

Overview of Artificial Ecological Floating Island Technology

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Abstract

Due to human large-scale development and construction activities. Great changes have taken place in the original natural environment, especially the shrinking wetland area and the deteriorating water quality have caused serious damage to the aquatic ecology of rivers, lakes and ponds, etc. Artificial floating island is a kind of sewage ecological restoration treatment technology. This technology uses plant roots, floating island substrates and plant rhizosphere microbial flora to degrade various organic substances in sewage to achieve the purpose of ecological restoration by setting up a floating substrate in the polluted water body to imitate the natural growth law of plants.

Keywords

Artificial Floating Island; Water Eutrophication; Floating Island Technology.

1. Introduction

With the continuous development of social economy, the discharge of industrial and agricultural wastewater is increasing. Traditional water treatment methods can only treat nitrogen and phosphorus in wastewater at a rate of 30% to 50%, and a large amount of nitrogen and phosphorus are discharged into rivers and lakes, which makes the water body more and more eutrophication. According to survey data, there are approximately 9.1 million ha of natural lakes in my country, of which 85% have varying degrees of eutrophication, and 50% of the lake surface has been eutrophication above moderate. The phenomenon of "water blooms" caused by eutrophication has become more frequent and has caused a series of undesirable consequences, such as the acceleration of lake siltation, the destruction of aquatic resources, and the functional water shortage caused by the pollution of water sources, causing the water ecosystem to be devastated. The blow and so on.

The treatment of water eutrophication is very difficult and costly. Traditional methods include removal of point sources (intercepting pollution sources and diversion), reducing and controlling non-point source pollution, mechanical dredging, etc. Although these methods are effective, they often encounter various difficulties and are costly in implementation. , And there are various restrictions. Looking at it from the other side, although the excessive nitrogen and phosphorus in the water body is a kind of pollution, it is an indispensable nutrient for plants in the growth process. The artificial biological floating island to be introduced in this article is a water treatment technology that uses the nitrogen and phosphorus in the water body to plant plants on the water surface carrier to repair the polluted water body in situ.

2. Artificial floating island concept

“Floating island” originally refers to a natural phenomenon in which a part of the plants on the lake shore is cut off due to the upward movement of the peat layer and floating on the water. Here, the floating island introduced is a kind of artificial floating body like a raft. Cultivate some aquatic plants such as reeds on this artificial floating body and place them in the water. Its main functions can be

summarized into 4 aspects: purifying water quality, creating living space for creatures (birds, fish), and improving the landscape. The wave-eliminating effect constitutes a protective effect on the shore. Plant artificial floating island is a floating structure that grows aquatic or terrestrial plants. It uses the principle of soilless culture technology, uses polymer materials as the carrier and substrate, and adopts modern agronomic and ecological engineering measures to domesticate or improve aquatic plants. Terrestrial plants are transplanted to floating islands on the surface of the water. Plants grow on the floating islands and absorb nutrients such as nitrogen and phosphorus in the water body through their roots to achieve the purpose of purifying water quality. Plant artificial floating islands have a series of advantages such as not being restricted by water depth and light transmittance, no secondary pollution, and can increase the safety of water bodies. It is a simple and efficient method for restoring nutritive water bodies.

3. Purification mechanism of artificial floating island

- (1) Floating island plants absorb and absorb nitrogen and phosphorus in the water body: The floating island plants absorb and absorb nutrients such as nitrogen and phosphorus in the water body through their roots to supply their own growth, thereby improving water quality.
- (2) Plant roots increase the surface area of water that is exposed to oxidation, and can secrete a large number of enzymes to accelerate the decomposition of pollutants.
- (3) Algae suppression effect of floating island plants: Some plants can specifically inhibit the growth of corresponding algae. For example, reeds have a restraining effect on the formation of blooms of *Microcystis aeruginosa* and *Chlorella*.
- (4) The formation of floating island plants and microorganisms synergistic effect: the floating island plants transport oxygen to the root zone, forming aerobic, facultative and anaerobic environment of different small organisms in the root zone, providing a suitable environment for the survival of a variety of microorganisms. At the same time, microorganisms can degrade some organic matter that plants cannot directly absorb into nutrients that plants can directly absorb.
- (5) Sunlight shielding effect of floating islands: Floating islands must occupy a certain amount of water surface, and can weaken the photosynthesis of algae in the eutrophic water body and delay the outbreak of water blooms.

4. Artificial floating island classification

The classification of artificial floating islands is divided into dry floating islands and wet floating islands according to whether plants are in direct contact with water bodies.

Dry floating islands can be divided into two types, one-piece type and split type, according to the positional relationship between the floating body that provides buoyancy and the plant culture container. Plants planted on dry floating islands do not directly contact the water body. Because the roots of the plants do not touch the water body, dry floating islands do not have direct water treatment capabilities. However, such floating islands are generally larger in size and can provide greater buoyancy. Larger woody horticultural plants can be planted on the island, which not only beautifies the environment, but also provides a habitat for birds and insects, and its underwater part can also be used as a spawning place for fish. This kind of floating islands are rarely used in our country. They are mainly used for landscapes. They are generally made of concrete and expanded styrene. Some higher terrestrial plants are planted on the floating islands, which cannot purify the water body.

Wet floating island is a type of floating island where transplanted plants are in direct contact with the water body. Floating island plants can directly use the nitrogen and phosphorus nutrients in the water body. Wet floating islands can be divided into frame type and frameless type according to the presence or absence of the outer frame. The frameless type is a relatively open structure. The floating island plants can grow freely on the floating island. The frameless floating island is generally made of coconut fiber, which is softer to the landscape and is not afraid of mutual impact. , Good durability.

However, it is also possible to use synthetic fiber as the base of the plant and then wrap it in synthetic resin. There is also the direct use of the mutual involvement of the root system or rhizome of a certain plant to form a biological floating bed on the water surface. Framed wet type floating islands are the mainstream of floating islands. Various materials can be used. Framed floating islands are generally made of stainless steel plus expanded polystyrene, fiber reinforced plastics, special polystyrene plus special synthetic resin, concrete, and salinization. Made of vinyl synthetic resin and other materials. The most used is polystyrene foam board, but the foam material itself will bring about the problem of secondary pollution. Now another kind of floating island made of bamboo or wooden strips appears more frequently. This kind of floating island has a strong structure and resistance to Corrosion, anti-aging, high buoyancy, easy to obtain materials, simple production steps, low cost and other advantages.

References

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