

Practice and Research of Multi-Directional Ecological Restoration Technology in River Course Water Environment Treatment Project

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Abstract: This paper discusses the practical application of multi-directional ecological restoration technology in river water environment treatment projects, understands the significance of applying ecological restoration technology to implement relevant treatment projects, and deeply discusses and describes its practical application, hoping to achieve effective treatment of river water environment, continuously improve the quality of river water environment, and achieve the goal of deepening sustainable development strategy.

1. Introduction

In the past, the river water environment has been greatly affected due to the overemphasis on economic development and neglect of environmental protection in relevant fields, which not only reduces the balance and health of the ecological environment, but also affects the living environment of people. With the deepening of the sustainable development strategy, ecological and environmental protection has gradually become the main direction of social development. People from all walks of life pay more attention to environmental protection and governance. At the same time, they also put forward higher requirements for the river water environment. To effectively improve the river water environment, we need to have multi-dimensional ecological restoration technology as support, and only through the effective application of various technical measures can the river water environment be improved and optimized. Therefore, it is necessary to strengthen research on relevant contents.

2. Significance of Applying Ecological Restoration Technology in River Water Environment Treatment Project

In the process of harnessing the river water environment, the applied multi-directional ecological restoration technology itself has a strong comprehensiveness, which is mainly to give full play to the advantages of various governance technologies through the joint application of various governance means, so as to produce a synergistic effect and improve the governance effect of pollution problems. The reasonable application of ecological restoration technology is of great significance to the improvement and optimization of river water environment, which is shown in the following aspects:

First, the multi-directional ecological restoration technology is based on the source of pollution, which can effectively reduce the impact of external pollution factors on the river water environment, reduce the integration and destruction of pollutants from the source, and achieve the goal of improving the water environment governance effect by controlling the invasion of pollutants. Second, this technology can realize the timely removal of river sludge, and reduce the pollutant content in the river water environment on the basis of the completion of sludge removal, so as to further optimize the water quality. Third, the application of this technology can achieve effective treatment of severe pollution in a short period of time. On the one hand, it can improve the water environment, on the other hand, it can activate the pollution resistance and purification capacity of

water bodies. Fourth, the reasonable application of this technology can optimize the aquatic community, ensure the balance and stability of the water environment, and achieve good pollution control effect while building a high-quality ecological landscape^[1].

3. Analysis on Multi-Directional Ecological Restoration Technology in River Water Environment Treatment Project

3.1 Endogenous Pollution Control

The long-term precipitation and accumulation of pollutants in the river channel will form a layer of sediment at its bottom. This sediment often contains a variety of pollutants, including nitrogen, phosphorus and heavy metals, which will be gradually released to the water body, causing continuous pollution problems to the water body. In serious cases, it can even be released into the air through the water body, causing greater impact on the surrounding air and environment. This kind of endogenous pollution problem can usually be realized through the combination of physical treatment technology and other treatment methods. For example, the river sediment is removed by corresponding mechanical equipment, and then the pollutants in the sediment are removed by biological enzymes. The effective application of various endogenous pollution control measures can not only realize the rapid removal of pollutants, achieve the effect of purifying the river, but also effectively reduce the sediment stock of the river, so as to avoid the high water level of the river. However, in practice, the use of machinery to remove sediment requires high cost, so it can only be used in some river regulation projects with serious pollution but small area. For the treatment project with large area, the treatment technology such as biological enzyme has better effect, which can effectively stimulate the microbial activity in the river and improve the degradation rate of toxic substances^[2].

3.2 External Pollution Control

Generally, external pollution will have a greater impact on the river water environment, especially in the case of continuous injection of external pollutants, once the purification limit of the river water body is exceeded, the pollution in the river will have a vicious cycle, increasing the difficulty of pollution control and treatment. Therefore, in the process of harnessing the river water environment, the first thing to do is to control the external source pollution, so as to lay a solid foundation for the application of subsequent harnessing technologies. In addition to urban sewage discharge, the external pollution of river water also includes sediment pollution. Rainwater carrying sediment into the river will cause a wide range of pollution problems. For this kind of pollution, the use of point source control measures can't achieve good results. It is also necessary to achieve effective control of external pollution through the multi-directional application of ecological remediation technology^[3].

For example, the automatic membrane filtration device can be applied to treat the pollution problem caused by rainwater. Through the effective application of folding filter screen membrane and filtration system, the automatic membrane filtration device can control the large area diffusion of pollution and effectively solve the problems such as water blockage, with good pollution control effect. In addition, the filter system is equipped with water storage tank and other facilities, which can use rainwater to circularly flush the interior of the equipment to avoid the accumulation of pollutants, thus improving the functionality and service life of the filter system. In addition, the external sewage interception and filtration system is usually set at the end of the rainwater pipe network connecting with the river mouth, which can effectively reduce the external pollutants entering the river through the effective application of the ecological detention technology of the revetment, especially the pollution problems caused by rainwater scouring. Traditional river revetment works are mainly used for flood control. With the integration of ecological restoration concept and technology, the role of today's revetment system in the control of external pollution is increasingly enhanced. When rainwater and surface water flow through the revetment, they will be filtered and infiltrated layer by layer, and the pollutants in them will be detained, absorbed and

purified. This control measure is mainly realized by means of the transformation ability of vegetation and biomass. Through the construction of vegetation and biological habitat, the effective integration of land, water and revetment is realized, and the purification ability of water body is improved while the effective control of external pollution is realized^[4].

3.3 Self-Purification of Water Body

For river water body, its self-purification ability mainly depends on its own ecosystem development, and a good ecosystem will help to improve the self-purification ability of water body. Therefore, in the process of implementing river water environment treatment, biological control must be done well. To begin with, play the role of ecological restoration of plants. Through the effective planting of submerged plants, floating leaf plants and emergent plants, the self-purification function can be fully exerted. First, submerged plants can effectively absorb pollutants in the river sediment to control the dispersion of sediment pollutants and the sedimentation of suspended substances on the water surface. Second, it can promote the release of oxygen and realize the rapid deposition of nutrients and heavy metals in water. Third, it can inhibit the growth of algae through the release of related compounds, such as phenolic compounds. However, in the process of specific application, the number of plants must be controlled reasonably and not too much, otherwise the air inside and outside the water will be isolated and the oxygen content of river water will be affected. Secondly, it is necessary to release plankton, benthos and fish, including herbivorous fish, shrimp and mussels. The release of these organisms can not only improve the biodiversity of the river, but also remove organic matter, animal and plant residues, algae, etc. in the water, effectively reduce the number of impurities and algae in the water, and ensure the water quality^[5].

3.4 Artificial Purification Technology

Generally, after the river water environment is seriously polluted, its self-purification ability will gradually lose, and the ecosystem will be out of balance. Therefore, in order to achieve rapid treatment of pollution problems, artificial purification technology needs to be applied. At present, the relatively mature artificial purification technology, such as ultramicro purification technology, is mainly based on the liquid phase interface and gas phase interface to produce submicron and micron scale oxidation bubbles through ultra-high pressure gas water mixing technology, so as to control the content of heavy metals, nitrogen and phosphorus substances, algae and other harmful substances. With this technology, the dissolved oxygen content in the water can be effectively improved, making the water more transparent^[6].

3.5 Composite Microbial Technology

The composite microbial technology can effectively degrade various organic substances in river water, so that the water quality can maintain normal aeration function and reduce its pollution. This bacterial agent is mainly composed of a variety of microorganisms, such as actinomycetes and photosynthetic bacteria. These microorganisms have different characteristics, but they can rapidly reproduce in the water body. Through the effective construction of the flora, the rapid absorption and degradation of nutrients in the water body can be achieved, so that the pollutants in them can be continuously reduced. This governance technology not only has low-cost investment, but also has good governance effect, so it has a relatively broad application prospect^[7].

4. Conclusion

To sum up, the rational application of multi-directional ecological restoration technology in the river water environment treatment project can not only achieve effective treatment of river water pollution problems, but also has a very important significance for the sustainable development of river water environment. Therefore, relevant fields should pay attention to this technology, strengthen research on it, and implement ecological restoration technology in accordance with the actual situation of river water environment, so as to improve the quality of river water pollution control, achieve the goal of balancing the ecological environment and improving people's living

environment.

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