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Opinion Article

# Water Quality and Environmental Responsibility in Shrimp Farming

**Fang Li***

*Department of Aquaculture, University of Exeter, Exeter, United Kingdom*

## DESCRIPTION

Marine shrimp (*Litopenaeus vannamei*), also known as white leg shrimp, are one of the most commercially valuable and widely farmed species in the aquaculture industry. However, the traditional methods of shrimp farming have been associated with various challenges, including disease outbreaks, water pollution, and high operating costs. In recent years, the adoption of innovative and sustainable practices such as Bio Floc Technology (BFT) has revolutionized shrimp farming. This article explores the benefits and principles of culturing marine shrimp, specifically *L. vannamei*, in BFT systems. Bio Floc Technology (BFT) is a sustainable and environmentally friendly aquaculture approach that has gained widespread recognition in recent years. It involves the creation of a controlled environment where microbial communities, consisting primarily of bacteria and microalgae, are encouraged to proliferate. These microbial communities help maintain water quality by converting organic matter, ammonia, and other waste products into biomass, which can serve as supplementary feed for shrimp and other cultured species. One of the defining features of BFT is its ability to support high stocking densities of shrimp. This is achieved by maintaining excellent water quality and optimizing the use of available space. Unlike traditional shrimp farming methods, BFT systems require minimal water exchange. This reduces water consumption, minimizes the risk of disease transmission, and lowers the environmental impact of shrimp farming. BFT systems encourage the growth of beneficial microbial communities, particularly heterotrophic bacteria and microalgae. These microbes play a vital role in maintaining water quality by breaking down organic matter and converting ammonia into less toxic forms. Proper aeration and pH control are essential in BFT systems to maintain oxygen levels and stabilize the pH within the optimal range for both shrimp and microbial communities. The microbial communities in BFT systems actively consume excess nutrients, organic matter, and ammonia, preventing water pollution and reducing the risk of disease outbreaks. Minimal water exchange means that there is less discharge of nutrient-rich water into surrounding ecosystems, reducing the environmental impact of shrimp farming. BFT systems allow for higher stocking densities, resulting in increased shrimp yields per unit area and shorter production cycles. The controlled environment of BFT systems ensures that shrimp are provided with optimal conditions for growth, leading to higher survival rates and faster growth. BFT systems require less water and land compared to traditional shrimp farming, reducing operating costs and the need for large land areas. The microbial communities in BFT systems can serve as a supplementary feed source, reducing the amount of commercial feed required. The reduced reliance on external water sources and the presence of beneficial microbes in BFT systems help reduce the risk of disease transmission to shrimp populations. Shrimp raised in BFT systems tend to be less stressed and healthier due to the improved water quality, which can result in a lower mortality rate. Setting up a Bio Floc Technology (BFT) system can require significant initial investment in infrastructure, aeration equipment, and microbial management.

Maintaining the balance of microbial communities in BFT systems can be challenging. Overgrowth of certain microbes or the development of unfavorable conditions can lead to water quality issues. Marine shrimp farming in Bio floc Technology systems offers a sustainable and environmentally responsible approach to meet the growing global demand for shrimp. By minimizing water exchange, enhancing water quality, and promoting microbial communities, BFT systems enable higher stocking densities, increased productivity, and reduced operating costs. As the aquaculture industry continues to evolve, embracing innovative practices like BFT for marine shrimp farming is a important step towards achieving sustainability, economic viability, and the responsible use of natural resources. With proper training, expertise, and investment, shrimp farmers can harness the advantages of BFT while contributing to the future of sustainable seafood production.

**Correspondence to:** Fang Li, Department of Aquaculture, University of Exeter, Exeter, United Kingdom, E-mail: fangli@gmail.com

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