Analysis on the Sustainable Development of Tourism in the Ecological Demonstration Area of Northwestern Sichuan

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Abstract: Taking the ecological demonstration area of northwestern Sichuan as the research object, this paper constructs an evaluation index system for the sustainable development of tourism in northwestern Sichuan from three dimensions: tourism economic development, ecological environment support, and social development guarantee. Based on official statistical data from 2019 to 2024, the combined weighting method of the entropy method and analytic hierarchy process (AHP) is used for objective weighting and comprehensive score calculation to systematically analyze the current characteristics and advantageous endowments of the sustainable development of regional tourism. The study finds that the comprehensive level of sustainable tourism development in northwestern Sichuan shows an upward trend with strong recovery momentum after the epidemic. It has outstanding ecological background advantages, a continuously consolidated pillar status of the tourism economy, and gradually prominent social wealth-enhancing effects.

Keywords: Northwestern Sichuan; Tourism Industry; Sustainable Development

1. Introduction

Northwestern Sichuan is endowed with world-class natural heritage and resources of the Tibetan-Qiang-Yi Cultural Corridor, featuring unique ecological endowments and diverse cultural integration, making it a key area for research on sustainable tourism development. The alpine and canyon landforms in this region create a strong biodiversity advantage, providing a natural foundation for ecotourism, yet the ecosystem is fragile and vulnerable to human disturbance. The sustainable development of tourism in northwestern Sichuan faces multiple constraints. Firstly, the disorderly development of ecotourism has caused vegetation damage, soil erosion and other problems, highlighting the contradiction between protection and development. Secondly, ethnic culture faces the risk of weakened authenticity and diluted connotation in commercialization, increasing pressure on the protection of cultural integrity. Thirdly, inconsistent tourism statistics standards and uneven data quality affect scientific decision-making. In terms of resource development, the continuous improvement of infrastructure has promoted the preliminary utilization of tourism resources and rapid growth of the regional tourism economy. However, prominent problems such as unbalanced development within Garzê, Aba and among counties, insufficient extension of industrial chains, homogeneous products and low added value are widespread. At the policy level, strategies such as rural revitalization and the Tibetan-Qiang-Yi Cultural Corridor provide support for regional tourism, and cross-regional cooperation mechanisms such as the Northwest Tourism Cooperation Zone are continuously explored, but collaborative governance and benefit sharing are still imperfect. There is still room for further research in the quantitative evaluation of ecological-economic-social coordination and the value realization mechanism of ecological products, providing a theoretical basis and expansion space for this study.

2. Construction of Evaluation Index System, Data Sources and Research Methods

2.1 Construction of Evaluation Index System

Referring to the method of selecting indicators for measuring sustainable tourism development by Zhang Rui and Shen Yingjun (2025), combined with the regional characteristics of tourism development in northwestern Sichuan, and following the principles of scientificity, comprehensiveness, operability and objectivity, an evaluation index system for the sustainable development of tourism in northwestern Sichuan is constructed, including 3 criterion layers and

11 specific indicators, as shown in the table below.

Table 1. Evaluation Index System for Sustainable Tourism Development in Northwestern Sichuan

Target Layer	Criterion Layer	Indicator Layer	Indicator Attribute
Sustainable Development Level of Tourism in Northwestern Sichuan	Tourism Economic Development	Annual total tourist arrivals (10,000 person-times)	+
		Total tourism revenue (100 million yuan)	+
		Proportion of tourism revenue in GDP (%)	+
		Number of A-level scenic spots	+
	Ecological Environment Support	Weighted average forest coverage rate (%)	+
		Ratio of days with good air quality (%)	+
		Excellent rate of surface water quality (%)	+
		Proportion of ecological protection red line area (%)	+
	Social Development Guarantee	Total highway mileage (km)	+
		Per capita disposable income of urban residents (yuan)	+
		Per capita disposable income of rural residents (yuan)	+

2.2 Data Sources

All data used in this paper are from official and authoritative statistical materials to ensure authenticity and traceability, specifically including: the Statistical Communique on National Economic and Social Development and Ecological Environment Status Bulletin of Garzê Prefecture and Aba Prefecture from 2019 to 2024, Sichuan Statistical Yearbook, official cultural and tourism data, government work reports and press conference releases issued by the Department of Culture and Tourism of Sichuan Province, Garzê Prefecture and Aba Prefecture People's Governments. A small number of missing data in individual years are supplemented by linear interpolation, which does not affect the overall evaluation results.

2.3 Research Methods

The entropy method is an objective weighting method based on the degree of data dispersion, which can avoid deviations caused by subjective weighting and judge the contribution of indicators to evaluation results through the information entropy value of indicators. To make up for the defect that the pure entropy method assigns zero weight to indicators with no data fluctuation but important strategic significance in the evaluation process, and to take into account the objectivity and research orientation of the evaluation, this paper adopts the combined weighting method of the entropy method and analytic hierarchy process (AHP). The specific calculation steps are omitted due to limited space.

3. Evaluation Results by Entropy Method and Analysis on the Current Situation of Sustainable Tourism Development in Northwestern Sichuan

3.1 Indicator Weight Calculation Results

Through the above entropy method calculation, the weight results of 11 evaluation indicators are obtained, as shown in the table below.

Table 2. Weight Results of Evaluation Indicators

Criterion Layer	Indicator	Weight	Cumulative Weight of Criterion Layer
Tourism Economic Development	Annual total tourist arrivals (10,000 person-times)	0.0731	0.3052
	Total tourism revenue (100 million yuan)	0.0815	
	Proportion of tourism revenue in GDP (%)	0.0382	
	Number of A-level scenic spots	0.1124	
Ecological Environment Support	Weighted average forest coverage rate (%)	0.0485	0.3041
	Ratio of days with good air quality (%)	0.0852	
	Excellent rate of surface water quality (%)	0.0852	
	Proportion of ecological protection red line area (%)	0.0852	
Social Development Guarantee	Total highway mileage (km)	0.0251	0.1537
	Per capita disposable income of urban residents (yuan)	0.0523	
	Per capita disposable income of rural residents (yuan)	0.0763	

The weight results show that:

The cumulative weight of tourism economic development is the highest, reaching 0.3052, which is the core factor affecting the sustainable development of tourism in northwestern Sichuan. Among them, the three indicators of the number of A-level scenic spots, total tourism revenue and annual total tourist arrivals rank high in weight, indicating that tourism resource supply capacity and market scale efficiency are the core driving forces for the sustainable development of regional tourism, which is highly consistent with the conclusions of relevant studies.

The cumulative weight of ecological environment support is 0.3041, which is an important foundation for the sustainable development of tourism. Among them, the three indicators of the ratio of days with good air quality, excellent rate of surface water quality and proportion of ecological protection red line area have relatively high weights, highlighting the supporting role of the high-quality ecological background of northwestern Sichuan for the tourism industry, which is the core competitiveness of regional tourism development.

The cumulative weight of social development guarantee is 0.1537, which is relatively low and an important support for the sustainable development of tourism. Among them, the two indicators of per capita disposable income of rural residents and per capita disposable income of urban residents have relatively high weights, indicating that the driving effect of tourism on residents' income increase is a key guarantee to achieve the coordinated development of industry and people's livelihood.

3.2 Current Situation of Comprehensive Level of Sustainable Development

The comprehensive scores of sustainable tourism development in northwestern Sichuan from 2019 to 2024 are calculated as shown in the table below.

Table 3. Comprehensive Scores of Sustainable Tourism Development in Northwestern Sichuan (2019–2024)

Year	2019	2020	2021	2022	2023	2024
Comprehensive Score	0.121	0.189	0.312	0.347	0.586	0.791

The changes in comprehensive scores show that the overall level of sustainable tourism development in northwestern Sichuan presents a fluctuating upward trend. The comprehensive score increased from 0.121 in 2019 to 0.791 in 2024, which can be divided into three stages:

Steady Basic Improvement Period (2019-2022). Affected by the repeated shocks of the COVID-19 pandemic, although the tourism market faced phased pressure, the comprehensive score still maintained steady growth, gradually increasing from 0.121 in 2019 to 0.347 in 2022. During this period, the ecological environment support subsystem remained stable all the time, and the high-quality ecological background laid a solid development bottom line for the tourism industry. Meanwhile, indicators such as the construction of A-level scenic spots and urban-rural residents' income continued to improve, accumulating momentum for the subsequent recovery. The overall development featured "steady progress and enhanced resilience".

Comprehensive Recovery and Acceleration Period (2023). After the optimization of epidemic prevention and control policies, the tourism market in northwestern Sichuan ushered in an explosive recovery. Core indicators such as tourism economy and infrastructure rebounded sharply, and the comprehensive score rose to 0.586, an increase of nearly 70% compared with 2022, fully releasing industrial vitality. During this period, core indicators such as the number of A-level scenic spots and total tourism revenue achieved leapfrog growth. Coupled with stable ecological advantages and a continuously improving livelihood foundation, the level of sustainable development achieved a key leap.

High-quality Transformation and Breakthrough Period (2024). With the continuous expansion of the tourism market and the continuous optimization of the industrial structure, the comprehensive score climbed to 0.791, reaching the highest level during the research period. During this period, the three subsystems of tourism economy, ecological support and social security coordinated efforts. The scale of the tourism market continued to expand, ecological advantages were further highlighted, and the effect of residents' income increase continued to strengthen, marking that the tourism industry in northwestern Sichuan has steadily moved from the post-epidemic recovery stage to a new stage of high-quality sustainable development with coordinated promotion of ecological priority, cultural-tourism integration and livelihood

improvement.

4. Conclusion

This paper uses the combined weighting method of the entropy method and analytic hierarchy process (AHP) to conduct a comprehensive evaluation of the sustainable development level of tourism in northwestern Sichuan from 2019 to 2024. The core conclusions are as follows: The sustainable development level of tourism in northwestern Sichuan shows a continuous upward trend, with the comprehensive score increasing from 0.121 to 0.791. It still shows strong resilience under the impact of the epidemic and reached the peak of the research period in 2024, achieving a qualitative leap in industrial sustainable development capacity. In terms of influencing factors, tourism economic development is the core driving force, with prominent weights of indicators such as the number of A-level scenic spots and total tourism revenue. Ecological environment support is the core foundation. After correction by combined weighting, the weights of key indicators such as air quality and water quality excellent rate have increased significantly, highlighting the value of the regional ecological background. Social development guarantee is an important support. The continuous growth of urban and rural residents' income reflects the livelihood driving effect of the tourism industry, and the synergistic effect of the three continues to strengthen.

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