Study on the Reducing Effect of Constructed Wetland on Runoff Pollutants

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Abstract: In recent years, the problem of environmental pollution in China has become more and more serious, and the number of surface runoff pollutants has gradually increased, which has seriously affected people's daily life and hindered the healthy and sustainable development of our socialist market economy. How to carry out ecological politics of natural environment, manage surface runoff pollutants and coordinate the relationship between social economic development and natural environment has become a key issue to be considered in modern society. This paper briefly analyzes the reduction effect of constructed wetland on runoff pollutants, expounds the reduction mechanism of constructed wetland on runoff pollutants, and probes into the subject of "Study on the reduction effect of industrial wetland on runoff pollutants ".

1. Analysis and Exploration on the Reducing Effect of Constructed Wetland on Runoff Pollutants

With the rapid development of modern social economy, the process of urbanization construction has gradually deepened, and the problem of natural environment pollution has followed. Nowadays, the area of surface runoff pollutants is expanding, the air quality of cities is decreasing day by day, and the water body is rich in oxidation in the air with various particle size pollutants. These pollution problems will lead to the pollutants in surface runoff entering the natural river system and into the groundwater layer, resulting in multiple pollution such as water pollution, air pollution and soil pollution. Therefore, the relevant departments in the region have stepped up efforts to improve the quality of surface runoff, reduce pollutants and maintain the natural environment by carrying out the construction and renovation of constructed wetlands.

(1) Analysis of the reduction effect of constructed wetlands on runoff pollutants

Wetlands (as shown in Figure 1) are parts of the land that are wet most of the time on the surface, in which wetland organisms are found to be unique ecosystems that can purify the air and mediate the natural environment of the region. Wetlands have a strong ecological purification function, including: mediating regional climate, optimizing water quality, regulating surface runoff and maintaining regional biodiversity. The wetland is formed by the infiltration of surface water for a long time. In this process, it can effectively eliminate the organisms that can not survive in the wetland system, and breed the species that can adapt to the wetland climate. Combining with this kind of function and characteristic of wetland, the constructed wetland can imitate the infiltration process of surface water to the land to a great extent, construct the small area climate system, simulate the natural environment of wetland, promote the water source propagation in this area, thus adjust the regional environment and reduce the surface runoff pollutants [1].

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Figure 1 Wetland landscape map

(2) Reduction mechanism of runoff pollutants in constructed wetlands

The constructed wetland has the same biological activities as the natural wetland, and it can degrade pollutants. In the constructed wetland system, plants can effectively absorb pollutants in the air, use it as a senior growing substance, and further promote the growth and reproduction of microorganisms in the constructed wetland. Therefore, all kinds of substances in constructed wetland can not only provide space and basic conditions for the poor students of microorganisms, but also can adsorb and filter some pollutants, and adjust the natural ecosystem of the region. It can be concluded that constructed wetland has a strong reduction effect on surface runoff pollutants.[2].

Reduction effect for suspended pollutants. In urban areas, there will be more pollutants and suspended matter in the surface runoff, constructed wetland can purify the polluted surface runoff water body and remove the suspended pollutant. This process mainly uses the pollutant interception and sedimentation function of constructed wetland to remove the suspended matter in the water body, and uses the humus of plants to add appropriate amount of substrate filler to enable the suspended matter to be caught and sink to the water body.

Figure 2 Suspended pollutants in surface runoff

Reduction effect for carbon-containing pollutants. In constructed wetlands, pollutants containing carbon can be subdivided into organic pollutants and inorganic pollutants, which have different reduction mechanisms for different pollutants and constructed wetlands. The composition of soluble inorganic pollutants in surface runoff can be analyzed: bicarbonate ion, carbonate ion, these two different substances will transform each other and fuse the cations in water to produce sediment, such as calcium carbonate. Under the action of constructed wetland, organic carbon pollutants in surface runoff will be degraded and absorbed by microorganisms, thus playing the role of removing pollutants. In this process, the gas and solid matter in the surface runoff can be removed by volatilization and precipitation to purify the surface runoff.

Reduction mechanism for nitrogen-containing compounds. In general, there are a large number of nitrogen-containing oxides in pollutants in surface runoff, which can affect the structure of the water body and promote the eutrophication of the water body (Fig .3), reduce the amount of oxygen dissolved in the water body, and destroy the ecological environment of the water body, which is not conducive to the healthy growth of organisms in the water. Therefore, under the action of constructed wetland, it is necessary to remove nitrogen-containing compounds, and make use of the microorganisms and plants in the wetland to absorb nitrogen to ensure the stability of surface runoff structure and the balance of nutrients in the wetland, which can meet the natural growth needs of

organisms in water and form a benign biochemical cycle system [3].

Figure 3 Water eutrophication

Reduction mechanism of phosphorus in surface runoff. In surface runoff pollutants contain more phosphorus, which can be divided into inorganic phosphate and organic phosphorus. However, orthophosphate can promote the growth of wetland plants and is one of the main nutrient elements of plant growth. Based on this, the converted phosphorus can be divided into two different forms, one is that the soil absorbs the phosphorus in the surface runoff, and the other is to use the adsorption method to remove the phosphorus matrix with high capacity to effectively remove the phosphorus in the surface runoff and maintain the normal operation of the ecosystem.

2. How to Apply Constructed Wetland to Reducing Pollution of Runoff

(1) Optimization of constructed wetland design

In order to effectively apply the effect of constructed wetland on surface runoff pollutant reduction, it is necessary to optimize the constructed wetland design, give full play to the advantages of constructed wetland application, and construct a good ecosystem. The staff should carry out in-depth research on constructed wetland according to the actual situation of the region, and master a variety of wetland types, such as: swamp wetland, underside green space, artificial lake, ecological wetland and so on. Although there is not yet a set of more perfect and standard design specifications for constructed wetlands, staff members should control the area and content structure of wetlands as an important measure to adjust surface runoff pollutants in combination with relevant rules and regulations, natural environment protection regulations, laws and regulations and technical regulations. In this process, staff should also consider the impact of external factors, such as: regional natural climate, seasonal changes, natural hazards, existing pollution, surrounding infrastructure, surrounding people, etc., to optimize the design of facilities layout, control the correlation coefficient between soil and water. In addition, in the selection of vegetation, workers should choose as many plants as possible that can meet the self-circulation needs of the wetland system, such as: if the soil has higher salinity, it is necessary to choose some plants with strong salt tolerance [4].

(2) Flexible use of constructed wetland purification mechanisms

In order to effectively apply the effect of constructed wetlands on surface runoff pollution reduction, workers should master the cutting mechanism of constructed wetlands on surface runoff pollutants, apply these mechanisms flexibly, and solve the problem of surface runoff pollution in the area. In the process of using constructed wetland, workers should realize that during the circulation of rainfall and surface runoff in wetland, the pollutants in the existing water body will be gradually removed, precipitated and degraded through a series of chemical reactions, biological reactions and physical reactions. During the rainy season, the microorganisms in the constructed wetland can not play a great role, mainly rely on the plant roots in the wetland to filter all kinds of pollutants in the water body. Therefore, staff should also pay attention to how to maximize the effect of constructed wetlands in different seasons, consider soil with different physical and chemical properties, adjust the structure and arrangement of constructed wetlands according to the degradation and absorption of pollutants by microorganisms, so as to achieve the purpose of

removing surface runoff pollutants [5].

(3) Analysis of the effect of constructed wetlands on surface runoff purification

In order to effectively apply the effect of constructed wetland on surface runoff pollution reduction, workers should carefully analyze the effect of constructed wetland on surface runoff purification. Against the background of deepening urbanization, the air quality of the city and its surrounding areas has gradually decreased, and various pollutants have been brought into rivers to form surface runoff pollutants. After the introduction of constructed wetland, it can fully play a role as a "purifier ", reduce a large number of pollutants, to the maximum extent, purify surface runoff, transform it into plant absorbable substances, improve soil fertility of constructed wetland, beautify the natural environment, and form an ecological system beneficial to human health. Based on this, it can be concluded that "constructed wetlands have obvious effect on reducing surface runoff pollutants and can beautify the natural environment of the region, regulate the natural ecosystem and promote the healthy and sustainable development of the region .".

3. Conclusion

To sum up, the pollution of surface runoff in our country is increasing gradually, and the remediation of pollutants is becoming an inevitable trend. In the actual process, the staff should grasp the reduction effect of surface runoff pollutants in constructed wetland area, and consider suspended pollutants, carbon-containing pollutants, nitrogen-containing compounds and phosphorus in surface runoff pollutants Compounds and so on, according to the actual situation of the region, optimize the design of constructed wetland, flexible use of constructed wetland purification mechanism to achieve the purpose of surface runoff purification.

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