
High Quality Development of Ecotourism Along the Middle and Lower Reaches of the Yellow River Based on Big Data

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Abstract

The Yellow River basin is an important economic zone and an important ecological barrier in China. The ecological environment protection of the Yellow River basin is an important direction for the development of ecotourism. Promoting the ecological protection and high-quality development of the Yellow River basin through ecotourism can realise the rational utilisation of ecological resources development and environmental protection functions. This paper takes wetland scenic spots as the main research object, and under the guidance of high-quality development theory, environmental education theory, education evaluation and other related theories, conducts field research on the current situation of eco-tourism environmental education in wetland scenic spots in the Yellow River basin. Based on the expert opinions and literature analysis, the evaluation index system of ecotourism environment of wetland scenic spots in the Yellow River basin is constructed. The Yellow River estuary and sand lake ecotourism scenic spots are selected as the case sites, and the entropy weight fuzzy comprehensive evaluation method is used for comprehensive evaluation, and the reasons for the evaluation results are analysed. This model has laid a theoretical foundation for the research on the high-quality development of ecotourism along the middle and lower reaches of the Yellow River in the context of big data.

Keywords: Yellow River basin, ecological barrier, ecological environment protection, ecological tourism.

1. Aims and Background

Environmental education plays a very important role in the sustainable development of the Yellow River basin and effective protection of heritage resources, tourist management and experience¹. Environmental education can enable tourists to correctly understand the value and significance of the environment, so that tourists can form correct environmental values and environmental responsibility^{2,3}. The lack of environmental knowledge and environmental protection behaviour of tourists is the biggest obstacle in the current development process of ecotourism⁴⁻⁷. The environmental education of ecotourism can not only popularise environmental knowledge to tourists, but also improve some bad behaviours of tourists. For decades, although great achievements have been made in harnessing the Yellow River, the Yellow River basin still has the problems of fragile ecological environment and poor development quality⁸. The development of eco-tourism environmental education conforms to the development trend of ecological protection in the Yellow River basin, enriches the content of eco-tourism environmental education that needs to be supplemented, and also plays a positive role in promoting people's environmental protection concepts and specific ecological protection behaviours. Therefore, how to carry out ecotourism environmental education for tourists, so as to improve tourists' awareness of ecological

environment protection, has certain enlightenment for promoting the high-quality development of the Yellow River basin.

2. Basic Overview of Wetland Scenic Spots in the Yellow River Basin

Wetland scenic area is one of the most important scenic areas in the Yellow River basin. It is of great practical significance to analyse its basic situation. The wetland areas in the Yellow River basin mainly include the Yellow River Delta Wetland, the wetland in the source area of the Yellow River, the wetland in Hetao Plain, Inner Mongolia, the wetland in Ningxia Plain, the wetland in Ruorgai Grassland, the wetland in Maowusu Sand, the wetland in Sanmenxia Reservoir Area, and the wetland in the lower reaches of the river^{9,10}. The total area accounts for about 8% of the total area of wetlands in China, nearly 2.8 million ha. It can be seen that the total wetland area of the Yellow River basin is not large, and the coverage rate of wetlands is lower than the national average, but the quality of wetlands is excellent, mainly natural wetlands.

The Yellow River originates from the area above Duoshixia in Maduo County, with a large number of wetlands concentrated in its source area. Ruorgai Wetland is one of the key biodiversity regions in China. The Ningxia Plain was formed in the river channel alluvial deposits. The types of wetlands mainly include lake wetlands and river wetlands, which play an important role in water retention, flood storage and water resource regulation. The Hetao Plain wetland is mainly composed of proluvial and alluvial landforms, located inland, and its water source is mainly from the artificially diverted Yellow River from May to October each year.

Wetland scenic spots in the Yellow River basin are rich in wetland tourism resources, which can be mainly divided into human tourism resources and natural tourism resources. Among them, human tourism resources mainly include cultural relics and historical sites and ethnic customs, while natural tourism resources mainly include wetland natural resources and rare species.

In recent years, the Yellow River has achieved good results in harnessing, but the shrinking area and declining quality of the Yellow River wetlands have not been fundamentally curbed, including natural factors and human factors. The protection and management of wetland resources in the Yellow River basin involves many departments, but a systematic and complete management system and mechanism have not been formed yet, and scientific governance methods and sources of funds are lacking. At present, there are some problems in the Yellow River wetland, such as excessive reclamation and grazing, unreasonable human economic activities, and emphasis on governance rather than prevention, such as illegal sand mining, blocking the river channel for flood discharge. The surrounding residents illegally enclose land to occupy wetlands for cultivation and once burned thousands of acres of plants result in the destruction of the living environment of birds and creatures. People's activities in the Yellow River beach area are too frequent, which makes the ecological quality of the wetland gradually decline. The destruction behaviours listed above make the area of the Yellow River wetland decrease year by year. The wetland plant resources are seriously damaged, and the soil erosion in the basin is intensified, leading to local desertification of soil and imbalance of ecological balance.

3. Characteristics of Eco-Tourism Environmental Education in Wetland Scenic Spots of the Yellow River Basin

Due to the special natural environment of wetland scenic spots in the Yellow River basin, the evaluation of the effect of ecotourism environmental education should be combined with the characteristics of ecotourism environmental education in wetland scenic spots, so as to formulate more targeted evaluation indicators. (1) Ecology. Ecology is the general feature of ecotourism environmental education in wetland scenic spots of the Yellow River basin. Environmental education is carried out by relying on ecotourism activities. Environmental education in wetland scenic spots of the Yellow River basin is embodied and carried out in ecotourism activities, so it must have ecological characteristics; (2) Cultural. The Yellow River basin flows through provinces and regions with rich history and culture. Wetland scenic spots contain rich history, cultural landscape, characteristic

folk customs and national culture. The unique humanistic tourism resources determine that its eco-tourism environmental education activities must have unique cultural connotation. The science popularization and publicity of historical customs and humanistic landscapes must be the main content of its eco-tourism environmental education; (3) Resource. The characteristics of resource mainly refer to that the wetland scenic spots in the Yellow River basin have rich wetland tourism resources. The unique wetland environment determines that the content of its eco-tourism environmental education must include wetland ecological knowledge, which is different from the eco-tourism environmental education in other types of scenic spots.

4. Construction of the Evaluation System of Ecotourism Environmental Education in Wetland Scenic Spots of the Yellow River Basin

The design of the evaluation index system must follow the following principles:

Scientific. The indicator system needs to truly and objectively reflect tourists' actual perception of eco-tourism environmental education, so the formulation of evaluation indicators needs to be based on scientific theories and guidance.

Hierarchy. The connotation of ecotourism environmental education is complex. The design of its evaluation system should include multiple dimensions, and corresponding specific indicators should be formulated under each dimension to form an orderly and distinct whole.

Feasibility. The indicator system needs to meet certain operability, and this feasibility needs to be quantified by means of questionnaire.

Systematicity. There are many evaluation elements and rich evaluation contents for the effect of eco-tourism environmental education, so it is necessary to take the system idea as the leading factor in designing the indicator system, analyse the functional relationship and logical connection between each indicator, and each indicator should be able to fully and truly reflect the overall characteristics.

Representation. For the evaluation elements of different themes, the selection of indicators should focus on pertinence, typicality and representativeness, and try to avoid indicators with similar meaning, unclear meaning and repetitive content, so as to ensure that the selected indicators are representative.

Following the principle of evaluation index construction, based on the theoretical model, the evaluation index of the environmental education effect of ecotourism in the wetland scenic spots of the Yellow River basin is formulated. According to the existing evaluation indicators of ecotourism environmental education based on literature research, the evaluation of ecotourism environmental education in wetland scenic spots in the Yellow River basin is designed to evaluate three different dimensions and eight different elements. When formulating specific indicators, we should take the environmental education theory and education evaluation theory as guidance, integrate the characteristics of eco-tourism environmental education in the Yellow River basin wetland scenic spots, and also refer to the indicator design of relevant evaluation studies at home and abroad (Table 1).

Table 1. Preliminary design of criteria layer and sub criteria layer of evaluation index system

Target layer A	Criteria layer B	Subcriteria level C
Effect of Environmental education on	Cognitive Level B1	Environmental knowledge C1
		Environmental Awareness C2
	Attitude level B2	Environmental Ethics C3

ecotourism in wetland scenic spots of the Yellow River Basin		Environmental willingness C4
		Environmental Aesthetics C5
	Behaviour Level B3	Environmental behaviour C6
		Environmental Skills C7
		Recommendation C8

This paper inquired about the opinions of scholars and experts in the tourism industry and relevant staff in the wetland scenic area, mainly based on the opinions of my tutor, experts in the tourism industry and staff in the scenic area. A total of 56 index items were designed in the initial questionnaire, including 3 items at the criterion level, 8 items at the sub criterion level, 18 items at the domain level, and 27 items at the index level. The connotation of each indicator is described, and experts are invited to evaluate and analyse each indicator. If the title item can highlight the situation of ecotourism environmental education in wetland scenic spots in the Yellow River basin, it should be retained; if the title item can not show the situation of ecotourism environmental education in wetland scenic spots in the Yellow River basin, delete it; if the statement is incorrect or the indicators are missing, leave a "correction column" behind each item, and the experts will modify or add indicators, thus forming the questionnaire of "Evaluation System of Ecotourism Environmental Education Effect in Wetland Scenic Spots of the Yellow River Basin".

5. Results and Discussion

Overview of the Case Site

Both the Yellow River estuary ecotourism area and the sand lake ecotourism area are 5A wetland ecotourism scenic spots with high visibility in the Yellow River basin. Through the search on Ctrip Consulting firm (the deadline is August 2020), we can see that these two scenic spots have good reputation. The Yellow River estuary ecotourism area ranks first in the popularity list of Dongying City's scenic spots, and the sand lake ecotourism area ranks first in the popularity list of Shizuishan City's scenic spots.

It can be seen from Table 2 that the overall score of Sand Lake ecotourism area is 4.5, higher than that of the Yellow River estuary ecotourism area, and the score of scenery, interest and cost performance is also higher than that of the Yellow River estuary scenic area. The number of comments on Sand Lake Scenic Area was 4451, with a favourable rating of 87.04%. The number of comments on Yellow River Estuary Scenic Area was 1270, with a favourable rating of 74.65%. It can be seen from the keywords that there are rare bird resources and beautiful scenery in the Yellow River Estuary and Sand Lake Scenic Area. In general, the comprehensive evaluation of the Sand Lake Scenic Area is higher than that of the Yellow River Estuary Ecotourism Area, because the Sand Lake Scenic Area is an old 5A scenic area with very high popularity and experience, while the Yellow River Estuary is a new 5A scenic area. Sand Lake is one of the first batch of 5A scenic spots in China and one of the top ten charming leisure tourism lakes in China. Because of its unique and beautiful natural landscape, it has been selected as one of the top 35 scenic spots in China. On January 7, 2020, the Yellow River estuary ecotourism area was comprehensively assessed as a 5A scenic spot by the Ministry of Culture and Tourism.

Table 2. Network comments on the Yellow River Estuary and Sand Lake ecotourism areas

Yellow River Estuary	Score	Overall 4.1 points	Scenery 4. 2 points	Interesting 3.8 points	Cost performance 3.8 points
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	Comments (1270)	Good comments (937) Spectacular scenery (14) Suitable for children (6) Poor comments (115) Near the Yellow River (26) Wetland ecology (20) Bird releasing area (11) Waterfowl Paradise (10)			
Sand Lake	Score	Overall 4.5 points	Scenery 4.5 points	Interesting 4.3 points	Cost performance 4.2 points
	Comments (4451)	Good comments (3763) Bad comments (144) Entertainment projects (65) Beautiful scenery in Jiangnan (67) Beautiful scenery (47) Good experience (45) Northern Jiangnan (25) Rare birds (18) Chinese civilization (34)			

Questionnaire Design and Survey

The article takes tourists as the object of questionnaire investigation. According to the evaluation indicators developed in the previous article, the environmental education effect problems tested in the questionnaire are combined with the previous research results and the advice of relevant experts. The questionnaire is designed in accordance with the principle of easy to understand, which is divided into two parts: the first part is the survey of the effect level of eco-tourism environmental education in the wetland scenic spots of the Yellow River basin, mainly for the evaluation of various indicators of the effect of environmental education, and the survey is conducted using the Likert five level scale. The second is the survey of tourists' basic personal information, including their occupation, education background, age, gender, monthly income, education level, etc. This paper chooses the Sand Lake and Yellow River Estuarine Ecotourism Area as the empirical case, which has the following advantages: (1) The Yellow River Estuarine and Yellow River Estuarine Ecotourism Area have a perfect wetland ecosystem, rich resources, and a good foundation for ecotourism environmental education; (2) There are many tourist attractions and tourism projects, which are more entertaining and attractive, and the tourist flow is large. It can provide enough samples to make the questionnaire results more authentic; (3) The scenic spot has a relatively high popularity, has a very good reputation and reputation in the country, which is conducive to the development of research.

Analysis of Basic Characteristics of Samples

In terms of gender, among 335 tourists surveyed, males accounted for 53.13%, 178, females 46.87% and 157, respectively, with a gender ratio of 1.13:1, reflecting that males' travel ability was slightly higher than females'. In terms of age structure, young and middle-aged tourists are the main tourists. Among them, tourists aged 19-30 account for 47.16%, and tourists aged 31-45 account for 30.75%, accounting for more than 75% in total. This shows that young and middle-aged people have the strongest ability to travel, because ordinary young people are more willing to go out to play, and their tourism interests are more extensive. The tourist group aged 46-60 ranks third, accounting for 13.43%. In terms of occupation, tourists come from different industries, among which enterprise employees are the most, accounting for 33.43%, followed by students, accounting for 26.27%, followed by professional technicians and retirees, accounting for 15.23% and 12.84%, respectively. Other occupations are distributed in turn: government and public institutions (5.37%), freelancers (3.28%), and others (2.09%). There are only 5 farmers, accounting for the least, accounting for 1.49%. In terms of satisfaction with tourism activities, there are 113 tourists who feel very satisfied, accounting for 33.73%. The highest proportion of tourists is 51.94%, with a satisfaction rate of more than 85%. The average tourists account for 12.24%. This shows that the tourism projects in the scenic area are very fun, and tourists can get a relatively high experience.

From the above sample statistical characteristics, it can be seen that the tourist group of wetland scenic spots has the characteristics of medium to high income, high education, mainly young and middle-aged people, and high tourism activity satisfaction.

Analysis on the Comprehensive Evaluation Results of Ecotourism Environmental Education

It can be seen from Table 3 that the scenic spot has achieved good environmental education effect in terms of social and cultural knowledge, resource knowledge and protection measures, but the environmental education effect in terms of wetland system knowledge, eco-tourism knowledge and laws and regulations is very low, so the overall effect of "environmental knowledge" education for tourists is general.

Table 3. Network comments on the Yellow River Estuary and Sand Lake ecotourism areas

Index	Strongly agree	Agree	Commonly	Disagree	Strongly disagree
E1 Concept and connotation of ecotourism	0.017	0.062	0.307	0.596	0.074
E2 Relevant laws and regulations	0.026	0.017	0.044	0.53	0.438
E3 Wetland ecosystem knowledge	0.026	0.038	0.2}7	0.554	0.139
E4 Wetland system function and operation	0.023	0.053	0.363	0.53	0.086
E5 Social and cultural characteristics	0.608	0.411	0.014	0.011	0.011
E6 Social and cultural understanding	0.211	0.381	0.432	0.02	0.011
E7 Animal and plant knowledge of wetland scenic area	0.098	0.563	0.357	0.026	0.011
E8 Knowledge of scenic area protection measures	0.208	0.515	0.298	0.023	0.011

It can be seen from Table 4 that the approval rate of "wetland environmental impact sensitivity" in environmental awareness education is the highest among the four indicators, and the sum of the evaluation rates of "very agree" and "agree" reaches more than 88%, which is very high in terms of this rate, indicating that tourists can easily notice other acts that damage the environment, and the environmental awareness education in the scenic spot has achieved very significant results. The approval rate of "wetland animals and plants and their habitat protection awareness" was 73.7%, ranking second. Tourists can always remind themselves to protect the animals and plants and the environment of the scenic spot without random destruction, which shows that tourists have a high awareness of protection. In addition, the approval rate of the other two indicators is very low. The approval rate of "actively learning the awareness of ecological environment protection" is only 6%, which shows that tourists rarely actively learn about wetlands and wetland environment protection after tourism, and the scenic spot has not played a guiding role in mobilising tourists' enthusiasm. The approval rate of "awareness of wetland environmental problems" is only 4.8%, which means that tourists do not worry about the problems of

resource waste and ecological damage. Tourists usually think that such problems should be solved by the government and the scenic spot, which has little to do with tourists themselves. Therefore, they do not form an awareness of environmental problems, and the scenic spot does not play a role in guiding and educating.

Table 4. Network comments on the Yellow River Estuary and Sand Lake ecotourism areas

Index	Strongly agree	Agree	Commonly	Disagree	Strongly disagree
E9 Wetland animals and plants and their habitat protection awareness	0.115	0.644	0.256	0.029	0.011
E10 Wetland environment impact sensitivity	0.363	0.545	0.112	0.023	0.011
E11 Awareness of wetland environmental problems	0.014	0.056	0.283	0.578	0.124
E12 Actively learn the awareness of ecological environment protection	0.014	0.068	0.381	0.539	0.053

6. Conclusions

This paper analyses the current situation of eco-tourism environmental education in wetland scenic spots of the Yellow River basin, and finds that there are problems in the content of eco-tourism environmental education, such as lack of variety, weak attraction and insufficient depth of development. In terms of eco-tourism environmental education methods, there are problems such as lack of relevant knowledge, rigid methods and weak professionalism. In terms of eco-tourism environmental education facilities, there are problems such as lack of facilities and poor experience.

Based on the theory of environmental education and education evaluation, this paper combines theoretical analysis and literature research to build a theoretical model for the evaluation of the environmental education effect of ecotourism in wetland scenic spots in the Yellow River basin, and designs an evaluation index system for the environmental education effect of ecotourism in wetland scenic spots in the Yellow River basin.

Taking the Yellow River Estuary Ecotourism Area and Sand Lake Ecotourism Area as examples, this paper conducts a comprehensive evaluation of the effect of eco-tourism environmental education based on empirical research and analysis, so as to obtain the actual level of eco-tourism environmental education in wetland scenic areas, and provide basis and guarantee for scientific formulation of eco-tourism environmental education development proposals in wetland scenic areas of the Yellow River basin.

References

- [1] C. HAI: Dynamic Feedback Mechanism between Ecological-environment and Economy for Sustainable Development. American Academic Press, New York, 2004.
- [2] L. R. HU: Evaluation of Talent Training Ecological Environment Sustainable Development Based on Relational Database. Information Engineering and Applications. London, 2012.
- [3] S. DERISSEN, M. F. QUAAS, S. BAUMGÄRTNER: The Relationship between Resilience and Sustainable Development of Ecological-economic Systems. Eco Econ J, 70 (6), 957 (2009).
- [4] Y. P. TAO: Exploitation and Sustainable Development of Ecological Environment Resources for Sports Tourism and Leisure Sports. Adv Mater Res J, 60 (3), 13 (2012).



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- [5] L. M. WANG, H. ZHAO, H. Z. JIANG, Y. Q. SONG, Y. J. ZHAO: The Relationship of Sustainable Development of Chinese Cashmere Goat with Ecological Environment. *Eco Domes Animal J*, 37 (6), 242 (2004).
- [6] W. JIN: *Agriculture Ecological Environment Protection and Sustainable Development*. Anhui Agricultural Press, Anhui, 2007.
- [7] Y. XIAO, K. YIN: Study on the Relationship between Land Use Dynamics and Economic Development - Ecological Environmental in Chongqing. *Adv Mater Res J*, 27 (9), 524 (2012).
- [8] Y. XUE: *On the Sustainable Development of China Forestry Ecological Benefit Compensation and the Relationship*. Beijing Agriculture Press, Beijing, 2012.
- [9] R. YU LONG, B. LIAN, A. N. YANG, Y. TANG, S. J. WANG, Z. Y. YIN: Ecological Environment Protection and Sustainable Development in the Karst Areas. *Earth Environ J*, 41 (4), 38 (2013).
- [10] X. C. ZHANG: Environmental Monitoring Technology and the Sustainable Development. *Cons Design Eng J*, 28 (6), 29 (2016).