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Water Pollution Control Based on Environmental Biotechnology

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Abstract: As an important part of water environmental protection, water pollution control is related to the fundamental interests of the people and the improvement of regional economy and society. When starting water pollution control work, it is necessary to comprehensively consider the influence of various factors, combine the specific characteristics and specific conditions of environmental biotechnology, and take management measures, control technologies and even policies and regulations that conform to the actual situation. The research purpose of this paper is based on environmental biotechnology in water pollution control. In the experiment, the water samples were measured for TP, ammonia nitrogen and other indicators. The test materials used soil, river sand and gravel, etc., and the calculation formulas of nitrification intensity and denitrification intensity were used to conduct experiments and analysis on the effects of wetland denitrification and phosphorus removal and livestock and poultry wastewater pollution data indicators.

1. Introduction

With the rapid improvement of my country's economy, water pollution control in water resources area not only includes technical control and other issues. In real life, due to different factors, in the management of water resource areas, there will be different management teams in the same water resource area., this division will also cause conflicts between management departments [1].

Due to the lag of supporting pollutant treatment facilities such as sewage treatment facilities and garbage treatment facilities, sewage, waste water and garbage cannot be treated in time, and the discharge to the natural environment has greatly increased, which has seriously exceeded the carrying capacity of the surrounding natural environment. Capacity, which in turn leads to the destruction of the ecological balance.Research by Hross M shows that the Stanford Water Pollution Control Authority owns and operates the Stanford Wastewater Treatment Facility, a state-of-the-art

wastewater treatment plant that uses a four-stage Bardenpho process to remove organic nitrogen. The plant's production facilities include two aeration tanks and four secondary clarifiers. Waste from the factory was dumped in Stamford Harbor, a stretch of water near Long Island Sound. In the event of high tide and/or industrial runoff, industrial wastewater must be pumped into Stamford Harbour [2]. Mnif I studies glycolipids, which have carbohydrate units linked to fatty acids and are surface microbial compounds produced by many microorganisms. Glycolipids are characterized by a high degree of structural diversity and the ability to reduce surface and interfacial tension at sites and interfaces, respectively. First, it describes in detail glycolipids, including rhamnolipids, trehalolipids, mannosyl erythritol lipids, and fibrinolipids; their production stress. This review describes important functional properties of glycolipids, including emulsification/demulsification, foaming and wetting, viscosity reduction, and hydrocarbon solubilization and fluidity. Due to these properties, they can be used as hydrocarbon emulsifiers, solvents and flow agents in environmental applications due to their moisture barrier and wood reducing properties. The classification, functional properties and applications of glycolipid biosurfactants in the environment and technology are introduced in detail [3].Therefore, the treatment of water pollution based on environmental biotechnology still needs to be improved.

Based on the research purpose, this paper studies the concept and characteristics of water pollution and water pollution control. In the experiment, the water samples were measured for TP, ammonia nitrogen and other indicators. The test materials used soil, river sand and gravel, etc., and the calculation formulas of nitrification intensity and denitrification intensity were used to conduct experiments and analysis on the effects of wetland denitrification and phosphorus removal and livestock and poultry wastewater pollution data indicators.

2. Research on Water Pollution Control Based on Environmental Biotechnology

2.1. Research Purpose

Water-based life is one of the most important material resources necessary for human health and improvement, and is directly related to the sustainable improvement of society. Due to the large population, my country's per capita water resources currently rank behind the world's per capita water resources, and it is listed as one of the few water-poor countries in the world [4]. With the reform and opening up, the rapid economic and social improvement of the country and the continuous advancement of urban planning, the improvement of urbanization has intensified, and the influx of people into cities has caused an increase in urban sewage, which has brought pressure on urban sewage treatment, deterioration of the ecological environment, urban degradation, industrial water use The technology and agriculture are backward and the water source is seriously polluted, which makes the water resources decrease day by day [5]. In recent years, my country has issued a series of policies related to the prevention and control of water pollution, clarifying water quality inspection standards and water pollution penalties, but there is still a lack of detailed regulations on the comprehensive improvement and utilization of water resources, and water pollution problems have not been effectively controlled. The study of water pollution is of great significance [6].

2.2. Research on Water Pollution Control

My country's water pollution prevention and control technology continues to improve, and gradually discusses the treatment methods that can be used for different types of water pollution.

From the selection of six major industries of food, paper, metallurgy, textile, petroleum, and pharmaceuticals, the different water pollution treatment technologies used by them, such as physical treatment, chemical treatment and biological contact oxidation, were investigated and evaluated, and finally the highest in the industry was selected horizontal water treatment technology [7]. my country has also done a lot of work in the field of water pollution prevention and control, such as river dredging, ecosystem restoration, water purification, on-site monitoring and other measures, but in some areas, the implementation effect has not been achieved initially [8-9]. Therefore, comparative studies of pollution control technologies suggest that river channel dredging projects should be given priority. According to the current situation of water pollution, it is concluded that only by strengthening the construction of the existing legal and regulatory system and promoting the formulation of unified management regulations in river basins can water pollution be effectively contained. Environmental governance should constantly update the legislative concept, and believes that the obligations and responsibilities of water pollution itself need to be Combined with pollution prevention and control, economic improvement and sewage charges are further clarified. In practice, my country's water pollution control legislation is not as perfect as it appears on the surface [10]. This paper discusses the judicial system reform from four aspects: the lack of legal system to prevent water pollution in the process of water pollution, government consultation and cooperation, citizen participation, and judicial system participation in governance. In the field of water pollution control, a concrete legal concept is proposed to lay a theoretical foundation for improving the legal structure of water pollution prevention and control in the future. The practice of constructing the inter-regional property rights market in the river basin through market transactions such as emission rights trading requires a high level of technology, which makes it difficult to continue to implement it in the scope of application in my country for a period of time in the future. In addition, the “Pigou tax” generated from ecological construction is transferred through the national central finance, and still depends on the reform, in-depth and mandatory nature of the national tax law, and lacks independent tax such as internal environmental protection tax[11]. Therefore, these propositions aim to establish a perfect river basin ecosystem to solve the external core problems of water pollution, share the cost of pollution prevention and control, and protect the river ecosystem, which can effectively achieve the purpose of protecting the river ecology [12].

2.3. Overview of Water Pollution

(1) The concept of water pollution

Water pollution refers to the phenomenon that the water environment is affected by some foreign substances and changes its physical or chemical properties, resulting in the loss of its normal function and the decline of its use value [13-14]. Generally speaking, due to the influence of human production and life, the water environment will be affected by some pollution sources, which will deteriorate the water quality, make the water quality eutrophic, lead to the death of organisms in the water environment, and then endanger the human health and ecology around the water source surroundings. Water pollution is actually one of the most important environmental problems in the world, and almost all countries are plagued by water pollution to some extent. Current academic researchers have made different classifications of water pollution based on research needs. According to the main causes of water pollution, it can be divided into natural pollution and man-made pollution; from the perspective of the main objects of pollution, water pollution can be divided into three categories: physical pollution, chemical pollution and biological pollution; from the pollutants Water pollution can be divided into industrial pollution, urban domestic pollution,

rural non-point source pollution, etc. [15]. Water pollution is a serious threat to my country's water resources security.

(2) Characteristics of water pollution

Water pollution has the following characteristics: First, the mobility of pollution. Water is constantly moving, no matter rivers or lakes and seas flow all the time, and water pollution also flows along with the flow of water [16]. Water pollution in any river basin will inevitably affect the water quality of the downstream water body. Second, the negative externalities of economic benefits. Negative externalities generally refer to the economic costs that other people spend without benefits outside the market; if the economic costs are added with positive benefits, it is called positive externalities [17]. Third, the complexity of governance. At present, my country's water pollution adopts the principle of combining comprehensive management and regional management. Although my country has set up seven major river basin management agencies, the method of combining comprehensive management and regional management adopted by the state is still unable to solve the problem of geographical segmentation. The environmental department of the government, as the river basin manager under the principle of territorial management, is responsible for the management of water resources; the economic improvement department plays the role of the economic developer within the administrative region, driven by economic interests and at the cost of destroying the ecological environment in exchange for the economy. Under the influence of local protectionism, the relatively loose departmental management model still maintains the original "division of labor" state, unifying the interests of all parties and the public interest, and effectively controlling water pollution in the region in a cooperative manner. Water pollution is divided into different types, which are divided into urban water pollution and rural water pollution by region; groundwater pollution, surface water pollution, marine water pollution, drinking water pollution, natural water pollution and cultural water pollution are divided by pollution type; The sources are divided into industrial water pollution, agricultural water pollution and other water pollution. This paper focuses on the water pollution of surface runoff.

2.4. Water Pollution Control

Governance is the process of exerting influence on a thing by means of management according to corresponding procedures around a specific goal. The pollution control in this study is mainly to protect and control the water body in the basin, restore the use value of the water body, reduce the harm of water pollutants to people, and ensure people's production and living water [18]. Because the river basin has the characteristics of integrity, which means that if we want to manage it, we must start from the whole, take the two banks, upstream and downstream, tributaries and mainstream of the whole basin as a whole system, sort out the internal relationship between them, A series of governance and measures should be taken uniformly to cut off the source of pollution. Only in this way can governance be effective and the goal of sustainable improvement be finally achieved. For water pollution control, various regions and functional departments have also issued corresponding policies and measures.

3. Investigation and Research on Water Pollution Control Based on Environmental Biotechnology

3.1. Research Content

(1) Measurement items

Water samples to measure TP, ammonia nitrogen and other indicators. Determination of substrate and plant samples Determination of substrate moisture by drying method; determination of substrate available phosphorus and determination of total phosphorus in plants.

(2) Test material

The sewage treatment plant of M University mainly deals with the load of the pool of the wastewater treatment station for livestock and poultry such as pigs, cattle, sheep, chickens and ducks discharged from the breeding areas in the park. As shown in Table 1:

Table 1. Outlet load

Metric	COD	TP	TN	pH
Load	110-210	20-40	60-200	6-9

3.2 Detection Method

Among them, w_1 is the amount of nitrate nitrogen produced by unit mass of soil matrix per unit time, mg/(gh); c_1 is the nitrate nitrogen concentration in the initial solution, mg/L; c_2 is the nitrate nitrogen in the solution after 24 hours Concentration, mg/L; t is the culture time, h; V_2 is the culture volume, L; V_1 is the water volume in the soil matrix, L; M is the sample mass, and g; K is the water coefficient. The formula for calculating nitrification intensity is as follows:

$$w_1 = \frac{(c_2 - c_1) \times (V_1 + V_2)}{t \times m \times k} \tag{1}$$

In the formula, w_2 is the amount of nitrate nitrogen produced by unit mass of soil matrix in unit time. Other parameters are the same as the formula of nitrification intensity. The denitrification intensity is calculated as follows:

$$w_2 = \frac{(c_2 - c_1) \times (V_1 + V_2)}{t \times m \times k} \tag{2}$$

4.Analysis and Research on Water Pollution Control Based on Environmental Biotechnology

4.1 Effects of Nitrogen and Phosphorus Removal in Wetlands

The effect of different influent water quality on the denitrification and phosphorus removal is based on the volume ratio of the air flotation tower and the effluent of the pool. The optimal dosage determined by the coagulation test and the influence on the phosphorus removal effect are studied. The addition amount is shown in Table 2 and Figure 1:

Table 2. Simulated dosage of flocculant in constructed wetland (unit:g)

Handle	1	2	3	4
Soil	0	8	16	18
River sand	0	9	18	21
Gravel	0	7	11	35

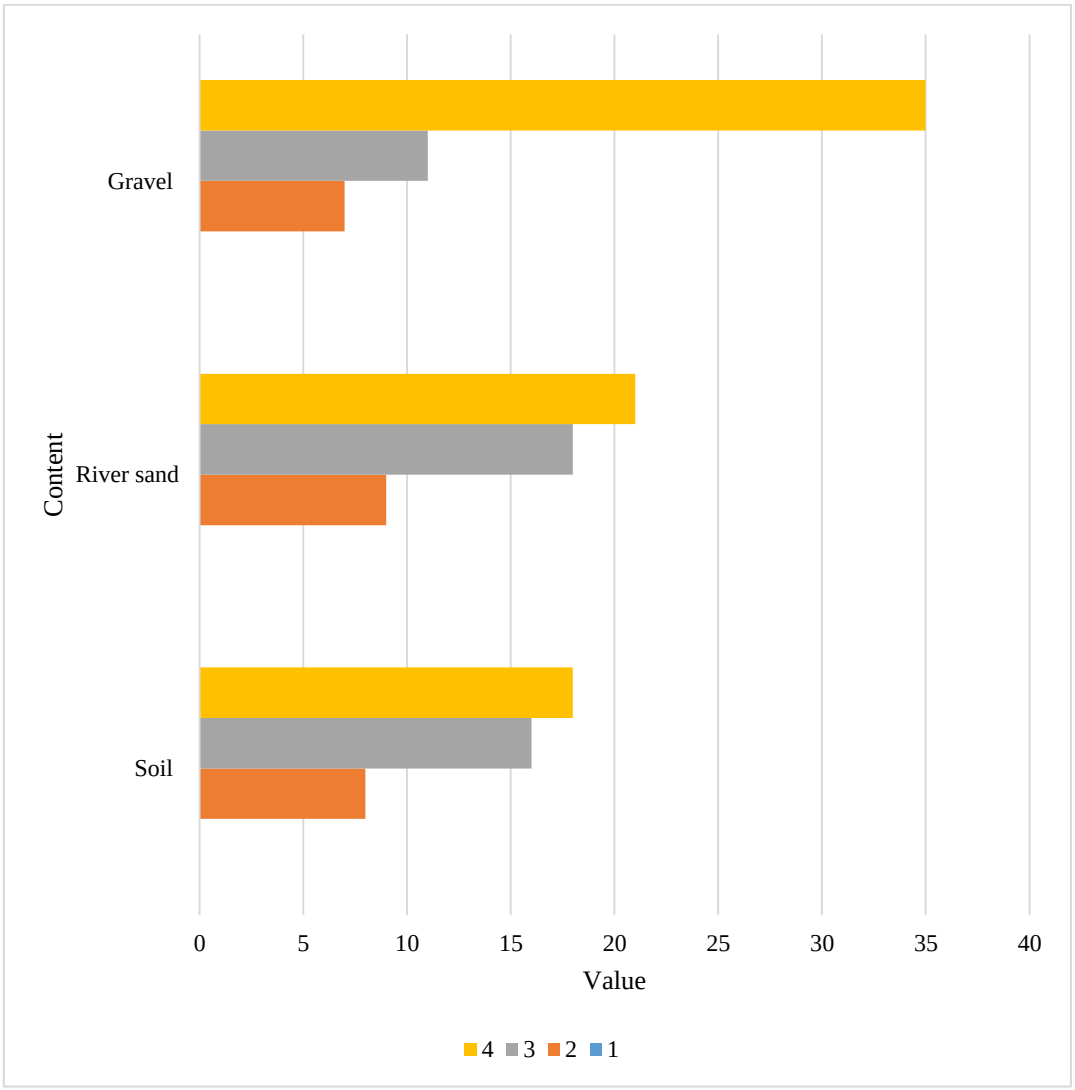

Figure 1. Comparison diagram of nitrogen removal and phosphorus removal effects

4.2 Data Indicators of Livestock and Poultry Wastewater Pollution

M University Sewage Treatment Plant mainly treats livestock and poultry wastewater such as pigs, cattle, sheep, chickens and ducks discharged from the breeding areas in the park. The original concentration of livestock and poultry wastewater used in the test was taken from the effluent after simply removing the coarse physical impurities through the coarse grid. The water quality indicators are shown in Table 3 and Figure 2:

Table 3. Composition and content of livestock and poultry wastewater

Surveillance project	Raw water	Constructed wetlands
SS	1982	159
TP	552	36
pH	8.3	8.3

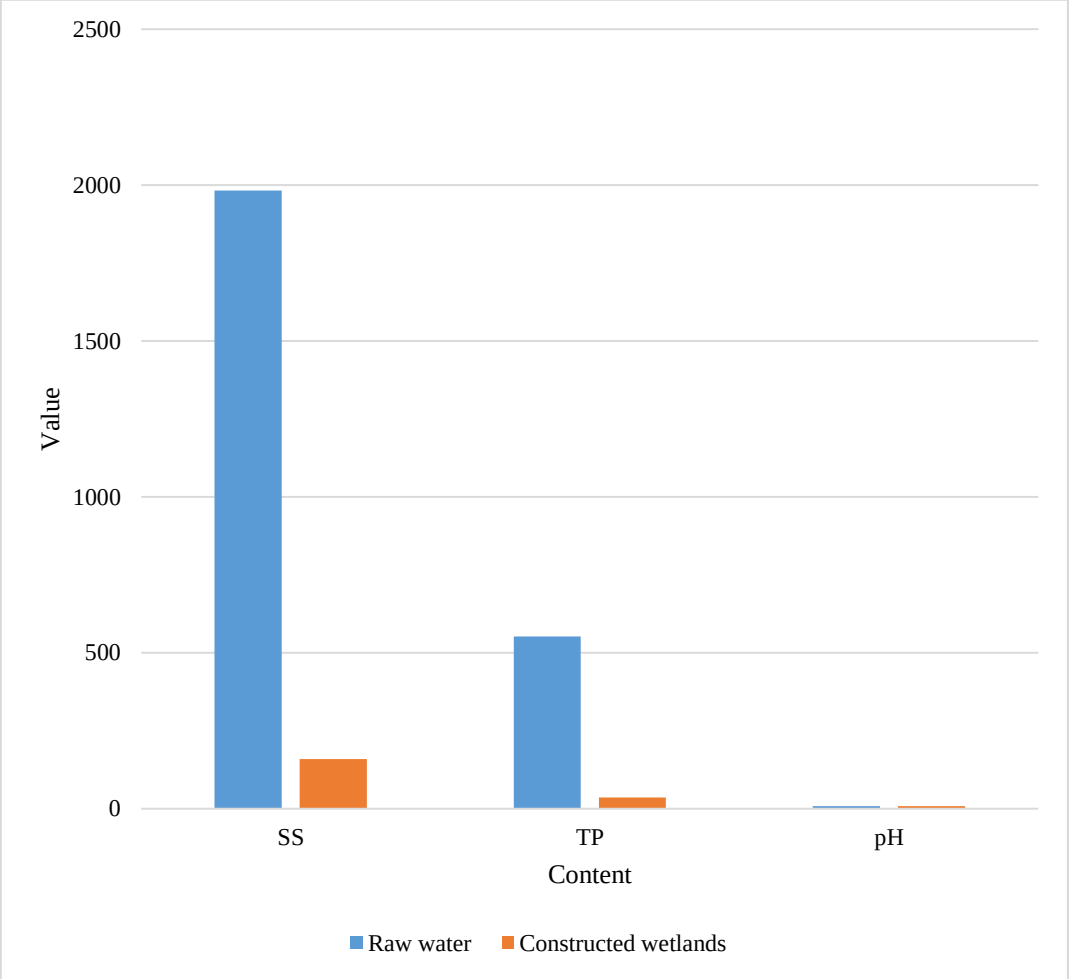

Figure 2. Pollution data of livestock and poultry wastewater

5. Conclusion

Since the reform and opening up, my country's economy and society have improved by leaps and bounds, urban integration has continued, and urban space has accelerated. With the rapid urbanization process on a large scale, the demand for and consumption of resources is also increasing day by day. In some areas, the economic improvement mode is extensive, the industrial planning is unreasonable, the industrial structure is heavy, and the total pollutant discharge scale is close to or exceeds the environmental load capacity. The natural environment The ecological balance is destroyed, the ecological environment problems are becoming more and more prominent, and water pollution control is imminent. However, in the process of water pollution control in my country, the frequent transboundary water pollution incidents appear to be a crisis of water resources utilization, but in fact it is the result of local government fragmentation and improper coordination. The effective control of water pollution is far from enough to rely on the separate management of local government departments. It is necessary to mobilize multiple resources and coordinate the responsibilities of various water-related departments to realize the unified planning, law enforcement and industrial layout of water pollution control.

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Data Availability

Data sharing is not applicable to this article as no new data were created or analysed in this study.

Conflict of Interest

The author states that this article has no conflict of interest.

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