability level of resources and the environment according to the regional natural conditions and social development requirements. It was evaluated by selecting the study area’s representative societal, economic, and ecological factors. GIS technology is used to obtain the evaluation results, which can be used as the basis for judging the suitability of the site’s construction [26,27]. Research on the site’s suitability evaluation has been relatively extensive abroad, and its research methods, emphasis, and scale have diversified. For example, Miller et al. divided the greenways into biological protection, recreation, and river corridor protection functions and superimposed the factors from these three aspects to evaluate the town’s greenway suitability [21]. Conine et al. focused on human needs to study the suitability of multi-objective urban greenway planning [28]. Dawson evaluated the priority of regional greenways based on the internal, external, and degree of stress of greenways [29].

The least-cost path (LCP) analysis is a GIS raster-based algorithm, a method mainly proposed by Conine et al. for a linear space. It focuses on the horizontal ecological processes and has been widely used in the planning and design research of large-scale spaces, such as greenways and scenic roads [30,31]. It combines a land suitability assessment with the LCP algorithm and determines the lowest-cost path between the starting point and the destination according to the minimum theoretical cost of the theoretical cumulative cost [27]. The GIS least-cost path analysis is considered to be the most effective tool for path delineation purposes, partly because it is capable of integrating multiple spatial factors into the delineation calculation [27,32]. The LCP can identify the areas that may be affected by a strong material flow and connectivity in the research scope in space [33], which is very consistent with the characteristics of the scenic line in this study. Therefore, the LCP is used as its analysis method [32,34].

1.4. New Contributions and Innovation

Based on this emerging research potential, this study aims to explore a complete and systematic theoretical system that can start from the regional macro whole. Through the unity of the theoretical characterization of the scenic line and the spatial finalization, the author puts forward a new concept of spatial medium, that is, the concept of the organic space system, and expounds its three major structures in detail. The role of research is
mainly reflected in the three core aspects. First of all, organic space can guide the transition of the urban–rural spatial relationship from binary differentiation to integration, and establish a system of a mutual penetration of a regional space. Second, drawing on the attributes of the scenic line, we should systematically integrate, protect, and develop the superior resources and key resources of the regional space. Finally, by establishing the basic pattern of spatial development, we can provide support for the regional ecological landscape, cultural heritage, industrial development, etc.

With the emergence of large-scale regional data, GIS tools, this study attempts to measure the key factors that affect the organic construction of scenic line planning and generate an optimized scenic line suitability analysis to promote the development of the scenic line planning methods by combining classical urban design thinking with regional data and technology. This is in line with the objective law of the existence of its internal mechanism in the organic development process of the scenic line and can provide a reference for the improvement of the function of the scenic line in the future and the expansion of the application scope of the scenic line and its derivative theory.

2. Materials and Methods

In this study, the relevant organic elements in the region were extracted, and the suitability was evaluated based on their weights. This forms a provincial urban–rural spatial organic structure based on the bamboo forest scenic lines through cost path analysis [35–37]. It is divided into the following two parts:

2.1. Research Areas

According to policies, documents, field visits, questionnaires, and other methods, there are currently 12 areas suitable for bamboo growth in Sichuan Province (officially recognized cities or counties), including Yibin City (core area), Chengdu City, Meishan City, Qingshen County, Hongya County, Luzhou City, Guang’an City, Mianyang City, Leshan City, Guangyuan City, Yingjing County, and Dazhu County (other main areas) (Figures 2 and 3).

Figure 2. Location of Sichuan Province.
2.2. Construction Methods

Figure 4 shows the process of the organic construction methods of the bamboo scenic line.

![Diagram of organic construction methods](image)

**Figure 4.** The chart on process of organic construction methods.

2.2.1. Determination of the Construction Elements

Elements refers to the construction elements that affect the degree of achievement of the goal of the institutional construction of the scenic line. In the construction of the scenic line, it is necessary to select elements around the established goal of the construction which represents the decomposition of the construction goal. The selection of the construction
elements is the first step in the suitability evaluation and is also the premise for the success of the scenic spot’s construction. Its selection needs to follow the following principles: ① the construction elements must be within the scope defined by the functional objectives of the scenic line and act on the construction objectives. ② Each construction element is independent to avoid a repeated superposition. ③ The data contained in the construction elements were thorough and detailed. ④ The selected elements must be operable in the context of the data collection.

Based on the combing and the summary of the greenway construction elements by domestic and international researchers in the application of greenway construction, different countries have their preferences for element selection [28,35,38]. In some greenways with large regional scales in Europe and America, the construction elements generally chosen are historical and cultural resources, natural resources, visual resources, the existing green networks, greenway connection points, the main transportation networks, urban centers, and entertainment areas [13,39]. In Singapore, to pay attention to urban protection and the leisure functions, the construction elements are more likely to include leisure squares, the main parks, isolated green belts, protective green spaces, and communities. When building greenways [40], Japan pays attention to the protection of the historical environment and the ecology of cities and villages. The constituent elements are predominantly water systems, mountains, and scenic relics [38,41].

In this paper, we learnt from the analysis and research of bamboo scenic lines by researchers [3,4] that the suitability refers to the analysis of the characteristics of the bamboo scenic lines based on good natural conditions, the landscape environment, transportation, and other infrastructure, combined with the supply and demand scenario of the bamboo industry and the organic connection of the relevant urban and rural spaces, to promote the integrated development of the bamboo scenic line modeling and systematization. Therefore, we mainly selected the elements that affect the construction of the scenic lines by considering the ecology, landscape, infrastructure, and industry aspects. The province’s composition of the landforms, river systems, and mountains is mainly considered in the ecological base layer. As a key factor affecting the construction of the scenic lines, landforms maintain the continuity and integrity of the landscape pattern of the region. These are also key to maintaining urban ecological security. Spatial patterns such as landscape trends are decisive factors in the construction of scenic spots. The construction of scenic spots also depends on tall mountains, undulating ridges, complex rivers, and other natural landscapes [42]. In the landscape pattern layer, we predominantly analyzed the landscape spatial distribution, reflected the evolution trends of its pattern, and explored its internal laws. We also clarified the relationship between the landscape line’s construction and the composition and spatial configuration of the landscape structure [43,44]. At the infrastructure level, the important connection points and their service scope within the province are considered, guaranteeing the implementation and operability of scenic spot construction. Among them, the important connection points are the main towns in the region, which represent the collection centers for service demand, infrastructure, and various other resources. The service scope is to consider the main towns in the region as the core to generate buffer zones with different radii. This reflects the influence and radiation area of the main towns in each area suitable for bamboo. The industrial development layer is divided into three industry types comprised of primary industry, such as the planting of ecological bamboo food, including bamboo shoots and bamboo fungus, and the management of bamboo bases. The second industry includes the processing and manufacturing of bamboo products. The tertiary industry is predominantly bamboo forest tourism with various themes (Table 1).
Table 1. Determination of the construction elements and factors for the bamboo forest scenic lines in Sichuan Province.

| Selection Criteria                                  | Primary Element Layer                  | Secondary Factor Layer                  |
|-----------------------------------------------------|----------------------------------------|-----------------------------------------|
| Ecological: relying on ecological resources         | Ecological base layer                  | Altitude, Slope, River system            |
|                                                     |                                        | Importance of ecosystem services        |
|                                                     |                                        | Ecological sensitivity                  |
| Landscape: study landscape structure                | Landscape pattern layer                | Landscape dominance, Landscape disturbance degree, Landscape fragmentation, Landscape separation, Landscape vulnerability |
| Orientation: connecting demand subjects             | Infrastructure layer                   | Important connection points, Scope of services |
| Particularity: connecting regional industries       | Industrial development layer           | Primary industry, The secondary industry, The tertiary industry |

Among them, the importance of ecosystem services includes important areas with ecological functions such as water conservation, biodiversity maintenance, water and soil conservation, wind prevention, and sand fixation [45–51]. Ecological sensitivity includes the sensitive and vulnerable areas of the ecological environment such as water and soil loss, land desertification, rocky desertification, and salinization [52–55]. Its calculation is based on the NPP quantitative index evaluation method in the Guidelines for Delineation of Ecological Protection Red Line designated by the Ministry of Environmental Protection and the National Development and Reform Commission [56]. The R-value of more than 100 cities was calculated by Professor Wang Wanzhong [57] of the Northwest University of Agriculture, Forestry Science and Technology. He used rainfall data and considered all the factors except for the rainfall erosivity. The data used for analysis, except the rainfall data, were from the Resources and Environment Science and Data Center of the Chinese Academy of Sciences, National Earth System Science Data Center, Remote Sensing Survey and Assessment of National Ecological Conditions, Scientific Data Center for Cold and Dry Areas, China Meteorological Science Data Sharing Service Network, Geospatial data cloud website, National Ecological Environment Survey Database China 1:1 mil Soil Database, and NASA website Geospatial Data Cloud website.

2.2.2. Evaluation Factor Weighting

The entropy weight method is an objective weighting method that is used after quantifying and synthesizing the information of the evaluation object. It has an objective consistency and can accurately reflect potential information from the evaluation system. In this study, various data were collected from the research area, and the weight of the evaluation factor index was obtained according to the weight calculation formula to provide a data basis for the cost path algorithm, as follows [58]:

\[
\begin{align*}
\text{Positive indicator} & : X_{ij} = \left[ \frac{x_{ij} - \min(x_{1j}, x_{2j}, \ldots , x_{nj})}{\max(x_{1j}, x_{2j}, \ldots , x_{nj}) - \min(x_{1j}, x_{2j}, \ldots , x_{nj})} \right] \times 100 \\
\text{Negative indicator} & : X_{ij} = \left[ \frac{\max(x_{1j}, x_{2j}, \ldots , x_{nj})x_{ij}}{\max(x_{1j}, x_{2j}, \ldots , x_{nj}) - \min(x_{1j}, x_{2j}, \ldots , x_{nj})} \right] \times 100
\end{align*}
\]

Among them, it is the number of the \( j \)-th index of the bamboo forest scenic line in the \( i \)-th area.
(2) The proportion \( p_{ij} \) of the \( i \)-th area bamboo forest scenic line is calculated using the index under the \( j \)-th index:

\[
p_{ij} = \frac{x_{ij}}{\sum_{i=1}^{n} x_{ij}}, (i = 1, 2, \ldots, n, \ j = 1, 2, \ldots, m)
\]

(3) To calculate the entropy of the \( j \)-th index:

\[
e_{ij} = -k \sum_{i=1}^{n} p_{ij} \ln(p_{ij})
\]

Among them, \( k > 0, \ k = 1/\ln(n), \ e_j \geq 0 \).

(4) The weight calculation:

\[
w_j = \frac{g_j}{\sum_{j=1}^{m} g_j} (1 < j < m)
\]

Among them, \( g_j = \frac{1-e_j}{m-Ee}, \ Ee=\sum_{j=1}^{m} e_j, \quad 0 \leq 1, \quad \sum_{j=1}^{m} g_j = 1 \).

2.2.3. Cost Path Algorithm

The “cost distance” refers to the “cost” or “price” of moving from one point to another in space. This must be calculated using the cost-distance weighting function [59]. In the analysis process, this study considers the ecological base, landscape pattern, infrastructure, and industrial development in the suitability evaluation system as measurement factors of the cost path. First, the resistance values of the four types of factors were calculated using the Reclassify and Raster Calculator in ArcGIS, and different patch areas were generated according to the resistance values in the region. The larger the low-resistance patch area, the higher the generated primary branch points. The secondary branch points and tertiary branch points are in order, and the potential venation corridor is constructed based on the selected branch points by the minimum cost distance method; that is, the cost distance in ArcGIS is used to calculate the minimum cumulative cost distance of each pixel from the resistance surface or to the minimum cost source on the resistance surface. Finally, the cost path in ArcGIS is used to determine the minimum cost path between the branch points, and the branch points are connected to a line to form a venation corridor [28, 60].

3. Results

3.1. Analysis Results on the Construction Elements of the Bamboo Scenic Line

3.1.1. Ecological Base Layer

(1) Landform and hydrological analysis

We downloaded the ASTER GDEM 30M resolution digital elevation data through the geospatial data cloud website and conducted a topographic analysis, considering such things as the slope, aspect, and topographic relief, and a hydrological analysis, considering such things as the depression filling, as well as a flow direction analysis, a flow analysis, and a river network extraction using ArcGIS software. Figures 5 and 6 show that the elevation in the research areas mainly presents a pattern of being high in the northwest and low in the central east. Most areas have gentle slopes, and steep slopes are predominantly distributed in the western and northern marginal mountains. Figure 7 shows that Sichuan has many rivers and dense river networks.
Figure 5. Elevation analysis of research areas in Sichuan Province.

Figure 6. Slope analysis of the research areas in Sichuan Province.

Figure 7. Hydrological analysis of research areas in Sichuan Province.
(2) Importance of ecosystem services

Figures 8–11 analyze the functions of water and soil conservation, water conservation, windbreak and sand fixation, and biodiversity conservation in the importance of the ecosystem services. Figure 12 shows the results of the comprehensive analysis of the above four indicators. The ecological conditions in the study area are excellent. In the planning process, we should prioritize ecology and protection in areas with “extremely important” ecosystem service functions. For “important” areas, we should appropriately develop suitable industries and resources and that the environment can carry according to the local conditions. We should also strengthen the ecological restoration and environmental protection and maintain the stability of the ecosystem service functions.

Figure 8. Conservation of water and soil analysis of research areas in Sichuan Province.

Figure 9. Water conservation function analysis of research areas in Sichuan Province.
Figure 10. Windbreak and sand fixation function analysis of research areas in Sichuan Province.

Figure 11. Biodiversity conservation functionality analysis of research areas in Sichuan Province.

Figure 12. Distribution of the importance of ecosystem services in research areas of Sichuan Province.
(3) Ecological sensitivity analysis and evaluation

Figures 13–16 analyze the sensitivity assessment of water and soil loss, the sensitivity assessment on the rocky desertification, and the land desertification sensitivity. Based on the integrated analysis of the three types of ecological sensitivity indicators, priority is given to identifying the extremely sensitive ecological spaces. It is then divided into the three levels of “extremely sensitive”, “sensitive”, and “generally sensitive” to obtain an evaluation of the ecological sensitivity of the research area in Sichuan Province (Figure 16) [61].

![Figure 13. Sensitivity assessment of water and soil loss in research areas of Sichuan Province.](image1)

![Figure 14. Sensitivity assessment on rocky desertification in research areas of Sichuan Province.](image2)
3.1.2. Landscape Pattern Layer

Landscape dominance was used to measure the deviation between the landscape and maximum diversity. The greater the diversity index, the smaller the dominance. The degree of landscape disturbance indicates the interference of humans in the landscape. The lower the interference intensity, the more conducive it is to the survival of the organisms. Therefore, receptors are of a greater ecological importance. Landscape fragmentation indicates the degree of landscape segmentation and reflects the complexity of the landscape’s spatial structure. It also reflects the degree of human interference in the landscape to a certain extent. Landscape separation refers to separating the individual distributions of different patch numbers in a specific landscape type. Figures 17–21 show little difference in the study area’s analysis results for the landscape pattern index. The values for landscape fragmentation and separation are relatively small, indicating that the internal forestlands of the core area and other central areas are mainly concentrated, with a strong continuity of vegetation cover and strong ecological benefits.
Figure 17. Landscape pattern index (landscape dominance) of research areas in Sichuan Province.

Figure 18. Landscape pattern index (landscape disturbance degree) of research areas in Sichuan Province.

Figure 19. Landscape pattern index (landscape fragmentation) of research areas in Sichuan Province.
3.1.3. Infrastructure Layer

The infrastructure layer refers to the primary connection points and service scope. This study takes the construction of characteristic towns in the research areas as the reference basis for the primary connection points. Table A1 shows the construction types and locations of the characteristic towns in the region. In this study, the vector points are generated according to the statistical table list, a buffer analysis is carried out based on each vector point with a different radius distance, and the cover service scope for the primary connection points is obtained, as shown in Figure 22.
3.1.4. Industrial Development Layer

The bamboo industry resources were classified in the study area, and the annual output values for the primary, secondary, and tertiary industries were calculated and graded. (Table 2)

**Table 2.** Economic situation of the characteristic towns in the research areas of Sichuan Province.

| City or County       | Yibin City | Chengdu City | Meishan City | Qingshen County, Meishan City | Hongya County, Meishan City | Luzhou City | Guang’an City | Mianyang City | Leshan City | Guanyuan City | Yingjing County, Ya’an City | Dazhu County, Dazhou City |
|----------------------|------------|--------------|--------------|-------------------------------|----------------------------|-------------|---------------|---------------|-------------|--------------|------------------------------|--------------------------|
| **Regional GDP**     | 277.64     | 612.18       | 199.16       | 10.91                         | 19.49                      | 216.98      | 204.32        | 302.45        | 242.68      | 153.01       | 12.63                        | 60.46                    |
| (100 million yuan)   |            |              |              |                               |                            |             |               |               |             |              |                              |                          |
| **Primary industry** | 277.64     | 612.18       | 199.16       | 10.91                         | 19.49                      | 216.98      | 204.32        | 302.45        | 242.68      | 153.01       | 12.63                        | 60.46                    |
| **Secondary industry** | 1308.92   | 5244.62      | 527.13       | 35.21                         | 36.13                      | 1021.86     | 410.98        | 1151.34       | 801.88      | 389.68       | 24.17                        | 143.17                   |
| **Tertiary industry** | 1015.33   | 1155.85      | 653.91       | 40.99                         | 70.24                      | 424.42      | 635.14        | 1402.41       | 818.75      | 399.16       | 37.76                        | 167.28                   |

3.2. Establishment of the Bamboo Scenic Line Evaluation System

By consulting the satellite map (the satellite map uses the image downloaded by the all-purpose electronic map downloader, and the original data are a Google Maps image), the statistical yearbook for the research areas, and the other relevant data, the original data were obtained for each index in the index layer. The entropy weight method was used to calculate the weight of each factor, combined with the field investigation of the research areas and suitability research based on a GIS analysis by the relevant researchers [62]. A suitability evaluation system for the bamboo scenic line was established (Table 3).
Table 3. Evaluation system for the construction of the bamboo scenic line in Sichuan Province.

| Primary Elements | Weight | Secondary Factors | Weight | Gradation | GIS Assignment |
|------------------|--------|-------------------|--------|-----------|----------------|
| Importance of ecosystem services | 0.208 | 0-0.098 | 9 | 0.098-0.157 | 7 |
| | | 0.157-0.220 | 5 | 0.220-0.300 | 3 |
| | | 0.300-0.757 | 1 | | |
| Ecological sensitivity | 0.127 | 0.560-0.984 | 9 | 0.436-0.560 | 7 |
| | | 0.336-0.436 | 5 | 0.239-0.336 | 3 |
| | | 0-0.239 | 1 | | |
| Ecological base layer | 0.39 | Buffer zone beyond 25 km | 9 | 10 km buffer zone | 7 |
| | | 5 km buffer zone | 5 | 3 km buffer zone | 3 |
| | | 1.5 km buffer zone | 1 | | |
| River system | 0.01 | 15-25 degrees | 9 | 5-15 degrees | 7 |
| | | 3-5 degrees | 5 | <3 degrees | 3 |
| | | | | | |
| Slope | 0.02 | >25 degrees | 9 | 15-25 degrees | 7 |
| | | 5-15 degrees | 5 | 3-5 degrees | 3 |
| | | <3 degrees | 1 | | |
| Altitude | 0.025 | 2689-7845 | 9 | 1775-2689 | 7 |
| | | 1125-1775 | 5 | 639-1125 | 3 |
| | | 82-639 | 1 | | |
| Landscape pattern layer | 0.12 | 0.000000972–0.000001396 | 9 | 0.000000591–0.000000972 | 7 |
| | | 0.000000306–0.000000591 | 5 | 0.000000102–0.000000306 | 3 |
| | | 0.000000027–0.000000102 | 1 | | |
| Landscape fragmentation | 0.011 | 0.000860776–0.000923264 | 9 | 0.000505579–0.00055579 | 7 |
| | | 0.00034425–0.00044425 | 5 | 0.00017986–0.00024425 | 3 |
| | | 0.000084605–0.000179862 | 1 | | |
| Landscape separation | 0.013 | 0.081-0.096 | 9 | 0.073–0.081 | 7 |
| | | 0.061–0.073 | 5 | 0.047–0.061 | 3 |
| | | 0-0.047 | 1 | | |
| Landscape vulnerability | 0.02 | Buffer zone beyond 25 km | 9 | 10 km buffer zone | 7 |
| | | 5 km buffer zone | 5 | 3 km buffer zone | 3 |
| | | 1.5 km buffer zone | 1 | | |
| Infrastructure layer | 0.21 | 10.91–60.45 | 9 | 60.45–153.01 | 7 |
| | | 153.01–204.32 | 5 | 204.32–302.45 | 3 |
| | | 302.45–612.18 | 1 | | |
| Primary industry | 0.076 | Buffer zone beyond 25 km | 9 | 10 km buffer zone | 7 |
| | | 5 km buffer zone | 5 | 3 km buffer zone | 3 |
| | | 1.5 km buffer zone | 1 | | |
| Scope of services | 0.079 | 24.17–143.16 | 9 | 143.16–527.13 | 7 |
| | | 527.13–801.88 | 5 | 801.88–1308.92 | 3 |
| | | 1308.92–5244.62 | 1 | | |
| Industrial development layer | 0.28 | Buffer zone beyond 25 km | 9 | 10 km buffer zone | 7 |
| | | 5 km buffer zone | 5 | 3 km buffer zone | 3 |
| | | 1.5 km buffer zone | 1 | | |
| Industrial development layer | 0.28 | 37.76–399.16 | 9 | 399.16–653.91 | 7 |
| | | 653.91–1015.33 | 5 | 1015.33–1402.41 | 3 |
| | | 1402.41–11,155.85 | 1 | | |
3.3. Results on Cost Path Analysis of the Bamboo Scenic Line

3.3.1. Resistance Sides

As shown in Figure 23, the resistance-side coefficient is inversely proportional to the suitability of constructing a scenic line; the lower the resistance value, the better the regional benefits. Therefore, the regions with the highest suitability include Yibin, Chengdu, Leshan, Qingshen, Hongya, Luzhou, and Meishan.

Figure 23. Analysis of resistance sides of research areas in Sichuan Province.

3.3.2. Petioles

As shown in Figure 24, the results show that the distribution of primary and secondary petioles is relatively average, but there are still a small number of areas driven by petioles. Therefore, it is necessary to accelerate the construction of more petioles, strengthen the connection between the adjacent petioles to form a networking group, and prioritize the radiation effect to cover the entire research area.

Figure 24. Distribution of petioles of research areas in Sichuan Province.
3.3.3. Veins

(1) Main veins’ structure

As shown in Figure 25, the overall distribution trend for the main veins of the scenic line was northwest to southeast. The distribution of the main vein system for the bamboo forest scenic line conforms to the trend for the ecological corridor in the study area. The north- and south-central veins connect the primary and secondary branches of the two locations, respectively, which form the main skeleton of the organic vein system. It has a robust connectivity and the ability for a function accumulation, integrates useful regional functions, breaks through the regional boundary restrictions, connects with long lines, drives the links between the regions, and promotes a rapid development of the region.

Figure 25. Distribution of main veins of research areas in Sichuan Province.

(2) Branch veins’ structure

As shown in Figure 26, the branch is generally an extension of the main vein, which supplements and improves the function and cover of the organic vein system. This was conducive to promoting the flow and spread of the bamboo landscapes. The core task for the main vein is to form a key pattern of ecological security, regional economy, and industrial development, however, it has not formed a complete cover in the region. The divergence of the branches compensates for this deficiency and forms a linear spatial connection. This drives the development of the regional economy through the resource advantages. However, it constructs a spatial pattern for the regional ecology, culture, and resources and improves the foundation for a sustainable regional development.

Figure 26. Distribution of branch veins of research areas in Sichuan Province.
(3) Fine veins’ structure

As shown in Figure 27, the fine veins of the bamboo scenic line are extensions of the main and branch veins. According to the different resource advantages for the region, they are mainly concentrated in the middle of the research areas, and in-depth penetration is guided by the spatially dominant resources and the current spatial development pattern.

Figure 27. Distribution of fine veins of research areas in Sichuan Province.

3.4. Results of Organic Construction of the Bamboo Scenic Line

Superimposing the three organic vein components of the resistance sides, petioles, and veins, a suitable layout for the Sichuan bamboo scenic line was obtained. That is, there were two main veins, two thin veins, multiple branches, one primary main branch point, five primary, secondary branches, one secondary main branch point, and four major secondary branches. This shows the suitability layout of “one heart, multiple points, two main and three secondary veins” (Figure 28). Finally, a provincial bamboo scenic line organic construction pattern of “one point, two axes and three belts” will be formed, in which “one point” refers to radiating to the surroundings with Yibin City as the core. “Two axes” refers to the “Chengdu–Yibin” axis and the “Mianyang” axis, which run through the north and south of the region, connecting multiple resource collection points to drive regional development. “Three belts” refer to the “Qingyi River–Minjiang River belt”, “Longmen mountain belt,” and the “Qujiang River belt”.

Figure 28. Suitability layout of research areas in Sichuan Province.
4. Discussion and Conclusions

4.1. Comparison with the Existing Provincial Bamboo Scenic Lines Industry Development Planning

In 2019, according to the resource distribution and development foundation, the Sichuan Provincial Party Committee and the Sichuan Provincial Government proposed the industrial development pattern planning of “a group of two areas and three belts” for the provincial bamboo landscape (Figure 29). The bamboo industry cluster in southern Sichuan focuses on 14 counties (districts) in Yibin, Luzhou, Leshan, and Zigong, which strive to build a modern bamboo industry development group with an agglomeration of factors. They also aim to integrate three industries with strong competitiveness and strive to build a bamboo industry development highland in western China. The Chengdu Plain bamboo cultural and creative zone focuses on ten counties (cities and districts) of Chengdu and Meishan. It strives to build an international bamboo industry cultural and creative pilot zone characterized by bamboo research and development, a bamboo expo, bamboo exhibition, bamboo training, bamboo weaving, and bamboo decoration. The giant panda habitat bamboo tourism area focuses on the areas involved in the Giant Panda National Park and strives to build a prototype bamboo tourism demonstration area characterized by a giant panda bamboo-eating landscape. The Qingyijiang bamboo industrial belt focuses on eight counties (districts) in Ya’an City, Meishan City, and Leshan City. It strives to build an integrated development belt characterized by bamboo charcoal, bamboo fiber, and bamboo cultural tourism. The Longmenshan bamboo industrial belt focuses on six counties (cities) in Chengdu, China. We will strive to build a high-end industrial belt characterized by western Sichuan bamboo forest plates, organic bamboo shoots, and bamboo products. The Qujiang bamboo industrial belt focuses on the five counties (cities, districts) of Dazhou and Guang’an. We will strive to build an emerging industrial belt characterized by high-performance bamboo-based fiber composites and bamboo commodity manufacturing [63].

![Figure 29. Industrial development pattern planning of “a group, two areas, and three belts” for the bamboo scenic line in Sichuan Province.](image-url)
County, Hongya County, Leshan City, and Chengdu Meishan Qingshen County. However, differences were also observed, mainly in the direction of the scenic line. For example, according to the petiole analysis for Guang’an City and Dazhu County, their branch trend is east–west, while the northeast–southwest in the industrial planning and development layout shows a slight offset. According to the distribution of the branches, Chengdu–Yibin, the main vein, accumulates, diffuses, and integrates resources in the north–south and east–west directions, forming the main vein from southeast to northwest. Another main vein in Mianyang City shows a similar development trend. There are two main reasons for these differences. Industrial planning and layout focus on the industrial elements, while the organic elements of this study are more comprehensive, considering not only the industrial conditions but also the ecological conditions, landscape conditions, and infrastructure conditions, so there are differences in the results. To reduce the construction cost and avoid natural damage, as well as reflecting the efficiency of animal movement, material flow, energy flow, and information flow, this paper introduces the “cost path” analysis method in the construction of the scenic line, emphasizing the shortest vein path formed under the premise of minimum cost, so there may be some differences in the results.

4.2. Suitability Evaluation Based on GIS Cost Path Analysis

Currently, most of the coupling the between suitability analysis and GIS technology is used in planning and designing scenic lines [9]. After comparing the development in the existing industries, it is found that the organic construction of the scenic line in this study can clarify the degree of resistance different regions may face during the development. It can also deeply reflect the important position of the region and the direction of different veins, which are important for analyzing the availability of resources and the protection value. Further planning has a more effective guiding significance. This is the significance of introducing the concept of being “organic”, which is also an innovation. This differs from the traditional suitability analysis method based on vertical ecological processes. It applies cost path analysis to the construction of the scenic line, obtains the evaluation results for the scenic line’s suitability, and determines the spatial pattern of the scenic line, which provides a new direction for future planning ideas.

4.3. Limitations

In China, the construction of scenic lines has not been used extensively as a planning method. However, considering China has considerable potential for protecting and using natural and cultural resources, the planning methods need to be changed. Using scenic lines can promote changes in regional natural scenic resource planning. Most scenic line construction uses GIS combined with a suitability evaluation and analysis. GIS technology is an effective means of understanding the environmental parameters and quickly and efficiently obtaining information. A suitability evaluation and analysis is the most direct method for determining whether it is suitable for development by integrating this information, providing a solid foundation for scenic line planning proposals.

This study uses a GIS planning method to replace the traditional planning method, which is scientific and progressive; however, there are also some limitations. The first is the acquisition of basic data. The more the data are modified, the more accurate the result. However, it is still challenging to obtain modified data. The team collected and screened the four element layers in this study as much as possible using the existing methods. The second is the choice of the pilot. Due to the large area of the province, the team could not take all the bamboo areas in Sichuan Province into account; they could only prioritize 12 officially recognized areas rich in bamboo resources in the representative pilot experiments. Compared to the study of the entire region of Sichuan Province, the results may also be different. Regional differences are also observed. By comparing the research results with the existing industrial planning layout, it was found that they were consistent. In Sichuan, the selection of the indicators for the suitability evaluation of the bamboo scenic lines is effective. However, for other provinces and cities that need to build bamboo scenic
lines or other characteristic scenic lines, it is also necessary to adjust the index selection according to the local conditions and establish a bamboo scenic line or other characteristic scenic lines with the characteristics of other provinces.

Under the dual influence of national leaders and science, the scenic line with Chinese characteristics also reflects the changes in ideology, use mode, and scale in the evolution process, that is, from protection and production or beautification to ecology and multi-purpose and from small-scale fragmentation to systematic regional and national networks. Under the background of China’s existing relevant policies, such as “new urbanization” and “rural revitalization”, the urban temporary population gradually began to return to the countryside. The countryside also began to reflect the nature of cities and towns under the concentration of the population. Urban and rural areas gradually integrated, leading to a joint regional development. In the process of this realization, the construction of scenic lines is rising and firmly grasping the demand of regional thought, providing natural services and artificial services on a large scale, developing the integration of cities and villages in an organic way, and creating a greener, more livable, and more economically dynamic environment.

4.4. Conclusion and Prospect

In this study, through a GIS cost path analysis and the suitability evaluation method, we reflected on the accumulation, integration, allocation, and diffusion of bamboo resources and material energy in space, providing a theoretical support for further deepening the control planning and landscape design of provincial bamboo landscapes. We introduced an organic context system for a suitability evaluation compared to traditional scenic line construction. Based on the original theoretical support, we introduced new concepts and ideas. In gradual realization, we have created more collaborative, livable, and economically dynamic urban and rural environments, which has provided a development direction and exploration path for the emerging land space planning and design, regional planning and design, etc.

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## Appendix A

### Table A1. Construction types and locations of characteristic towns in the research areas of Sichuan Province.

| Research Areas | Tourism and Leisure Type | Modern Agricultural Type | Commercial Logistics Type | Processing and Manufacturing Type | Cultural Creativity Type | Science and Technology Education Type |
|----------------|----------------------------|--------------------------|---------------------------|-----------------------------------|-------------------------|---------------------------------------|
| Yibin City     | Shihai Town, Xingwen County, Longhua Town, Pingshan County | Jiangnan Town, Nanxi District, dipeng Town, Jiang'an County, Dawo Town, Gaoxian County, Tengda Town, Junlian County, Wangjia Town, Geng County | Caiba Town, Cuiping District, Nixi Town, Yibin County | Peishi Town, Nanxi District, Gaochang Town, Yibin County, Tongzi Town, Jiong'an County, Gongguan Town, Geng County | Lijiazhuang Town, Cuiping District, Shuanghe Town, Changning County |
|                |                            |                          |                           |                                   |                         |                                       |
| Wenzhou City   | Wugong Town, Jining County, Xianzhe Town, Dayi County | Fuhong Town, Qiongxiang District | Banzhuanyuan Town, Xindu District | Puyang Town, Dujiangyan City, Puxing Town, Xinjin County | Luodai Town, Longquan Town, Huayuan Town, Chongzhou City | Deyuan Town, Pidedu District, Lichuan Town, Pengzhou City |
|                |                            |                          |                           |                                   |                         |                                       |
| Meishan City   | Yangzhou Town, Pengshan District, Hangyang Town, Qinghe County | Wengong Town, Renshou County | Chaoyang Town, Cuiping District, Nixi Town, Yibin County | Peishi Town, Nanxi District, Gaochang Town, Yibin County, Tongzi Town, Jiong'an County, Gongguan Town, Geng County | Zhibo Town, Hongya County |
|                |                            |                          |                           |                                   |                         |                                       |
| Luzhou City    | Yangzhou Town, Hangyang County, Shuangzhou Town, Gulin County | Fenhuailing Town, Jiangyin District, Daqiao Town, Hejiang County | Shidong Town, Longmatan District | Huangyang Town, Jiangyang District, Dadukou Town, Nanxi District, Taihu Town of Luoxian County, Longfeng Town of Xuying County | Xinghua Town, Longmatan Town, Xinmatan Town, Xuying County | Hemian Town, Nanxi District, Yuxian Town, Luxian County |
|                |                            |                          |                           |                                   |                         |                                       |
| Guang'an City  | Feilong Town, Wusheng County | Guantang Town, Qianfeng District, Mingyue Town, Huaying City | Hu'an Town, Qianfeng District, Liemian Town, Wusheng County | Zhongtai Town, Guan'an District, Haixi Town, Happy Town, Huaying City, Gaota Town, Linshau County | Yongxiang Town, Huaying City | Xiexing Town, Guang'an District |
|                |                            |                          |                           |                                   |                         |                                       |
| Mianyang City  | Xiangyang Town, Pingwu County, Qingyang Town, Santai County | Jiezi Town, Youxian District | Xuzhou Town, Zitong County | Sengy Town, Youxian District, Jiepai Town, Anzhou District | Riversidetown, Fucheng District, Chenkang Town, Youxian District, Qionglan Town, Jianguo City, Yuli Town, Beichuan County | Qingyi Town, Fucheng District, Huaibding Town, Jiangyou City |
|                |                            |                          |                           |                                   |                         |                                       |
| Leshan City    | Ruigu Town, Qianwei County, Jiaian Town, Mian County, Heizhugou Town, Ebian Yi Autonomous County | Fuli Town, Shawan District, Jiajiong County, Huiyang Town, Jiajiong County | Fuxi Town, Emenshan City | Jinshan Town, Wuchangqiao District, Jianian Town, Shawan District | Suiji Town, Shizhoutong District, Zhuyuan Town, Jinyang County |
|                |                            |                          |                           |                                   |                         |                                       |
| Guangyuan City | Zengqia Town, Chaofan District, JIANMENGUAN Town, Jiange County | Wuqiong Town, Cangxi County | Hongyan Town, Zhaohua District, Yuanhe Town, Jiange County | Zhongzi Town, Chaofan District | Guanzhuang Town, Qingchuan County | Pu'an Town, Jiange County, Zhuyuan Town, Qingchuan County |
|                |                            |                          |                           |                                   |                         |                                       |
| Dazhu County   | Wumu Town, Dazhu County | Yangxia Town, Dazhu County |                              |                                   |                         |                                       |
References

1. GB50137-2011; Code for Classification of Urban Land Use and Planning Standards of Development Land. Ministry of Housing and Urban-Rural Development of the People’s Republic of China: Beijing, China, 2012.

2. Feng, Y. Spatial Restructure and Society Transformation Investigation and Analytical Study of Evolvement of the Five Small Towns in the Middle Area of China; Tsinghua University: Beijing, China, 2006.

3. Qi, B. Research and Demonstration of Bamboo Forest Landscape Model Construction; China Science Publishing & Media Ltd.: Beijing, China, 2022.

4. Fan, S.-M. Sichuan Bamboo Landscape; China Forestry Publishing House: Beijing, China, 2020.

5. Sichuan Forestry and Grassland Administration. Sichuan 14th Five Bamboo Industry High Quality Development and Bamboo Landscape Line High Quality Construction Planning; 2021. Available online: https://www.sc.gov.cn/10462/c108551/2021/11/11/4e8f08c960dc4851a709455f986d5af/files/44dcae254c25410ca69cb284e11cb6.pdf (accessed on 2 December 2021).

6. Saarinen, E. The City. Its Growth. Its Decay. Its Future. J. Aesthet. Art Crit. 1945, 3, 87–88.

7. Wu, L. Introduction to Sciences of Human Settlements; China Architecture Publishing & Media Co. Ltd.: Beijing, China, 2001.

8. Zheng, X.; Sun, M.; Chen, Y.; Wang, X. Evaluation of regional ecotourism suitability based on GIS and artificial neural network approach toward ATV trail planning. Appl. Geogr. 2008, 28, 248–258. [CrossRef]

9. Ryan, K.-L.; Flink, C.A. Introduction and Overview: The Greenway Movement, Uses and Potentials of Greenways; Elsevier: Amsterdam, The Netherlands, 1995; pp. 1–13.

10. Ahern, J. Greenways as a planning strategy. Landsc. Urban Plan. 1995, 33, 131–155. [CrossRef]

11. Fabos, J.G. Introduction and Overview: The Greenway Movement, Uses and Potentials of Greenways; Elsevier: Amsterdam, The Netherlands, 1995; pp. 1–13.

12. Fabos, J.G. Greenway planning in the United States: Its origins and recent case studies. Landsc. Urban Plan. 2004, 68, 321–342. [CrossRef]

13. Von Haaren, C.; Reich, M. The German way to greenways and habitat networks. Landsc. Urban Plan. 2006, 76, 7–22. [CrossRef]

14. Qu, L.; Fu, B.; Calabrese, L. Beyond the Greenways: A People-Centered Urban Planning and Design Approach for Shenzhen, the World Factory in Transition. In Proceedings of the 8th Conference of the International Forum Urbanism, Sciforum (MDPI), Incheon, Republic of Korea, 22–24 June 2015.

15. Force, U.T.; Rogers, R. Towards an Urban Renaissance: Final Report of the Urban Task Force; E & FN Spon: New York, NY, USA, 1999.

16. Song, X.P.; Tan, Y.T.; Edwards, P.; Richards, D. The economic benefits and costs of trees in urban forest stewardship: A systematic review. Urban For. Urban Green. 2018, 29, 162–170. [CrossRef]

17. McGarr, I. Earth with Nature; American Museum of Natural History: New York, NY, USA, 1969.

18. Steiner, F. Resource suitability: Methods for analyses. Environ. Manag. 1983, 7, 401–420. [CrossRef]

19. Searns, R.M. The evolution of greenways as an adaptive urban landscape form. Landsc. Urban Plan. 1995, 33, 65–80. [CrossRef]

20. Miller, W.; Collins, M.G.; Steiner, F.R.; Cook, E. An approach for greenway suitability analysis. Landsc. Urban Plan. 1998, 42, 91–105. [CrossRef]

21. Zheng, Q.; Sun, M.; Chen, Y.; Wang, X. Evaluation of regional ecotourism suitability based on GIS and artificial neural network model: A case study of Zhejiang Province, China. Chin. J. Ecol. 2006, 25, 1345–1441.

22. Guo, X.; Fan, J.; Zhu, W.; Yan, D. Ecological suitability of olive in Sichuan Province: Fuzzy comprehensive evaluation based on GIS. Chin. J. Ecol. 2010, 29, 586–591.

23. Wen, Z.; Fan, W. Greenway and its Functions in Urban Areas. Urban Plan. Int. 2000, 3, 40–43.

24. Tang, Z.; Ye, Y.; Jiang, Z.; Fu, C.; Huang, R.; Yao, D. A data-informed analytical approach to human-scale greenway planning: Integrating multi-sourced urban data with machine learning algorithms. Urban For. Urban Green. 2020, 56, 126871. [CrossRef]

25. Liu, Y.W.; Li, Z.; Tang, Z.; Zhang, Y.; Ren, P. Greenway network design of Great West River Pilot Area in Changsha City, Hunan Province of South-central China based on suitability analysis and GIS. Chin. J. Ecol. 2012, 31, 426–432.

26. Teng, M.; Wu, C.; Zhou, Z.; Lord, E.; Zheng, Z. Multipurpose greenway planning for changing cities: A framework integrating priorities and a least-cost path model. Landsc. Urban Plan. 2011, 103, 1–14. [CrossRef]

27. Conine, A.; Xiang, W.-N.; Young, J.; Whitley, D. Planning for multi-purpose greenways in Concord, North Carolina. Landsc. Urban Plan. 2004, 68, 271–287. [CrossRef]

28. Dawson, K.J. A comprehensive conservation strategy for Georgia’s greenways. Landsc. Urban Plan. 1995, 33, 27–43. [CrossRef]

29. Atkinson, D.M.; Deadman, P.; Dudycha, D.; Traynor, S. Multi-criteria evaluation and least cost path analysis for an arctic all-weather road. Appl. Geogr. 2005, 25, 287–307. [CrossRef]

30. Snyder, S.A.; Whitmore, J.H.; Schneider, L.E.; Becker, D.R. Ecological criteria, participant preferences and location models: A GIS approach toward ATV trail planning. Appl. Geogr. 2008, 28, 248–258. [CrossRef]

31. Bloß, L.; Heiland, S.; Hokema, D. A Greenway for Sustainable Mobility. Master’s Thesis, Technische Universität Berlin, Berlin, Germany, 2016.
35. Giordano, L.d.C.; Riedel, P.S. Multi-criteria spatial decision analysis for demarcation of greenway: A case study of the city of Rio Claro, São Paulo, Brazil. *Lands. Urban Plan.* 2008, 84, 301–311. [CrossRef]

36. Wu, J. Establishment of Vernacular Landscape Corridor in Greenway System: A Case Study of Zengcheng in Guangdong Province. *Chin. Lands. Archit.* 2014, 30, 36–39.

37. Zhou, P.; Wu, X.; Tao, D.; Yan, H. Multi-objectives Green Corridor Planning: The Prairie Silk Road Case. *Planners* 2014, 30, 121–126.

38. Yokohari, M.; Amemiya, M.; Amati, M. The history and future directions of greenways in Japanese New Towns. *Lands. Urban Plan.* 2006, 76, 210–222. [CrossRef]

39. Jongman, R.H.; Külvik, M.; Kristiansen, I. European ecological networks and greenways. *Lands. Urban Plan.* 2004, 68, 305–319. [CrossRef]

40. Tan, K.W. A greenway network for Singapore. *Lands. Urban Plan.* 2006, 76, 45–66. [CrossRef]

41. Asakawa, S.; Yoshida, K.; Yabe, K. Perceptions of urban stream corridors within the greenway system of Sapporo, Japan. *Lands. Urban Plan.* 2004, 68, 167–182. [CrossRef]

42. Wen, T. Research on Suitability Evaluation of the GreenWay Route Selection in County Territory—Taking Xingan County of as an Example; Chengdu University of Technology: Chengdu, China, 2018.

43. Forman, R.T.; Godron, M. *Landscape Ecology*; John Wiley & Sons: New York, NY, USA, 1986; Volume 4.

44. Tumer, M.G.; Garner, R.H. *Quantitative Methods in Landscape Ecology*; Springer: New York, NY, USA, 1991.

45. Chan, K.M.A.; Shaw, M.R.; Cameron, D.R.; Underwood, E.C.; Daily, G.C. Conservation planning for ecosystem services. *PLoS Biol.* 2006, 4, e379. [CrossRef]

46. Termorshuizen, J.W.; Opdam, P.; Van den Brink, A. Incorporating ecological sustainability into landscape planning. *Lands. Urban Plan.* 2007, 79, 374–384. [CrossRef]

47. Grét-Regamey, A.; Walz, A.; Bebi, P. Valuing ecosystem services for sustainable landscape planning in Alpine regions. *Mt. Res. Dev.* 2008, 28, 156–165. [CrossRef]

48. De Groot, R.S.; Alkemade, R.; Braat, L.; Hein, L.; Willemen, L. Challenges in integrating the concept of ecosystem services and values in landscape planning, management and decision making. *Ecol. Complex.* 2010, 7, 260–272. [CrossRef]

49. Benedict, M.A.; McMahon, E.T. *Quantitative Methods in Landscape Ecology*; John Wiley & Sons: New York, NY, USA, 2007.

50. Gómez-Baggethun, E.; Barton, D.N. Classifying and valuing ecosystem services for urban planning. *Ecol. Econ.* 2013, 86, 235–245. [CrossRef]

51. Lant, C.L.; Roberts, R.S. Greenbelts in the Cornbelt: Riparian wetlands, intrinsic values, and market failure. *Environ. Plan. A* 1990, 22, 1375–1388. [CrossRef]

52. Mesterton-Gibbons, M. A consistent equation for ecological sensitivity in matrix population analysis. *Trends Ecol. Evol.* 2000, 15, 115. [CrossRef]

53. Eggermont, H.; Verschuren, D.; Audenaert, L.; Lens, L.; Russell, J.; Klaassen, G.; Heiri, O. Limnological and ecological sensitivity of Rwenzo mountain lakes to climate warming. *Hydrobiologia* 2010, 648, 123–142. [CrossRef]

54. Butt, M.A.; Nisar, K.; Mahmood, S.A.; Sami, J.; Qureshi, J.; Jaffer, G. Toward GIS-based approach for identification of ecological sensitivity areas: Multi-criteria evaluation technique for promotion of tourism in Soon Valley, Pakistan. *J. Indian Soc. Remote Sens.* 2019, 47, 1527–1536. [CrossRef]

55. Bai, Y.; Guo, R. The construction of green infrastructure network in the perspectives of ecosystem services and ecological sensitivity: The case of Harbin, China. *Glob. Ecol. Conserv.* 2021, 27, e01534. [CrossRef]

56. National Development and Reform Commission of the People’s Republic of China. *Guideline for Delineation of Ecological Conservation Redline*; 2017. Available online: https://www.mee.gov.cn/gkml/hbb/bgt/201707/W02017072838397753220005.pdf (accessed on 8 June 2022).

57. Wang, W.Z.; Jiao, J.Y. Quantitative Evaluation on Factors Influencing Soil Erosion in China. *Bull. Soil Water Conserv.* 1996, 16, 1–20.

58. Li, A.; Yue, C.; Meng, Q. Comprehensive Measures of Urbanization Development Quality and Spatial Autocorrelation Features. *J. Liupanshui Norm. Univ.* 2016, 28, 1–6.

59. Yuan, Y.; Cheng, Y. Research on Parametric Route Selection in Landscape Environment. *Chin. Lands. Archit.* 2015, 31, 36–40.

60. ESRI. ArcGIS Desktop Help 10.1. *Creating the Least Cost Path*. 2012. Available online: http://resources.arcgis.com/en/help/main/10.1/index.html#//009z00000021000000 (accessed on 10 April 2016).

61. Ministry of Natural Resources of the People’s Republic of China. Guidelines for the Evaluation of the Carrying Capacity of Natural Resources and the Environment and the Suitability of Land and Space Development (for Trial Implementation). 2020. Available online: http://www.gov.cn/zhengce/zhengceku/2020-01/22/5471523/files/7aa9dd04662b49a69bdf41f071e3d85.pdf (accessed on 10 June 2021).

62. Zhou, Q. Study on Suitability Evaluation of Route Selection in Rural Industry Greenway. *Chin. Lands. Archit.* 2021, 37, 89–94.

63. The People’s Government of Sichuan Province. Opinions of the Sichuan Provincial Committee of the Communist Party of China and the People’s Government of Sichuan Province on Promoting the High-Quality Development of the Bamboo Industry and Building the Beautiful Rural Bamboo Forest Landscape. 2018. Available online: https://www.sc.gov.cn/10462/10464/10797/2019/11/8/e8c09de8f1d24202859351d6e12275f1.shtml (accessed on 12 June 2021).