Application Research of Water Ecological Restoration Technology Based on Computer in River Channel Management

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Abstract. With the rapid development of the national economy, China has completed the preliminary well-off society. However, with the development of economy, China's water ecological resources have suffered a lot of losses. Therefore, water ecological restoration technology has become an important technology in river management, especially when combined with computer technology, it can effectively repair water bodies and improve the quality of water resources. Through the natural purification system, we can gradually purify the water quality, which will play a role in the integration of human and nature. Firstly, this paper analyzes the commonly used technology of water ecological restoration based on computer. Then, the main problems of water environment and water ecology are put forward. Finally, some suggestions are put forward.

Keywords: Water Ecological Restoration Technology, River Regulation, Quality of Ecological Environment

1. Introduction
In recent years, great achievements have been made in water conservancy projects in China. However, with the rapid development of economy, water conservancy project has caused the original ecological environment and the living environment of landscape, which has caused many negative effects, such as water body odor, water eutrophication, cyanobacteria bloom and so on. Therefore, with the improvement of people's quality of life, people pay more and more attention to the living environment. However, water ecological restoration technology will better deal with water pollution. Relative to a complete water ecosystem, water ecological restoration technology must have sufficient aquatic animals, aquatic plants, microorganisms and protozoa, which will gradually transform water pollutants. Through the improvement of living environment of aquatic organisms, we will achieve the goal of water purification. Water ecological restoration technology has become the most common ecological restoration system in the world, which not only has many advantages, such as low investment cost, low operation cost, high efficiency and so on[1].
2. Common techniques of water ecological restoration
Water ecological restoration technology has become the most important river management technology. At present, there are mainly the following types in the world, as shown in Figure 1.

![Figure 1. Common techniques of water ecological restoration](image)

2.1. Microbial treatment technology
Microbial treatment technology is the most commonly used technology in river treatment. Through microorganisms, we can quickly remove the aerobic and anaerobic pollutants from the sewage sources in the river, which will quickly improve the pollution severity. The specific methods of microbial treatment technology are mainly divided into the following concentration. First, we put the artificially cultivated microorganism that can degrade pollutants into the water. Second, by controlling the growth environment and quantity of microorganisms, microorganisms will gradually decompose and transform pollutants, which will gradually achieve the goal of river pollution control[2]. However, in the specific application process, we must select the appropriate microorganisms according to the types of water pollution, which can ultimately achieve the goal of river pollution control.

2.2. Construction of ecological bank slope
Through water ecological restoration technology, we can restore the biological environment of water body, which will gradually improve and balance the new water ecosystem. By building ecological bank slope, we can not only improve the traditional vertical slope form of river, but also improve the diversity of river species. Through the roots of plants, we can consolidate the soil of the river, which will improve the stability of the river bank slope and reduce soil erosion. Through the construction of ecological bank slope, we can gradually repair the water ecological environment, which will gradually enrich the biological chain for the original ecosystem. By creating a more complex ecosystem, we will improve the efficiency of water ecosystem restoration[3].

2.3. Bioremediation technology
Bioremediation technology is a common technology in river management, which mainly includes microbial remediation technology, animal remediation technology, plant remediation technology and so on. Through microbial absorption and degradation, we can greatly purify water. At the same time, animals and plants are the main links in the construction of water ecosystem, which will also purify the pollution sources and pollutants in the water.

2.4. Constructed wetland treatment technology
Constructed wetlands are rich in organisms and microorganisms, which can accelerate the decomposition of organisms. Through the self-healing function of natural environment ecological chain, we can realize the purpose of purifying water body under the joint action of physics, chemistry and biology. In the construction of constructed wetland, we should try our best to maintain the biodiversity
of the system. By regulating the surface flow, we will realize the purified water ecosystem. Constructed wetland has many characteristics. First, constructed wetlands can maintain species diversity, which is not damaged by a single factor. At the same time, constructed wetland can provide a good living environment for aquatic organisms. Secondly, constructed wetland can adjust the humidity and temperature of air. Third, constructed wetlands can regulate runoff, which will ensure the rationality of soil moisture content\(^4\).

3. Problems in water environment and water ecology
A total of 1000 questionnaires were issued, and 981 questionnaires were valid, with an effective rate of 98.1%. The specific analysis is as follows.

3.1. Various pollution sources
At present, there are various sources of water ecological pollution in rivers in China, which seriously increases the load of river pollution. With the pollution load obviously exceeding the environmental carrying capacity, the water ecology in the river will be threatened gradually. According to the survey results, the main problem is pollution of planting industry, accounting for 65.9%. The second is pollution of livestock and poultry breeding industry, accounting for 57.6%. Details are shown in Figure 2.

![Figure 2. Various pollution sources](image)

3.2. Water ecology is difficult to self-purification
The water ecology of some rivers is seriously damaged, which leads to the poor self-purification ability of water body. The diversity of aquatic plants is closely related to the health and self-purification ability of water ecosystem. According to the survey results, the main problem is serious damage to water habitat, accounting for 62.8%. The second is poor self-purification capacity of water body, accounting for 57.0%. Details are shown in Figure 3.

![Figure 3. Water ecology is difficult to self-purification](image)

4. Key points of water ecological restoration technology in river regulation
4.1. Optimize plant species allocation
When we repair river water pollution, we should adopt targeted water ecological restoration technology
according to different types of water pollution, which will optimize the treatment scheme and biological supporting types. We must take into account the local ecological and climatic environment in order to maximize the survival rate of plants. By optimizing the allocation of plant species, we can purify water pollutants, which will achieve the optimization of the environment. Therefore, by optimizing the allocation of plant species, we will better manage river regulation. Through the cooperation of different kinds of plants, we will achieve good water purification effect, which will make the reconstructed water ecosystem run smoothly\(^5\).

4.2. Construction of diversified rivers

River ecosystem is a very complex biological ecosystem. Therefore, in the construction of artificial restoration river system, we must follow the natural shape of the river. By building a variety of river forms, we will effectively avoid hardening of the soil on the river bank and riverbed. In the natural state, the river is sinuous. Therefore, in the construction of rivers, we should try our best to maintain the meandering nature of the river. At the same time, we should construct the composite cross-section of the main channel and the revetment. With the help of stake, reed, willow, shallot, stake and other plants, we will form a natural material to protect the bank slope, which will avoid the phenomenon of river bank slope hardening\(^6\).

5. Conclusion

According to the practical investigation, we must do a good job in pollution source control. Only by combining the technology of water ecological restoration with the control of pollution sources, can we really deal with the river problems. Water ecological restoration technology can not only play a role in water restoration, but also greatly improve the quality of water sources. Therefore, in the course of river regulation, we must apply the technology of water ecological restoration. During this period, we must fully consider the local environment and other factors, which will better highlight the role of water ecological restoration technology.

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