16 Summary

Aquaculture faces significant environmental challenges, particularly regarding nutrient pollution and disease outbreaks. Consequently, understanding the causal relationships between production intensity, species diversification, and environmental impact is essential for developing effective strategies that support long-term sustainability and resilience. Current expansions in aquaculture and allied activities are strategically planned to address complex socio-economic and environmental constraints. India, in particular, emphasizes the balanced utilization of oceanic, coastal, and freshwater resources while prioritizing the preservation of ecosystem biodiversity. Sustainable technologies are being adapted to diverse agro-climatic conditions, integrating advanced diagnostics, aquatic pollution monitoring, and specialized therapeutics alongside the adoption of best management practices (BMPs).

The focus has shifted toward achieving sustainability by prioritizing the cultivation of native species within both open-water and improved closed-culture systems. A precautionary approach is applied to the use of genetically modified organisms, feed additives, and organochemicals, ensuring they undergo rigorous validation before implementation. To mitigate the risk of disease transmission, stocking densities are optimized to prevent physiological stress. Furthermore, coastal zones are protected through strict regulations on effluent discharge, ensuring that intensive operations do not compromise the surrounding environment or human health. The integration of innovative, eco-friendly technologies-such as Integrated Multi-Trophic Aquaculture (IMTA), Recirculating Aquaculture Systems (RAS), and Biofloc Technology (BFT)-represents a transformative approach to organic and integrated farming, significantly enhancing both productivity and ecological integrity.

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