



WWF-US Aquaculture Strategy

The Context

Vision	Our vision is to build a future in which sustainable aquaculture supports food security, minimizes environmental impacts, and enhances economic and social well-being for communities and governments worldwide.
Mission	To transition global aquaculture towards more sustainable models by integrating cutting-edge feed technologies, reducing direct and indirect environmental impacts, promoting biodiversity, and ensuring equitable economic opportunities across value chains.
Position	Sustainable aquaculture production systems must incorporate alternative feed solutions, precision feeding, and circular economy principles to enhance ecosystem health, climate resilience, social equity, and economic performance.
Why WWF takes this position	Without scaled innovation in aquaculture feed and ingredients, the sector will continue to contribute to deforestation, overfishing, greenhouse gas emissions, and biodiversity loss. A shift to alternative protein sources, precision feeding, and waste upcycling can significantly reduce environmental impacts while improving economic viability and food security.
Key impacts to be mitigated	• Direct greenhouse gas emissions from aquaculture and embedded ones from feed ingredient production • Nutrient pollution and water degradation from waste and feed practices • Habitat destruction linked to production sites and feed ingredient sourcing • Overfishing due to reliance on forage fish for fishmeal and fish oil • Poor feed quality leading to food safety and animal health concerns • Endocrine disruptors affecting aquatic and ecosystem health • Antibiotic overuse contributing to resistance in aquatic species • Labor and human rights violations in aquaculture and feed supply chains
Key opportunities to be amplified	• Increased availability of alternative protein sources to reduce environmental impact • Improved nutrient recovery and waste valorization in feed production • More resource-efficient production systems with reduced inputs • Reduced methane and GHG emissions through feed innovations • Strengthened resilience of aquaculture systems to climate change • Greater equity, fair labor practices and transparency across the value chain
Focus areas	1) Sustainable Feed Solutions 2) Climate and Environmental Impact Reductions 3) Biodiversity and Ecosystem Protection 4) Nutrient Recovery and Waste Utilization 5) Animal Health and Welfare 6) Social and Economic Equity 7) Innovation and Technology

Objectives

1) Sustainable Feed Solutions

- a. Alternative Proteins: Scale up the use of insect protein, mycoproteins, single-cell proteins, macroalgae, and microalgae
- b. Genetically Engineered Fish Oil Substitutes: Promote the adoption of microalgae, insect-based oils, and genetically modified canola and soy
- c. Functional Ingredients: Support the use of proven probiotics, prebiotics, organic acids, phytochemicals, and immunostimulants
- d. Fermentation: Promote the application of fermentation technology as a valuable tool for enhancing the nutritional quality of ingredients while promoting sustainable food production
- e. Precision Feeding: Deploy AI and data-driven solutions for optimizing feed use and minimizing waste and pollution

2. Climate and Environmental Impact Reduction

- a. Improved FCRs/Time to Market: Improve overall production efficiency
- b. Methane and GHG Emissions: Achieve a 30% reduction in emissions from aquaculture and feed supply chains by 2030 through innovative feed solutions
- c. Deforestation Embedded in Feed Ingredients: Eliminate habitat destruction linked to feed ingredient production
- d. Nutrient Loss Reduction: Implement strategies to reduce nutrient runoff and improve water quality

3. Biodiversity and Ecosystem Protection

- a. Sustainable Sourcing: Eliminate the use of forage fish in feeds and promote alternative sources
- b. Ecosystem Services: Expand low trophic aquaculture systems that support water quality and habitat restoration

4. Nutrient Recovery and Waste Utilization

- a. Circular Economy: Promote the use of agricultural residues, poultry wastewater, and fish sludge in feed production
- b. Fermentation & Synthetic Biology: Enhance feed nutrient density and digestibility using bioengineering technologies

5. Animal Health and Welfare

- a. Antibiotic Reduction: Adopt alternative health management strategies to minimize antibiotic reliance and resistance
- b. Food Safety: Strengthen feed quality standards to prevent foodborne pathogens
- c. Stress Reduction: Implement nutrition and farming strategies to enhance animal well-being

6. Social and Economic Equity

- a. Fair Labor Practices: Ensure ethical labor conditions in aquaculture and feed production
- b. Community Involvement: Foster local engagement in sustainable aquaculture development
- c. Equitable Value Chains: Support small-scale farmers and fair trade principles

7. Innovation and Technology

- a. Cloud-based systems: Develop platforms to store and manage detailed feed data — sources, impacts, and nutrition — to enhance transparency, traceability, and informed decision-making across the supply chain
- b. AI and Machine Learning: Optimize feed formulation and production efficiencies
- c. Life Cycle Assessment (LCA) Tools: Monitor and minimize environmental footprints
- d. New Revenue Streams: Expand opportunities in sustainable aquaculture and feed markets