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Research on Quality Evaluation of Landscape Resources and Its Spatial Visualization in the Chengdu-Chongqing Yangtze River Tourism Corridor

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Abstract: The Chengdu-Chongqing Yangtze River Tourism Belt is a core area for the construction of the Yangtze National Cultural Park. Scientifically evaluating its landscape quality is of great significance for regional cultural and tourism integration and ecological value conversion. This paper constructs an 8-indicator evaluation system containing two dimensions of visual perception and resource endowment, coupling Analytic Hierarchy Process (AHP) and GIS spatial analysis technology to quantitatively measure and spatially visualize the corridor landscape quality. The results show that: (1) The spatial differentiation of landscape quality is significant, showing a gradient pattern of "High in East, Low in Middle, Stable in West". The high-value area is concentrated in the Fuling to Wushan section of Chongqing, and the low-value area is embedded in the Chongqing main city urban area. (2) Indicator weights show that Openness and Naturalness are the dominant factors, with a combined weight of over 42%, indicating that visual corridor permeability and ecological endowment authenticity are the core of quality evaluation. (3) The high-intensity urbanization process produces a "double shielding" effect on the core high-weight factors, which is the main cause of the "collapse" of landscape quality in the middle section. Based on this, a segmented differentiated control strategy of strict protection in the east section, restoration and improvement in the middle section, and optimization and enhancement in the west section is proposed, so as to provide a scientific basis for the planning of the Yangtze National Cultural Park.

Keywords: Landscape Quality; Spatial Visualization; Chengdu-Chongqing Yangtze River Tourism Belt; GIS; AHP.

1. Introduction

As a crucial symbol of Chinas national image and civilization, the high-quality development of the tourism belt along the Yangtze River basin has become an integral part of the national strategy. With the in-depth implementation of the Plan for the Construction and Protection of the Yangtze River National Cultural Park and the advancement of the Chengdu-Chongqing Twin-City Economic Circle, creating a Yangtze River Cultural Tourism Corridor with international influence holds significant importance for promoting the regional integration of culture and tourism and facilitating the conversion of ecological value. As a core metric for measuring the attractiveness and competitiveness of tourist destinations, tourism landscape quality not only relates to tourists visual experiences and aesthetic perceptions but also directly impacts the conservation efforts and development potential of regional tourism resources. Therefore, scientifically and quantitatively evaluating the landscape quality of the Chengdu-Chongqing Yangtze River Tourism Corridor and identifying its spatial differentiation characteristics are prerequisites for achieving the optimal allocation of tourism space in this region.

Research on landscape quality evaluation has undergone a paradigm shift from "objective reality" to "subject-object co-construction"[1]. Early studies mostly focused on static assessments of resource endowments based on the formal aesthetic principles of the expert school. With the development of environmental psychology, the landscape preference theory proposed by Kaplan et al. incorporated perceptual dimensions such as "openness" and "mystery" into the evaluation system, emphasizing the dominant role of visual experience [2]. In recent years, scholars at home and abroad have further expanded evaluation perspectives, ranging from rural landscapes and urban spaces to road corridors, constructing multi-dimensional indicator systems covering naturalness, cultural value, visual aesthetics, and restorativeness[3].However, existing studies predominantly rely on qualitative or semi-quantitative methods such as the Analytic Hierarchy Process (AHP) and Scenic Beauty Estimation (SBE). These methods struggle to intuitively reveal the spatial distribution patterns of landscape elements when dealing with large-scale linear corridor spaces and are susceptible to interference from subjective experience [4]. As the advantages of GIS technology in spatial analysis and multi-source data fusion become prominent, it has provided a new technical paradigm for tourism landscape evaluation[5].However, research on comprehensive spatial evaluation of landscape quality that couples visual perception dimensions with resource endowment dimensions under the complex terrain conditions of the upper Yangtze River remains relatively scarce[6].Particularly in the Chengdu-Chongqing section, the most economically active and densely populated region in the upper Yangtze, the spatial pattern and driving mechanisms of landscape quality remain unclear, failing to meet the needs for refined management and control of the Yangtze River National Cultural Park [7].

This study focuses on the Chengdu-Chongqing Yangtze River Tourism Corridor and establishes an evaluation indicator system encompassing the dual dimensions of visual perception and resource endowment. Employing methods such as GIS spatial overlay analysis and Geodetector, this paper conducts quantitative measurement and spatial visualization of the corridors landscape quality. This study aims to reveal the spatial differentiation patterns and the distribution of cold and hot spots of landscape quality in the Chengdu-Chongqing Yangtze River Tourism Corridor, and to

identify the dominant factors influencing the spatial differentiation of landscape quality. The findings are expected to provide a scientific basis and decision support for the formulation of plans for the Yangtze River National Cultural Park and the high-quality development of regional tourism.

2. Overview of the Study Area and Data Sources

2.1. Study Area

The geographical scope of the Chengdu-Chongqing Yangtze River Tourism Corridor primarily encompasses the section of the Yangtze River main stem flowing through Sichuan Province and Chongqing Municipality, along with its radiating influence zone. Defined by the Yangtze River main stem as the central axis, the core study area consists of a buffer zone extending 3.5 kilometers to both banks. This region spans the southeastern edge of the Sichuan Basin and the parallel ridge-valley region, featuring complex and diverse topography and geomorphology, including hills, low mountains, and river valley plains. The study area is rich in tourism resources. In terms of natural landscapes, it possesses world-class resources such as the Three Gorges of the Yangtze River and the Southern Sichuan Bamboo Sea. In terms of cultural landscapes, it integrates Ba-Yu culture, Three Kingdoms culture, and Red culture, making it the most concentrated zone of culture and tourism resources in the upper reaches of the Yangtze River. However, this region also faces challenges such as high ecological sensitivity, unbalanced urban-rural development, and landscape homogenization. Selecting this region as a case study holds typical representativeness for exploring landscape quality evaluation and spatial management of the corridor.

2.2. Data Sources

This study utilizes a combination of multi-source geospatial data and socio-economic data to ensure the objectivity and comprehensiveness of the evaluation results. All spatial data uniformly adopt the CGCS2000 coordinate system and undergo preprocessing such as projection transformation, clipping, resampling, and topology checks in ArcMap software. The main data sources are shown in Table 1.

Table 1. Data Sources

Data Content	Data Source
Digital Elevation Model (DEM)	Geospatial Data Cloud (GDEM)
Land Use/Cover Data	Resource and Environment Science and Data Center
Administrative Boundaries and Water System Vectors	National Geomatics Center of China
Traffic Road Network Data	OpenStreetMap (OSM)
Tourist Attractions, Cultural Relics and Historic Sites	Captured via Amap (Gaode Map) API Interface

3. Construction of Indicator System and Calculation Methods

Visual landscape characteristics serve as the foundation for stimulating tourists emotional responses. Based on the aforementioned theoretical framework and principles, this study established eight core visual landscape characteristic indicators, as listed in Table2: Coherence [8], Complexity [9], Legibility [10], Mystery[11], Naturalness [8], Openness [12],Cultural Character[13],and Management Perception[14].

Openness refers to the capacity and potential for lines of sight to extend over grand scenery. Viewshed openness comprises three core components: the viewpoint, the viewshed, and the observation objects. The viewpoint represents the location where tourists observe the landscape. The viewshed is centered on the tourists vantage point and represents the visible field of view when looking around. Observation objects primarily refer to the landscapes and backgrounds observable by tourists, including buildings, grasslands, vegetation, water bodies, etc. The viewshed calculation was conducted using the ArcMap software environment. In the code, a Z-factor of 1.7m was added to the anchor point to represent human eye height. Considering that the field of view is limited by various factors, the default maximum visible distance was set to 3.5 km. Through viewshed analysis implemented for each point, the viewshed area for each point was obtained.

Coherence refers to the degree of dominance and integrity exhibited by the landscape spatial structure within the viewshed. From the perspectives of landscape ecology and geographic information science, highly coherent landscapes typically manifest as large-scale, continuous, and homogeneous land use/cover patches. This study utilizes land use type data for the Chengdu-Chongqing region, comprising nine categories: water bodies, trees, flooded vegetation, plants, built-up areas, bare land, snow/ice, clouds, and pasture. Using the Intersect tool in GIS software, the land use layer was intersected with the viewshed extent. Subsequently, the intersected data were analyzed using a frequency statistics tool to quantify the land patches within each viewshed area. This process yields the area of the largest connected natural landscape patch within the dominant land cover type for each points field of view, thereby deriving the Coherence Index for each point. The calculation formula is defined as follows:

$$\text{Coherence} = \frac{\text{A}_{\max}}{\text{A}_{\text{visible}}} \quad (1)$$

Where A_{max} denotes the area of the largest connected natural landscape patch within the land cover type that occupies the largest area in the viewshed. $A_{visible}$ denotes the total area of the viewshed.

Complexity refers to the richness of landscape elements and structures, aiming to identify the optimal state of "moderate complexity." The study constructs the Complexity indicator based on two dimensions: land cover diversity and edge density. Land cover diversity is quantified using Shannons Diversity Index (SHDI), which comprehensively reflects the richness of land use types and the uniformity of their area distribution within the viewshed. The calculation formula is as follows:

$$\text{K}_1 = -\sum_{\text{i=1}}^{\text{n}} \text{p}_\text{i} \ln \text{p}_\text{i} \quad (2)$$

Where p_i represents the proportion of the area of the i-th land cover type within the viewshed window. *K1* represents the Shannon Diversity Index of land cover types, and *n* is the total number of types.

Edge density (K2) reflects the total length of land patch boundaries and is related to the volume of visual information.

The calculation formula is as follows:

$$K_2 = \frac{L_{edge}}{A_{visible}} \quad (3)$$

Where L_{edge} represents the total length of all land cover patch boundaries within the viewshed.

The final Complexity is calculated as:

$$\text{Complexity} = w_{k1} \cdot K_1 + w_{k2} \cdot K_2 \quad (4)$$

Complexity comprises land cover diversity (K1) and edge density (K2). w_1 and w_2 are the corresponding weights; typically, w1=w2=0.5 is adopted based on research requirements.

Legibility measures the clarity and spatial recognizability of linear elements within the viewshed. Its connotation is embodied in the accessibility of the road network and the prominence of water body boundaries, forming a visual guidance system composed of the "path skeleton" and "waterfront contour."

This study utilizes road data from the Sichuan-Chongqing region, comprising nine road types: main roads, secondary roads, expressways, branch roads, crosswalks, rural roads, bicycle paths, and highways. In GIS calculations, roads are typically represented as linear elements, while water bodies are presented as the boundaries of polygon elements. To comprehensively assess this characteristic, this paper constructs a Legibility indicator (E) that integrates the total length of water shorelines and the total length of the road network. The calculation formula is as follows:

$$E = \alpha \cdot P_w + \beta \cdot L_r \quad (5)$$

Where P_w represents the sum of the perimeters of all water patches within the viewshed, L_r represents the total length of all road centerlines within the viewshed, and α and β are the weight coefficients for water prominence and path clarity, respectively. Based on expert experience, both are assigned a value of 0.5 in this study.

Mystery depicts the characteristic of landscape space that stimulates the observers desire to explore due to occlusion, winding patterns, and unknownness. It is primarily manifested in the geometric form of the path system; specifically, the more winding and twisting the road, the more difficult it is for the line of sight to penetrate, resulting in a stronger sense of spatial depth and unknownness. Therefore, this paper constructs the Mystery indicator ($I_{mystery}$) centered on path tortuosity. The calculation formula is as follows:

$$I_{mystery} = \frac{L_{path}}{D_{straight}} \quad (6)$$

Where L_{path} represents the total length of roads within the viewshed, and $D_{straight}$ represents the straight-line distance between the start and end points of these paths.

Naturalness measures the degree to which natural elements dominate the landscape. Its connotation is embodied in the spatial purity and area advantage of natural land use types (forest land, grassland, water bodies, wetlands).

Using GIS software, the viewshed was intersected with land use data, and the area of various land types was calculated using statistical tools. Natural land types and anthropogenic interference were separated and quantified by comparing the area of natural land versus artificial land. A regulation coefficient was introduced to amplify the negative impact of artificial interference. The Naturalness (N) calculation formula is as follows:

$$N = \frac{A_{visible}}{A_{nat} + k \cdot A_{art}} \quad (7)$$

Where A_{nat} represents the area of natural land (forest, grassland, water bodies, wetlands) within the viewshed, and A_{art} represents the area of artificial land (built-up areas, bare land) within the viewshed. kis a regulation coefficient (>1) used to amplify the negative impact of artificial land; typically,k=2 is set based on experience.

Cultural Character refers to the enrichment and prominence of cultural elements such as historical features, traditional architecture, and folk symbols within the landscape. In GIS, this is manifested as the spatial aggregation of cultural Points of Interest (POIs), such as cultural heritage sites and historical blocks, as well as areas retaining traditional spatial fabric. By intersecting the anchor point viewshed with POI data from the Sichuan-Chongqing region, cultural POIs within each anchor points viewshed were counted. Based on the number of cultural POIs within the viewshed, the Cultural Character indicator (C) is constructed. The calculation formula is as follows:

$$C = \sum_{1}^{n} b_i \quad (8)$$

Where b_i represents the quantity of various cultural POIs within the viewshed. A higher indicator value indicates denser and more diverse cultural POIs within the viewshed, more prominent historical features and traditional fabric, stronger cultural connotation and readability borne by the landscape, and a deeper humanistic experience for visitors.

Management Perception measures the orderliness and accessibility characteristics formed by human construction and maintenance activities within the landscape, manifested as the density of the traffic network composed of high-grade paved roads. As the most direct linear landscape elements of anthropogenic intervention, the density of paved roads directly reflects the accessibility and management intensity of the region. By intersecting the viewshed with road data, the Management Perception indicator (M) is constructed. The calculation formula is as follows:

$$M = \frac{\sum_{1}^{n} R_i}{A_{visible}} \quad (9)$$

Where R_i represents the length of the i-th segment of paved road within the viewshed, and n represents the total number of paved road segments within the viewshed.

Table 2. Visual Landscape Indicators

Indicator	Calculation Method
Openness	Viewshed analysis area value
Coherence	Statistics from intersection of land use types and viewshed polygons
Complexity	Statistics from intersection of land use types and viewshed polygons
Legibility	Statistics from intersection of water body data, road data, and viewshed polygons
Mystery	Calculation of road path tortuosity within the viewshed
Naturalness	Statistics from intersection of land use types and viewshed polygons
Cultural Character	Intersection of POI data and viewshed polygons
Management Perception	Statistics from intersection of road data and viewshed polygons

4. Calculation and Analysis of Corridor Landscape Quality

4.1. Construction of Tourism Corridor Viewpoints

In the visual landscape calculation for the Yangtze River tourism corridor in the Chengdu-Chongqing region, given that the main stem of the Yangtze River within the entire Chengdu-Chongqing region extends over 900 kilometers, performing calculations for the whole area poses significant computational challenges. Therefore, this study utilized ArcMap software to construct the centerline of the Yangtze River in the Chengdu-Chongqing region. Viewpoints were then generated at 1km intervals along this line, resulting in 945 viewpoints. Viewshed analysis was conducted using ArcMap to obtain the visual landscape attributes for each point. The visual results from all viewpoints were used to represent the visual landscape of the entire Chengdu-Chongqing Yangtze River corridor.

4.2. Data Processing and Normalization

The eight indicators-Openness, Coherence, Complexity, Legibility, Mystery, Naturalness, Cultural Character, and Management Perception-were calculated individually. The resulting eight landscape indicators possess different units and numerical ranges. To eliminate the influence of units and ensure comparability between different indicators, facilitating subsequent comprehensive evaluation analysis, the original indicator values required normalization to map them within the [0, 1] interval. This study adopted the Min-Max Normalization method, which linearly maps original data to the [0, 1] range through linear transformation. The calculation formula for any indicator is as follows:

$$x' = \frac{x - x_{min}}{x_{max} - x_{min}} \tag{10}$$

Where x_{min} and x_{max} represent the minimum and maximum values of a certain indicator across all samples, respectively. After the above transformation, the range of x' is [0, 1]. The processed data eliminated the influence of original units, bringing all indicators to the same order of magnitude. Through the above data processing, normalized values for the eight landscape indicators were obtained, laying the foundation for subsequent analysis.

4.3. Determination of Indicator Weights

The study invited five experts with backgrounds in landscape planning to form an expert panel. Each expert possessed over five years of research experience and had a deep understanding of visual landscape quality assessment, comprising both academics and practitioners. A questionnaire regarding the importance of landscape indicators was designed, asking experts to score the significance of these indicators in landscape quality assessment. First, relevant information about this study was introduced to each expert, followed by the distribution of questionnaires to each panel member, ensuring anonymity to avoid individual bias. The scoring process underwent two rounds: the first involved independent scoring, and the second involved feedback and correction. After two rounds, expert opinions converged. The scores from the second round were taken as the final values. Ultimately, weights for the eight indicators were obtained, as shown in Table 3: Openness, Coherence, Complexity, Legibility, Mystery, Naturalness, Cultural Character, and Management Perception.

Experts unanimously agreed that Openness and Naturalness are typically the core factors in landscape quality assessment, with weights of 0.2224 and 0.2028, respectively. Next were Cultural Character, Coherence, and Mystery, which also held relatively high importance, with values of 0.1566, 0.1187, and 0.1026, respectively. Finally, Complexity, Management Perception, and Legibility were generally considered to be of lesser importance, with weights of 0.0822, 0.0582, and 0.0565, respectively.

Table 3. Indicator Weights

Indicator	Weight	Importance
Naturalness	0.2028	Important
Cultural Character	0.1566	Moderate
Mystery	0.1026	Moderate
Complexity	0.0822	Unimportant
Openness	0.2224	Important
Legibility	0.0565	Unimportant
Coherence	0.1187	Moderate
Management Perception	0.0582	Unimportant

Based on the weights obtained in Table 3, the landscape score for each viewpoint can be calculated. The calculation formula is as follows:

$$LC = \sum_{1}^{n} w_i \cdot lc_i \tag{11}$$

Where LCrepresents the calculated landscape evaluation score of the viewpoint; i represents the landscape indicator element, totaling 8 categories; lc_i represents the score of the *i-th* influencing element at the viewpoint; w_i represents the weight of the *i-th* indicator.

4.4. Spatial Distribution Characteristics of Chengdu-Chongqing Yangtze Visual Landscape

Research results indicate that the landscape characteristics of the Yangtze River tourism belt in the Chengdu-Chongqing region exhibit significant "east-west differentiation and obvious segmentation" in space, deeply influenced by topographical evolution and human development. As shown in Figure 1,Hydrologically, the entire study area belongs to the upper reaches of the Yangtze River. To facilitate spatial differentiation analysis, the "upper, middle, and lower reaches" mentioned below specifically refer to the relative locations within the corridor, corresponding spatially to the "western, central, and eastern sections." The Western Section (relatively upstream) ranges from Hejiangmen, Yibin, Sichuan to Jiangjin District, Chongqing, located in basin hills, corresponding to the medium landscape quality zone. The Central Section (relatively midstream) ranges from Jiangjin District to Fuling District, Chongqing, covering the main urban area, corresponding to the low landscape quality zone. The Eastern Section(relatively downstream) ranges from Fuling District to Wushan County, Chongqing (Sichuan-Chongqing boundary), located in the Three Gorges Valley, corresponding to the high landscape quality zone.

Based on natural breaks, the comprehensive score of landscape quality in the Chengdu-Chongqing Yangtze River Tourism Corridor was divided into five levels: Low Quality, Medium-Low Quality, Medium Quality, Medium-High

Quality, and High Quality. The spatial distribution pattern is shown in the figure. Overall, the landscape quality in the study area presents a distribution characteristic of "riverine belt extension, significant spatial heterogeneity, and a distinct East-High West-Low gradient." First, high-value landscape quality areas are distributed in a "bead-like" clustered pattern. High Quality and Medium-High Quality zones are mainly concentrated in the eastern section of the corridor, specifically the core area of the Three Gorges Reservoir from Fuling to Wushan, Chongqing. This section has high landscape quality scores and good spatial connectivity, indicating that this segment possesses a high-quality background of landscape resources. Second, low-value landscape quality areas are distributed in a patchy mosaic pattern. Low Quality and Medium-Low Quality zones are mainly scattered in the central section of the corridor, particularly in Chongqings main city and surrounding areas with high urbanization density, forming obvious landscape quality depression zones. Finally, the western section of the corridor is dominated by Medium Quality zones, with stable landscape quality performance, lacking extreme value zones, and exhibiting small spatial fluctuations.

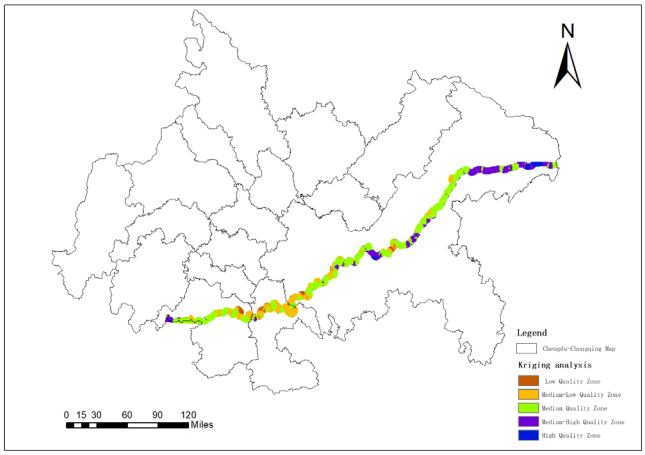

Fig. 1 Landscape Quality distribution

4.5. Analysis of Driving Mechanisms for Spatial Differentiation of Landscape Quality

The indicator weight system determined based on the Analytic Hierarchy Process (AHP) shows that Openness and Naturalness are the top two dominant factors influencing the landscape quality of the Chengdu-Chongqing Yangtze River Tourism Corridor, with a combined weight of 42.52%; Cultural Character and Coherence follow; while Management Perception and Legibility have relatively lower weights. This weight structure indicates that the expert group generally believes the core of corridor landscape quality lies in the permeability of visual corridors and the authenticity of the ecological background, rather than post-developed artificial management facilities.

High-High Coupling of Visual Openness and Natural Background. * * The reason why the eastern section of the corridor has become a high-value cluster area for landscape quality lies in its significant advantages in high-weight indicators. First, this section is located in the Three Gorges Canyon area, where the open river surface and steep cliffs on both banks form a strong visual contrast. Main viewpoints such as the Kuimen of Qutang Gorge and the Goddess Peak of Wushan have excellent viewshed coverage, providing tourists with a grand visual experience, resulting in extremely high scores for the highest-weighted Openness indicator. Second, the canyon area has a high vegetation coverage rate and less artificial construction land, ensuring high scores for the second-weighted Naturalness indicator. In addition, this section is also the core carrying area of Three Gorges culture, with high scores for the Cultural Character indicator, further consolidating the high-quality level. Therefore, the eastern section is a typical "Visual Experience + Ecological Background" dual-driven high-quality area, where the superposition effect of advantages in high-weight indicators is obvious.

"Dual Occlusion" of Core High-Weight Factors by Urban Construction.The landscape quality "collapse" appearing in the central section of the corridor is essentially a dual weakening of the two core high-weight indicators by the urbanization process. On the one hand, dense high-rise building clusters and bridge facilities have formed visual barriers on most riverside interfaces, blocking the extension of lines of sight towards the river surface and the opposite bank, significantly reducing the Openness of the landscape. Since this indicator has the highest weight, the negative impact of its score decline on comprehensive quality is amplified. On the other hand, high-intensity land development has led to natural surfaces being replaced by artificial impervious surfaces, causing a significant decrease in the Naturalness indicator score. Although tourism service facilities in this area are perfect, and scores for Management Perception and Legibility are high, since the combined weight of these two indicators accounts for only about 11.5%, their positive contribution cannot compensate for the huge score loss caused by the decline in Openness and Naturalness. This reveals that in landscape quality evaluation, artificial service facilities cannot replace the value of core landscape resource backgrounds; if urban development ignores visual corridor protection, it will significantly weaken the overall landscape quality of the corridor.

Homogeneous Geomorphology Limits the Performance of High-Weight Factors.The landscape quality of the western section of the corridor is overall at a medium level, mainly limited by geomorphological features restricting high-weight indicators. This section is located in the hilly and plain坝 (dam/flat) area of the Sichuan Basin, with flat terrain and less visual obstruction; the Openness indicator performs well, which is the basis for its ability to maintain a medium-quality zone. However, due to the lack of vertical drop and visual impact of canyon geomorphology, the Naturalness of the landscape is relatively weaker than that of the eastern section, and landscape types are mostly farmland and low hills, with medium scores for Complexity and Cultural Character. With a high score in "Openness" but medium scores in "Naturalness" and "Cultural Character," the weighted comprehensive quality manifests as a stable medium-value zone, lacking the drive to form extreme-value zones.

5. Conclusion and Discussion

5.1. Conclusion

This study reveals the spatial pattern of landscape quality in the Chengdu-Chongqing Yangtze River Tourism Corridor through GIS spatial visualization and AHP weight evaluation. The findings are as follows:

First, the spatial differentiation of landscape quality in the Chengdu-Chongqing Yangtze River Tourism Corridor is

significant, showing a gradient pattern of "East High, Central Low, West Stable." High-value landscape quality areas are mainly concentrated in the eastern section (Fuling to Wushan, Chongqing); this section relies on the Three Gorges canyon geomorphology, having the highest landscape quality scores and the best connectivity. Low-value areas are embedded in the central section (Jiangjin to Fuling, Chongqing), significantly affected by the urbanization of the main city. The western section (Yibin, Sichuan to Jiangjin, Chongqing) is dominated by medium-quality areas, with small spatial fluctuations.

Second, Visual Openness and Natural Background are the core factors determining landscape quality.The weight calculation results show that the combined weight of Openness and Naturalness exceeds 42%, higher than Cultural Character and Management Perception. This indicates that under the background of the Yangtze River National Cultural Park construction, tourists and experts are more inclined to perceive macro visual corridors and ecological authenticity rather than single cultural nodes or artificial facilities.

Third, Human activity intensity is negatively correlated with landscape quality. In the central urban dense area, building occlusion leads to lower "Openness" scores, and land development leads to a decline in "Naturalness." Although "Management Perception" scores are high, they cannot compensate for the disadvantages of core background indicators, confirming the shielding effect of excessive urbanization on the landscape quality of linear corridors.

5.2. Discussion

Traditional tourism evaluations mostly focus on resource grades or cultural values; the weight results of this study reveal the importance of a "Perception-Based" standard. The priority of the Openness weight indicates that in large-scale linear corridors, the continuity of visual corridors is more critical than discrete cultural points. This echoes Kaplans Landscape Preference Theory, namely the human instinctive preference for"Prospect-Refuge" spaces. The core value of the Chengdu-Chongqing Yangtze Corridor lies not only in "what exists" but also in "what can be seen"; future evaluations should incorporate more perception indicators such as viewshed analysis.

The phenomenon of landscape quality "collapse" in the central section reveals the dilemma of landscape protection in the process of rapid urbanization. High-intensity land development, although improving traffic accessibility and service facility levels, cuts off the visual connection between mountains and water bodies, reducing landscape Coherence. This hints that in the construction of the Chengdu-Chongqing Twin-City Economic Circle, we need to be wary of "Constructive Destruction"; city skyline control should yield to the visual permeability of the Yangtze River landscape corridor.

The Chengdu-Chongqing Yangtze River Tourism Corridor should implement a differentiated planning strategy of "Section-Specific Policies and Precision Control." For the eastern high-quality cluster area, the core lies in maintaining the highest-weighted Openness and Naturalness indicators; it is necessary to strictly control building height and development intensity within the viewshed of main viewpoints in the Three Gorges Canyon area, protect the integrity of the original geomorphological contour lines and visual corridors, and avoid damage to high-weight factors. For the quality collapse area in the central section caused by the urbanization occlusion effect, focus should be placed on riverside space restoration; by controlling riverside building setbacks and constructing permeable greenways, reshape the visual pattern of "revealing mountains and exposing water," balance the contradiction between urban development and landscape permeability, and compensate for the shortage of Openness scores. For the landscape homogenization problem in the western section, focus should be placed on enhancing Landscape Complexity and Cultural Character; break landscape monotony by introducing regional cultural nodes and optimizing vegetation community structures. Overall, planning should shift from single resource protection to spatial governance emphasizing both visual perception and ecological background, to achieve high-quality sustainable development of the Yangtze River National Cultural Park.

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