

9. **Protection and plantation of native vegetation:** Cultivation of seaweed and mangroves helps to slow down global warming.

10. **Follow ecologically sustainable practices:** Achieved by following systems such as ecological aquaculture, organic aquaculture, composite fish culture, integrated aquaculture, and closed circulatory systems.

11. **Reduce the use of fossil fuel:** Ecofriendly fuels such as solar, biofuels, etc. can be used as energy sources which will reduce the emission of greenhouse gases to a large extent.

12. **Ensure transparency and traceability:** Maintain regular record keeping of farming operations in the production chain and real-time sharing of information to the public wherever needed.



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Guidelines for Ecofriendly Aquaculture: The Way Forward to Sustainability



Aquaculture or farming of aquatic organisms in captivity contributes half of the total fish supply with a significant increase of nearly 10% every year globally. Aquaculture operation offers a wide range of possibilities for diversification with respect to culture practices, species, and other input resources. However, the intensification resulted in negative impacts on the environment.

The major economic and environmental disadvantages are

1. High investment and maintenance cost
2. Increased susceptibility to diseases due to the higher stocking density
3. Difficulty in waste or effluent treatment
4. Excessive use of antibiotics and leaching out of residues to the environment

To maintain the resilient, productive aquaculture system over the years, we must ensure the reduction of carbon footprints, efficient use of resources, waste management and conservation of natural resources for future use. The farmers/users should follow sustainable aquaculture practices to conserve the resources in ecofriendly, technologically appropriate, economically viable and socially acceptable manners.

Key points to sustainable aquaculture practices are

1. **Selection of the right species for aquaculture:** Always prefer native species since exotic species may escape from farm and invade natural water bodies.

2. **Select farming sites that does not need any habitat conversion:** Choose appropriate farm site by considering different factors like land use, water flow, soil types, etc. The selected site should not cause destruction to natural habitat and biodiversity. Always exclude environmentally sensitive areas like swamps, mangrove areas, coral reefs etc.

3. **Selection of correct design and layout of farm:** The effluent from the farm is one of the major threats to the environment. The effluents should be properly treated before release to the environment. In addition to this biosecurity measure such as setting up of quarantine unit is also necessary.

4. **Managing feed in appropriate manner:** Always prefer the use of sustainable sources of feed ingredients (byproducts of plant / animal / microorganisms), feed additives (probiotics and enzymes like proteases

phytase, xylanase, etc.) and environment-friendly production technique (aerobic / fermentation system). Appropriate feeding quantity and interval shall be maintained to maximise feed conversion and reduce waste generation.

5. **Water usage management:** Control the overall water use index in the farm and follow the water conservation practices such as water exchange, filtration, recycling, wastewater treatment etc.

6. **Proper use of organic fertilizers:** Organic fertilizers enrich the biological cycles in the production of aquatic organisms. However, their use in excess must be restricted to avoid infection in farmed species and eutrophication of the pond.

7. **Restrict the use of chemicals and veterinary drugs:** Chemicals and Veterinary drug residues cause environmental contamination and pose health problems to the public. Hence they must be controlled in both feeding and disease management regimes.

8. **Encourage the use of environment-friendly inputs:** Use various biological methods such as probiotics, prebiotics, postbiotics, phytobiotics, use of specific bacteriophages etc. for prophylaxis and treatment of diseases.