

Wetland Ecological Protection in the Yellow River Basin

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Abstract

Wetland is an important natural resource. It is the most active and complex ecosystem of material and energy exchange in the earth surface system. It plays an important role in soil and water conservation, water conservation, climate regulation and so on. The Yellow River is known as the "Mother River" of the Chinese nation and the birthplace of Chinese civilization. At the same time, the Yellow River Basin is an important economic zone in China. It is an important region to get rid of poverty and plays an important role in China's economic and social development and ecological security. The Yellow River wetland is a large wetland in the densely populated area of the middle and lower reaches of the Yellow River, with vast water area and tidal flat, rich wildlife resources and numerous birds. However, for a long time, the functions and benefits of wetlands have not been given due attention. At present, wetlands are facing the destruction and threat of many factors, such as urban development, farmland reclamation, environmental pollution, sediment deposition caused by soil erosion, over development and unreasonable utilization. As a result, wetlands and their biodiversity have been seriously threatened and damaged. The area and resources of wetlands are decreasing day by day, and the functions of wetlands are getting better. In order to fully understand the problems of wetland ecological protection in the Yellow River Basin, this study will carry out the research and analyze the problems of wetland ecological protection in the Yellow River Basin, which can provide guidance for protecting wetland resource.

Keywords

Yellow River Basin; Ecological management; Wetland resources.

1. Introduction

Wetland has rich and unique natural resources, which is an important material basis and ecological support for human survival and development. Along with forest and ocean, wetland has become the world's three major ecosystems. China is rich in wetland types, with the total area ranking first in Asia and fourth in the world. As one of the most important ecosystem functions of the earth's biosphere, wetland has great development potential. Ecology, environment, resources and sustainable development have gradually become the key areas of scientific research in the 21st century. However, since the 20th century, the rapid development of the world economy has led to the large-scale development of wetland resources. Under the environment of economic development, wetland has gradually become the victim of economic development.

According to the survey, in recent years, the area of lakes and wetlands in China is limited to 34% of the total area in the 1950s, and nearly 30000 rivers and wetlands have disappeared. The ecological problems of many important wetlands are quite serious, and some areas have completely lost their functions as wildlife habitats. Until the 1950s, the protection of wetland ecological resources was of great importance to human development and healthy life. The

expansion of urbanization makes the nature reserve threatened by the potential economic benefits. The development of tourism projects, farmland and construction occupation, and the development of fish pond industry make the wetland space continuously compressed and the wetland buffer zone gradually narrowed.

In the ecosystem of the Yellow River Basin, the wetland located in the water land ecotone is the link and bridge between the terrestrial ecosystem and the water ecosystem. It has important ecological functions such as water conservation and biodiversity maintenance. The wetland ecosystem is an important basis for maintaining the healthy life of the Yellow River. The main wetlands in the upper, middle and lower reaches of the Yellow River exist and function as a whole system, which have certain protection value. However, the Yellow River is a water shortage river. Under the situation of relatively backward socio-economic development and extremely frequent human activities, the wetland protection of the Yellow River Basin is facing multiple pressures such as water shortage, economic and social development and human behavior interference.

At present, ecological protection and high-quality development of the Yellow River Basin has become a national strategy. This study is of great significance in promoting the ecological construction of the Yellow River Wetland and maintaining the sustainable development of regional society and economy.

2. Literature Review

Wetland research began in Limnology, and gradually developed towards systematization and integration in the 1880s. Wetland science is a rapidly developing and comprehensive discipline, involving environmental science, ecological science, geographical science, resource science, hydrological science, ecological science and other disciplines.

There are increasing focus on wetland conservation and management. The related research on wetland ecological protection in foreign countries mainly started in the 1970s, which was first put forward by Naveh. He believed that wetland has the function of self-recovery, and planting plants is only to speed up the recovery of wetland, and the time required for wetland recovery is usually about 10 years [1]. Groot et al. [2] aimed to summarize the challenges faced by the application of ecosystem services assessment in environmental management, and explore some solutions, so as to achieve a comprehensive and practical framework. Batzer [3] said that the current definition of wetland is for the regulatory needs of quickly and accurately delimiting wetlands. Swartz et al. [4] focused on the species-specific response of amphibians to wetland mitigation in the ecosystem, emphasizing the value of soil and water conservation, water resources protection and water environment improvement to the ecosystem.

Some other scholars study wetland tourism using different methods. Currie [5] was the first one to put forward wetland tourism, focusing on the functions of wetland environmental purification, wetland ecological restoration and protection. Orimoloye et al. [6] used remote sensing and GIS methods to assess the spatial pattern of Isimangaliso wetland, as well as the potential determinants and impacts of wetland degradation from 1987 to 2017. Pueyo-Ros et al. [7] comprehensively studied the combination of urban planning and urban wetlands. Therefore, they are relatively advanced in the construction, reconstruction, management and ecological environment governance of urban wetlands.

Some researchers discuss the wetland evaluation, which includes wetland function evaluation, wetland ecosystem health evaluation, wetland ecological security evaluation and wetland environmental impact evaluation. Zhao et al. [8] classified the current wetland evaluation research according to the different evaluation objects, evaluation contents and expression methods of evaluation results, proposed the technical routes and methods of three basic stages of wetland evaluation, analyzed the research progress of wetland evaluation in North America,

Europe, Asia and China in detail, and pointed out the significance of wetland evaluation. Ludwigson [9] introduced the definition of wetland and its important significance in protecting biodiversity and maintaining regional ecological balance; drew lessons from the theory of regional ecosystem evaluation, selected diversity, representativeness, rarity, naturalness, stability and human threat indicators and carried out hierarchical treatment, and formulated a set of wetland ecological evaluation index system. On the basis of defining the relationship between wetland ecosystem services, functions and values, Handy and Wu [10] summarized the current methods and application characteristics of wetland ecosystem services value evaluation.

Although some scholars have demonstrated the wetland protection in the Yellow River Basin [11-13], few of them discuss the protection condition in the city of Kaifeng. This study fill this gap by discussing the protection condition and measures in Kaifeng.

3. Wetland Protection in Yellow River Basin of Kaifeng

According to the second national wetland resources survey in 2013, the wetland area in Henan is 624,900 hm², accounting for 1.18% of the national wetland area. The wetland area of the Yellow River in Henan province is 203,900 hm², accounting for 32.47% of the wetland area in Henan Province. The types and proportions of various wetlands are shown in Table 1.

Table 1. Types and proportion of wetlands in the Yellow River of Henan Province

| Type | Total | River | Lake | Swamp | Constructed |
|----------------------------|-------|-------|------|-------|-------------|
| Area/10,000hm ² | 20.39 | 15.65 | 0.04 | 0.16 | 4.54 |
| Ratio/% | 100 | 76.75 | 0.2 | 0.78 | 22.27 |

This study conducted a survey about wetland protection in Kaifeng, and the following four problems are found.

3.1. Imperfect Legislation of Wetland

Through the analysis of China's wetland legal construction system, we can know that although the current wetland protection regulations issued by the wetland protection department have played a positive role in the protection of wetlands, but related to the specific protection provisions of wetlands, the corresponding wetland protection regulations are relatively macro, lack of specific and feasible legal norms and regulations. In the traditional legal system of China, there is no targeted and complete legal system for wetland protection.

Although there are some system schemes available for reference in Kaifeng City, including the national wetland protection and restoration system scheme, the notice of the general office of Henan Provincial People's Government on printing and distributing the implementation scheme of wetland protection and restoration system in Henan Province, and the implementation scheme of Kaifeng wetland protection and restoration system, a careful study of the detailed rules of these schemes shows that there are many differences in the wetland species The definition of category, the subject and object of protection, the management system and rewards and punishments have only made general provisions, lacking operability and binding force. The dominant power of management is still in the hands of administrative departments, which makes the main body of wetland management only focus on maximizing their own interests in practical work, and lack of corresponding motivation in wetland protection and management.

3.2. Incomplete Management System

In the protection and utilization of Kaifeng Wetland Nature Reserve, there are some problems, such as insufficient department cooperation, independent government among various departments, non sharing of information and non-uniform policies, which affect the management efficiency of Kaifeng Wetland Nature Reserve. The main reason for these problems lies in that the property right of Kaifeng Wetland Nature Reserve is not clear enough, which makes it difficult to divide its management responsibilities effectively, and the lack of clear property right leads to different departments and organizations' planning and utilization of Kaifeng Wetland Nature Reserve. Kaifeng Wetland Nature Reserve as a public product, different use rights of internal resources belong to different departments and organizations. Especially after the opening of commercial development of Kaifeng Wetland Nature Reserve, a large number of external commercial organizations and institutions participate in the development of Kaifeng Wetland Nature Reserve Based on the pursuit of interests. Without clear property rights planning, Kaifeng Wetland Nature Reserve may be affected Based on the consideration of interests, the owners of each use right of Wetland Nature Reserve maximize the use of related rights, and even overuse. The cooperation of government management departments is insufficient, and each department only manages the work within its own scope, because the information sharing of departments is not like this, and the system is not unified, which may make it difficult for them to find the excessive use of the use right of Wetland Nature Reserve in Kaifeng.

3.3. Lack of Social Management

The survey found that in the long-term past, the government has been in the leading position in the management and protection of Kaifeng Wetland Nature Reserve for a long time. Although the corresponding management department was established in the later stage, the competent department of Kaifeng Wetland Nature Reserve has always played a leading role, and the public is in a relatively passive situation. In China, public participation in wetland protection has always been guided by government departments, rather than organized spontaneously. Under such conditions, it is difficult for the public to get the opportunity to participate in wetland protection. In such a long-term process, it is difficult to stimulate the enthusiasm of the public to participate in wetland protection, and the public's enthusiasm for learning wetland protection related popular science knowledge is also increasing It's going to take a hit. Wetland protection work has shown a stage of development. Generally, it is planned and implemented by government departments, which is not continuous and scientific. Once the enthusiasm and strength of government organizations for wetland protection are reduced, wetland protection work will stagnate and difficult to develop, and public participation in management will become nothing.

3.4. Serious Wetland Ecological Damage

Wetland ecological environment itself is fragile and sensitive, and with the passage of time, wetland ecological environment problems gradually appear, coupled with human unreasonable behavior more serious damage to the wetland ecological environment. At present, there are some open landscape spots in Wetland Nature Reserve of Kaifeng City, and most of them have entertainment facilities. These entertainment facilities can ensure the tourists to enjoy the beautiful scenery and relax more. However, many of these open scenic spots are set up in the wetland reserve, and the concept of the reserve is not very clear for tourists, and the boundary of the reserve is not very clear, so it is common for tourists to enter the reserve without permission. For tourists, these behaviors are the freedom of personal choice and will not cause great impact, but there are great hidden dangers for the wetland ecological environment. The environment of wetland ecological reserve itself is fragile, if people enter the reserve, it will make its ecological environment worse faster.

4. Measures for Wetland Protection

4.1. The Promotion of Wetland Legislation

The government need to strengthen the construction of relevant laws and regulations, so that the protection of wetlands can be completed smoothly. In determining the legislative concept of wetland ecological protection, we should adhere to the principle of unity, not for a local law, but from a macro perspective. In the content of the law, it should be combined with the reality. Through the development of relevant legal content, it can really effectively prevent the destruction of wetland ecological environment. At the same time, in the legislation of wetland ecological protection, the principle of "easy before difficult" should be adopted, and the legislation must be completed step by step and level by level.

4.2. Strengthening the Function Construction of Local Government

Leading cadres play a key role in the implementation of ecological environment protection. The leading cadres are an organic part of local governments at all levels. The regulations and rules on environmental protection made by local government organs are very important for ordinary people. However, due to the local government's dereliction of duty in some aspects, the wetland ecological environment of Wetland Nature Reserve in Kaifeng City has further deteriorated. According to the results of interviews with nearby residents, the local government's decisions on ecological protection always change.

4.3. Establishment of Wetland Social Management System

In the future, we must establish community co management mechanism and strengthen wetland co management. Develop the Yellow River Regional Ecological Protection Assistant to assist the wetland reserve in resource monitoring. The nature reserve, together with the local government, compensates the local people with the help of ecological projects, so as to guide the local people to actively participate in ecological protection. At the same time, we should select local famous people or monks who practice in temples, employ them as wetland protection administrators, and provide them with professional training to help them master the knowledge of wetland protection. Learn the national and local laws on wetlands, and explain them to the local people with the help of their local reputation, so as to expand the publicity and make more people understand. We should also teach them to accurately identify the species of wild animals and plants, as well as the use of monitoring instruments, always pay attention to the dynamic of resources, record and summarize the biological species, and regularly make statistics and Analysis on the data, so as to fully grasp the dynamic of resources.

4.4. Strengthen Wetland Ecological Protection

In order to improve the wetland ecological environment of Kaifeng Wetland Nature Reserve, it is necessary to improve the public's awareness of self-protection and environmental protection, start from little things, do not litter, do not make noise in the ecological reserve, and try to reduce the number of driving into the scenic area. You can choose to take the battery car in the scenic area to be a civilized tourist. Kaifeng Wetland Nature Reserve is a unique natural scenery endowed by nature. We should be proud of it. We should take action to protect our environment and our beautiful home, so that people can fully realize the importance of environmental protection. Through the action of strengthening public awareness of environmental protection, it can effectively prevent the recurrence of wetland ecological behavior of Liuyuankou Wetland Nature Reserve in Kaifeng City. Everyone is aware of the importance of environmental protection, and consciously participate in environmental action. For the wetland ecological protection work, it is beneficial and harmless, and for the environmental protection work of the whole society, it is also beneficial.

5. Conclusion

Due to the influence of natural and social factors, the area of wetland in China has decreased sharply in recent years, and the wetland ecology has been damaged to varying degrees. If it is not controlled, the wetland resources in China will be lost. In this situation, it is of great theoretical and practical significance to strengthen the development and protection of wetland resources. The Yellow River is a complex and large-scale river ecosystem. Wetlands with different spatial distribution and ecological structure are important ecological units of the Yellow River ecosystem. At the same time, the Yellow River is a water shortage river. Under the situation of relatively backward socio-economic development and extremely frequent human activities, wetland protection in the Yellow River Basin is facing multiple pressures such as water shortage, economic and social development, human behavior interference and so on.

The study found that there are four problems in the wetland protection of Wetland Nature Reserve in Kaifeng City: first, the wetland legislation is not perfect; second, the management system is not perfect; third, the lack of social management; fourth, the wetland ecological damage is serious. In view of the existing problems, this paper puts forward the corresponding protection measures, and puts forward the protection countermeasures from the five aspects of legislation improvement, local government function construction, wetland social management, high-quality development promotion and wetland ecological protection. This study can effectively improve the level of Wetland Nature Reserve in Kaifeng City in the future, and effectively protect the Yellow River Wetland from multiple perspectives, so as to promote the improvement of regional ecological environment.

References

- [1] Naveh Z . The Neo-Technological Landscape Degradation and Its Ecological Restoration[J]. 1973.
- [2] Groot RSD , Alkemade R , Braat L , et al. Challenges in integrating the concept of ecosystem services and values in landscape planning, management and decision making[J]. Ecological Complexity, 2010, 7(3):260-272.
- [3] Batzer D P . Wetland Ecology: Principles and Conservation[J]. Eos Transactions American Geophysical Union, 2013, 82(3):626-626.
- [4] Swartz L K , Lowe W H , Muths E L , et al. Species-specific responses to wetland mitigation among amphibians in the Greater Yellowstone Ecosystem[J]. Restoration Ecology, 2020.
- [5] Currie, Andrew. The vegetation of the Outer Hebrides[J]. Proceedings of the Royal Society of Edinburgh, 1979, 77:219-265.
- [6] Orimoloye I R , Kalumba A M , Mazinyo S P , et al. Geospatial analysis of wetland dynamics: Wetland depletion and biodiversity conservation of Isimangaliso Wetland, South Africa[J]. Journal of King Saud University - Science, 2020, 32(1):90-96.
- [7] Pueyo-Ros, Josep, Garcia, et al. Ecological Restoration of a Coastal Wetland at a Mass Tourism Destination. Will the Recreational Value Increase or Decrease?[J]. Ecological Economics, 2018.
- [8] Xinyue, Zhao, Jixian, et al. Evaluation of bioaugmentation using multiple life cycle assessment approaches: A case study of constructed wetland - ScienceDirect[J]. Bioresource Technology, 2017, 244:407-415.
- [9] Ludvigson G A , González, Luis A , Metzger R A , et al. Meteoric sphaerosiderite lines and their use for paleohydrology and paleoclimatology[J]. Geology, 1998, 26(11):1039.
- [10] Hardy T , Wu W . Impact of different restoration methods on coastal wetland loss in Louisiana: Bayesian analysis[J]. Environmental Monitoring and Assessment, 2021, 193(1).
- [11] Wang G . Estimating the Agricultural Water Consumption of the Yellow River Basin Based on Remote Sensing data[C]// Agu Fall Meeting. AGU Fall Meeting Abstracts, 2015.

- [12] Zhang L , Han G . The effect of seed addition and litter removal on plant composition in a coastal marsh of the Yellow River Delta[J]. 2021.
- [13] Li Y , Cheng C , Li X . Research Progress on Water Purification Efficiency of Multiplant Combination in Constructed Wetland[J]. IOP Conference Series: Earth and Environmental Science, 2021, 632(5):052051 (9pp).