

Research on Ecological Management Strategies for Urban River Water Environment

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Abstract. The ecological management of urban river water environments holds significant importance for sustaining city development and safeguarding ecological balance. Human activities have led to severe pollution in urban rivers, diminishing their self-healing capacity and disrupting their essential functions. This article highlights the significance of ecological management, principles guiding such management, challenges posed by water shortage and pollution in urban rivers, and strategies to address these issues. Respect for nature, restoration of ecosystem functions, and comprehensive governance emerge as key principles for effective ecological management. Water scarcity and pollution issues are explored, including the impact of urbanization and industrialization on water quality. The article suggests strategies such as thoughtful channel design, sewage recycling projects, and scientifically managed revetment works to restore and maintain healthy urban river ecosystems.

1 Introduction

Urban rivers play a pivotal role in the sustainable development of cities and the preservation of ecological balance. However, rampant human activities have led to severe pollution in these vital water bodies, undermining their self-regeneration capacity and essential functions. This degradation not only disrupts the well-being of aquatic organisms but also impairs the daily lives and productivity of urban populations. As water pollution in urban rivers escalates, downstream ecological disturbances exacerbate, posing a threat to the survival of diverse riverine species. To address these challenges and safeguard both ecology and economic growth, it becomes imperative to shift towards responsible urban river development that prioritizes water environment purification from its root causes [1]. Embracing ecological management practices for urban river water environments holds substantial promise in fostering a robust urban ecology. This article delves into the significance of such practices and outlines key principles and strategies essential for restoring and maintaining the health of urban river ecosystems. The discussion encompasses respecting nature, restoring ecological functions, embracing comprehensive governance, and addressing the pressing issue of water scarcity in urban rivers [2]. Furthermore, it explores the menace of urban water pollution, including rainwater contamination, river siltation, and deteriorating water quality, underscoring the urgency of ecological intervention [3]. With a focus on sound ecological management, this article advocates for scientific cross-sectional design, sewage recycling projects, and mindful

revetment works as crucial steps toward rejuvenating urban river water environments [4]. By adopting holistic strategies, cities can pave the way for thriving urban ecosystems that balance ecological health and sustainable urban development.

2 The significance of ecological management of urban river water environment

Engineering Urban rivers are of great significance to the sustainable development of cities and the protection of the ecological environment. The long-term unreasonable behavior of people has caused serious pollution to the river ecosystem, which will not only reduce the self-healing ability of the water environment but also affect the basic functions of the river.

Seriously affects people's normal production and life. When the water pollution of urban rivers becomes more and more serious, the ecological pollution downstream will also increase, affecting the survival of various organisms in the rivers. Therefore, whether it is from the perspective of ecology or economic development, it is necessary to avoid the actual.

During the development period, it will bring pollution to the water environment of the river, purify the water environment of the urban river to the greatest extent, and curb the problem of water pollution from the root [1]. On the whole, the ecological management of the urban river water environment can provide great power support for the healthy development of the urban ecological environment, thereby providing a more suitable living environment for biological survival. In addition, the implementation of

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ecological governance can also improve the purification capacity of the river's water environment and give full play to the role of the river's flood discharge and drought relief.

3 Principles of Ecological Governance of Urban River Water Environment

3.1 Respect nature

At present, people have higher requirements for the ecological environment, and pay more attention to the harmony between man and nature. In the process of urban river management, it is necessary to comprehensively consider, and restore the original appearance of nature as much as possible, focus on ecological protection, implement governance strategies in an all-round way, reasonably carry out ecological restoration, maintain biodiversity, and finally form an ecological balance between man and nature.

3.2 Recovery function

During the ecological management of river water environment, it is necessary to fully restore the ecological environment of the city as a whole, to provide strong support for the balance of the ecosystem, and to fundamentally restore the flood and waterlogging prevention functions of the river. As an important component of the urban ecological landscape system, river channels play a role in transportation, flood control and drainage. It has multiple functions such as reducing pollution and maintaining ecological balance [2]. In addition, carrying out this ecological governance work can also better promote urban ecological environmental protection, provide guarantee for urban economic development, and achieve the purpose of improving social and economic benefits.

3.3 Comprehensive governance

When carrying out ecological management of the urban river water environment, it is necessary to ensure that the ecological management work is carried out in an all-round way. It is necessary to know whether the cross-sectional shape matches the actual application requirements, and at the same time fully consider the width between the banks of the embankment. In addition, the landscape function of the river should also be brought into play. As an important component of the urban landscape ecosystem, the river plays an important role in urban ecological construction and beautification of the urban environment. Therefore, this aspect cannot be ignored in the governance work. It is necessary to deploy various tasks scientifically and rationally, formulate an effective governance plan, and finally achieve the goal of ecological governance.

4 Water shortage in urban rivers

4.1 Water shortage in urban rivers

(1) Functional water shortage in the city. The lack of an urban water environment is mainly manifested in the relative shortage of domestic water resources. Many cities will build and develop around water sources in the actual development process. River water is an extremely important freshwater resource in the life and production process of the city. The ecological adjustment ability of urban rivers is relatively weak. During the actual construction process, the original ecological environment has been damaged to a certain extent. In addition, domestic wastewater, industrial wastewater, and agricultural wastewater are continuously discharged into the river, resulting in a decline in the stability of the urban surface water environment[1]. During the development of modern society, the number of river water environmental problems has increased significantly. In the actual development process, the water resources of many urban rivers have been unable to meet the requirements of domestic water, and even the standards for industrial production water, resulting in the city's functional permanent water shortage has seriously disturbed the daily life of residents and restricted urban development.

(2) Insufficient water supply in the river course. The water in the corresponding river courses in the city is mainly the actual stagnation of the plain water network, its own water flow is relatively small, and the water circulation speed is relatively slow. Urban rivers also have a strong seasonality. In the dry season, the amount of water is not enough, which leads to the obstruction of water circulation; in the rainy season, there is sufficient rainwater, but it also brings rainwater pollution problems, and finally gathers in urban rivers to pollute the river water. Regardless of the dry season or the rainy season, the clean water resources available in urban waterways are in short supply. Secondly, the city's surface water and groundwater are over-exploited, the water level of the river drops sharply, the groundwater replenishes it insufficiently, the river course is silted up, and the self-cleaning ability of the water environment is poor, which leads to the problem of urban water resource pollution control.

4.2 urban water pollution

(1) Urban rainwater pollution. Urban rivers are often regarded as important channels for urban sewage discharge. The rapid development of cities, the significant increase in population, and the further increase in the degree of industrialization have not only improved people's living standards, but also laid hidden dangers for environmental pollution. If a city encounters a sudden heavy rain, when the rainwater flows on the surface, the garbage scattered or piled on the roadside will be washed into the urban pipe network; in many cities, due to industrial development, a surge in the number of cars, winter heating, coal-fired power generation and other reasons, lead to serious air pollution. In addition, due to human urban activities, ground and roof subsidence and contamination

There are many pollutants polluted by rainwater, and these pollutants flow into rainwater pipes or urban sewer network under the influence of rainwater flushing. Surface runoff generated during urban rainfall, or rainwater flowing into rainwater pipes and sewage pipes, will eventually converge in urban rivers, causing serious visual and environmental pollution to rivers. Rainwater pollution also occurs in agricultural and industrial areas around cities and along urban rail lines. These will lead to problems such as water quality imbalance and eutrophication in cities, resulting in the reduction of economic and ecological functions of water bodies[2].

(2) River siltation. Among the water environment problems of urban rivers, the silt and pollutants at the bottom of the rivers are also very prominent, resulting in blocked river flooding, which is not good for urban flood control and flood fighting. Secondly, the bottom mud accumulated in the river channel with excessive pollution will emit extremely strong corrosive stench in summer, breed a large number of mosquitoes, and affect the image of the city; it is a breeding ground for various pathogenic bacteria, spreading diseases through the river water, and threatening human health; it is River water quality continues to be polluted. One of the sources, leading to a serious imbalance in the water environment, water eutrophication and other environmental problems[7].

(3) The water quality of the river deteriorates. Some cities blindly pursue economic speed Rapid growth, no emphasis on environmental value, no focus on water pollution.

Pollution problems, and lax supervision of sewage discharge, resulting in failure to meet discharge standards. The standard waste water is discharged into the river, and even surface water pollution leads to groundwater pollution, threatening the water safety of the city.

5 Ecological management strategy of urban river water environment

5.1 Scientifically and rationally design the cross-section of the channel.

In the process of ecological management of urban river water environment, when encountering cross-section or longitudinal section, special attention should be paid to the safety performance of reservoir flood discharge, to maintain the original shape of the river to the greatest extent, and scientifically and rationally design the cross-section plan of the river. Ensure that the width of the river is coordinated and the depth is integrated. When designing the cross-section scheme of the river, it is necessary to ensure that the basic elements of the river will not suffer from various hazards. At the same time, on the basis of ensuring that the ecology of the urban river will not be damaged, the design of the river can fully reflect the development needs of urban intelligence. Thus creating a more beautiful ecological water landscape [3].

5.2 Construction of sewage recycling projects

The total population of cities in our country is increasing, and the discharge of a large amount of domestic sewage is not up to the standard. The indiscriminate discharge of large areas of sewage will not only damage the urban environment, but also seriously pollute the urban soil and water sources. People's lives and health are seriously threatened. under construction

In the process of establishing the urban ecological environment, relevant personnel should do a good job in the construction of sewage recycling projects, reasonably and effectively control the phenomenon of sewage discharge, and lay a good foundation for the healthy development of the urban ecological environment. For the construction of ecological cities, when treating sewage, it is necessary to effective combination of treatment and decentralized treatment to form a complete set of sewage treatment cycle mechanisms to realize the effective utilization of urban sewage. For example, in order to better recycle sewage, a city has effectively classified and treated the sewage in the city. In the city, schools, residential areas, commercial areas

There are not many toxic substances in the sewage, and a large amount of sewage can be reused with simple treatment. Therefore, in response to this phenomenon, the city clearly stipulates that school sewage can be used for urbanization after effective treatment, urban greening consumes a lot of water, and sewage recycling can meet the needs of green[6].

It can also improve the utilization rate of water resources, realize the optimal allocation of resources, and save water resources, which is consistent with the concept of green development [4]. However, this method is not suitable for sewage discharge in urban industrial areas. For sewage containing more toxic and harmful impurities, relevant

Personnel should formulate a special sewage treatment plan and corresponding discharge channels, do a good job in centralized treatment, and prevent the random discharge of industrial sewage from polluting the overall urban environment.

5.3 Scientific management and control of revetment works.

From During the construction of revetment works, it is necessary to understand the principles of water ecological management. According to the actual demand, according to the natural conditions in the embankment and the specific situation of the water surface line, Choose the construction scheme that has the least impact on biological survival. for urban waterways. In terms of water environment management, the selection of river protection structure and river embankment type. It is necessary to consider comprehensively all aspects to ensure that the construction technology is consistent with the actual plan. On the basis of meeting the design requirements, it is necessary to choose the most economical. The construction plan can improve the stability and safety of revetment works. At present, the ecological environment of waters in many areas of my country's cities is still in an unreasonable state,

the engineering design should be consistent with the natural development of the river. In line with the law, the use of concrete should be reduced as much as possible in the construction of the project, so that the river course can maintain its original appearance. During the construction of revetment works, it is necessary to focus on widening the channel blockage and straightening the river channel, among which widening the channel blockage will continuously increase the degree of downstream inundation loss, while intercepting

If the bend is taken straight, the water will continue to scour the river channel and cut down. timing should be compared from the perspective of discharge flow and economic loss, choosing the most cost-effective construction plan improves the economic benefits of the project. in the river in the process of Tao governance, we must adhere to the scientific concept of development and the principle of sustainable development.

To improve the level of urban river management [5].

6 Conclusion

In conclusion, the ecological management of urban river water environments holds immense significance for the sustainable development of cities and the protection of the ecosystem. The improper actions of humans have led to severe pollution in these river systems, which not only diminishes their ability to self-heal but also disrupts their vital functions. This, in turn, affects the well-being of both residents and the environment. To address these challenges, ecological governance strategies must be implemented. the joint development of a multi-ownership economy. Adopting effective ecological management strategies becomes imperative[7]. This includes scientifically designing channel sections, constructing sewage recycling projects, and implementing proper revetment works management. By striking a balance between engineering solutions and ecological preservation, cities can enhance water quality, alleviate water scarcity, and promote a healthier environment. The ecological management of urban river water environments is not only a pressing need for environmental protection but also a vital aspect of ensuring the well-being and prosperity of urban communities. By following sound ecological principles and implementing targeted strategies, cities can rejuvenate their river ecosystems, mitigate water shortages, and foster a harmonious coexistence between urban development and nature.

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