

Pollution Sources and Treatment Measures of Urban River Sediment

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Abstract

Sediments are sediments that accumulate at the bottom of water bodies such as rivers, lakes, reservoirs, and bays for a long time. Pollutants enter the water body through sedimentation, wastewater discharge, and rainwater, and finally deposit in the sediment to make it polluted. The core of river sediment treatment is "exogenous emission reduction and internal source dredging". The ecological treatment method of river sediment pollution is a development trend.

Keywords

Urban river; Sediment; Pollution; Treatment.

1. Introduction

Sediment is a long-term accumulation of sediment at the bottom of rivers, lakes, reservoirs, and bays, and is an important part of natural waters. The sediment is mainly composed of inorganic minerals, organic minerals and mobile phases, and has a high water content. The main sources of sediment pollution in water bodies are natural sources and human factors. Natural sources mainly include soil parent material, precipitation, and surface runoff. Human factors mainly include industrial, transportation and agricultural production. Pollutants enter the water body through sedimentation, waste water discharge, and rainwater, and finally deposit in the mud to make it polluted. Therefore, the sediment is considered as the ultimate place for water pollutants. A large amount of pollutants accumulate in the sediment of the river, which not only disrupts the ecological balance in the river, but also gradually releases pollutants that continuously cause secondary pollution to the water body of the river. The pollution release process can last 20 years or even longer. The living environment of the city and river management in the city will have a very big impact.

2. Pollution Sources of Urban River Sediment

The sources of sediment pollution in the river of Shichuan River mainly include the following aspects: (1) Because the river channel is a natural channel, there is no river defense, rainfall and other natural factors carry a large amount of surface pollutants directly into the river channel, causing the pollutants to deposit in the river channel sediment. (2) Because the Ishikawa River is located in the urban fringe of Fuping County, on the one hand, a large amount of industrial wastewater is discharged into the river or the surface, and on the other hand, there is also a large amount of farmland. Excessive application of chemical fertilizers

and pesticides will also be discharged through the surface runoff. The river course, along with surrounding solid waste, biological sewage, etc. will also carry pollutants into the river course. After a long period of accumulation, the pollutants are deposited in the sediment of the river course, causing serious sediment pollution. (3) Secondary pollution caused by sludge at the bottom of the river. The sludge deposits in rivers are serious, which can easily lead to poor water flow. Once the environmental conditions change, pollutants containing a large amount of heavy metals are easily released to overlying water bodies, causing secondary pollution.

3. Treatment Measures of Urban River Sediment

The core of river sediment treatment is "exogenous emission reduction and internal source dredging". Among them, external source emission reduction is the basis of treatment and internal source dredging is the prerequisite for remediation. However, the disposal of sludge after dredging is also a problem that needs to be solved urgently. Sediment is rich in nutrients and is a potential resource. Making full use of this resource has high social value. Dredged sediment resources have been developed in various countries. Dredged sediment resources are becoming more and more popular value.

In order to solve the problem of sediment pollution in the river of Shichuan River, from the three aspects of external emission reduction, internal dredging, and reuse of sediment, we propose an ecological treatment method for sediment pollution in the river of Shichuan.

(1) External emission reduction

In order to prevent direct discharge of sewage into rivers or carry pollutants into rivers through surface runoff, we first discuss the direct discharge of industrial wastewater and domestic sewage with surrounding enterprises and factories, and strictly prohibit direct discharge of untreated polluted water to In the river, at the same time, a sewage treatment plant is established. All polluted water bodies must be discharged after the sewage treatment plant meets the standards and directly cut off the source of pollution. Secondly, for the problem of surface runoff carrying pollutants into the river, we have set up a river ecological slope protection method to block Pollutants prevent it from reaching the river. Specifically, the prefabricated ecological concrete block is used to build the bank slope. Its structure is constructed from top to bottom with an ecological concrete thickness of 12 cm, a gravel layer thickness of 10 cm, a fine sand layer thickness of 10 cm, and a PE composite geomembrane.

(2) Endogenous dredging

During the remediation of the Shichuan River, due to the large amount of silt in the original river channel, if the silt is not cleaned up, it will adversely affect the water quality of the water body in the river channel after remediation. We use physical technology dredging method and masking method to carry out endogenous dredging of the existing sediment in the river. Firstly, the dredging method is used to remove the polluted sediment from the river, remove the pollutants from the water area, and reduce the pollution contribution rate of the sediment to the overlying water body, thereby improving the water environment. At the same time, the dredging method cannot completely clean the polluted sediments in the river. The residual sediments in the river are isolated by the masking method. The sand gravel layer and sand pebble layer are used to separate the river sediments and the water body, which can effectively prevent pollution in the sediment. Material enters the water body and causes secondary pollution, which has a significant effect on improving water quality.

(3) Ecological treatment of sediment

After physical dredging of river polluted sediment, the amount of sediment produced is very large, and the problem of sediment treatment after dredging is a big problem. In recent years, with the deepening of the construction of ecological civilization, the resource treatment of river sediment has gradually become a trend.

Although the composition of the river sediment is complex, its eutrophication guarantees the content of organic matter, nitrogen and phosphorus, which can be used as an ecological fertilizer to improve the soil properties. This is the resource utilization way that can best reflect the value of the sediment. However, since it cannot be guaranteed whether the cultivated plants will absorb the heavy metals and other components in the polluted sediment, it is not used for growing edible plants. Due to the large number of plantings, wide planting areas, and poor soil properties, we can use the excellent fertility in the sediment to improve soil fertility. While reducing the cost of sediment treatment, we can also save urban greening expenditures. Make the utilization of the green resources of the sediment become a good strategy for two purposes.

In the Ishikawa River Comprehensive Rehabilitation Project, we carried out research on the impact of river polluted sediment on the growth of green plants in a way of respecting nature, saving resources, and ecological improvement. The results show:

- ① By measuring the basic physical and chemical indicators of the river sediment, it is shown that the river sediment can be used as cultivation soil and its nutrient content is high, which is suitable for planting.
- ② The greening plants are planted after adding river sediment, and their growth status is no less than that of soil without river sediment.
- ③ Tests on the soil after planting show that the content of pollutants in the sediment has decreased, which proves that some of the river sediments can be removed by planting plants.

Therefore, in the Shichuan River Neutralization and Rehabilitation Project, we dredged the river sediments, pretreated them by drying, filtering, etc., and then filled them into the riverbank green belt as fertilizer, on the one hand, to avoid secondary pollution of river water quality. On the other hand, save resources, recycle the sludge, achieve sustainable and harmless treatment, and achieve the goal of ecological management.

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