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Commentary

Construction of a Large-Scale Subsurface Flow Wetland for the Functional Detection of Microbes in Marine Aquaculture Water

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DESCRIPTION

Aquaculture is the controlled growth of useful aquatic animals such as fish, crustaceans, mollusks, algae, and aquatic plants. Contrasted with commercial fishing, which includes capturing wild fish, aquaculture involves raising populations of freshwater, brackish water, and saltwater species in controlled or semi-natural environments. Aquaculture carried out in seawater habitats and lagoons is known as Mari culture, as opposed to freshwater aquaculture, which is more frequently referred to as marine farming. Pisciculture is a kind of aquaculture that involves raising fish for food purposes. The breeding, cultivation, and harvesting of fish and other aquatic plants is referred to as aquaculture, or "farming in water." It is a sustainable food source and industrial product that helps restore populations of aquatic creatures that are in risk of extinction and creates healthier ecosystems. Due to the rising demand for seafood, technology has increased fish growth in open oceans and coastal marine regions.

The production from marine aquaculture was 30.8 million tonnes and made up 37.5% of the total 82 million tonnes of aquaculture products produced globally in 2018. The proportion of aquaculture produced in marine environments is expected to increase significantly, according to experts. Land-based and nearshore aquaculture methods, meanwhile, have gained widespread acceptance and promotion. For aquaculture, seawater is typically taken from offshore locations. The influent water from offshore areas must be appropriately treated before entering the aquaculture system because, in recent decades, the quality of offshore waters has declined due to eutrophication. The advantages of built wetlands (CWs) as an environmentally beneficial solution are reduced secondary pollution, inexpensive construction costs, easy management, and widespread application in the treatment of agricultural non-point source water pollution. For the simultaneous occurrence of numerous complex physical, chemical, and biological processes, such as sorption and sedimentation, photolysis, hydrolysis, volatilization, plant absorption and accumulation, plant exudation, and microbial degradation, CWs are dependent on the removal of pollutants. Surface Flow Constructed Wetlands (SFCWs), Horizontal Subsurface Flow Constructed Wetlands (HSSFCWs), and vertical subsurface flow constructed wetlands are the three types of CWs that can be classified based on the flow pattern. Because of its great water treatment effect, low risk of system obstruction, and relatively simple maintenance requirements, HSSFCW is utilized in a variety of water treatment processes. Wetland plants typically select salt-tolerant plants to remediate saline wastewater. Mangrove plants are regarded as the best option because of their strong salt tolerance and effective water filtration capabilities. In artificial wetland systems, microorganisms are essential for processes including nutrient fixation and transformation as well as the breakdown of organic pollutants. Previous studies on the differences in microbial community structure in the various functional components of built wetlands tended to be short-term in nature and lacked studies on the microbial community structure during long-term operation, particularly for seawater created wetlands. In order to increase the dissolved oxygen environment in the system, constant aeration was used in this work to build a large-scale subsurface flow wetland system. A theoretical foundation for the development and use of subsurface flow wetland technology in the field of seawater purification was provided by the exploration of the purification effect of subsurface flow wetland on the inflow of natural sea area and the analysis of the microbial community structure of subsurface flow wetland.

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