

Plan to Accelerate Aquatic Food Systems as Climate Solutions

Axis: **3. Transforming Agriculture and Food Systems** ▾

Key objective: 9. More resilient, adaptive, and sustainable food systems ▾

Solution: [Aquatic food systems as climate solutions](#)

Host Initiative: [FAO Blue Transformation](#)

Cooperating entities: [UN Trade and Development \(UNCTAD\)](#), [WorldFish](#), [Aquatic Blue Food Coalition](#), and [UNFCCC Aquatic Food & Ocean Breakthroughs Marrakech Partnership](#)

Scope: [Aquatic food and bioinputs production and value chains derived from marine and inland capture fisheries and aquaculture](#), at global, regional, national and local levels.

Levers assessment:

- **Risk-informed decision-making:** **Medium maturity** ▾
 - *Rationale:* High climate vulnerability and risks to fisheries and aquaculture is well recognized, but systematic use of climate data, early warning systems (e.g. water temperature anomaly alerts, storm surge warnings), and adaptive management tools (e.g. fishing quota trading systems, livelihood diversification frameworks) remains limited, especially in developing countries and for small-scale producers. Where possible, measurable targets (e.g. number of fishers and fish farmers benefiting from early warning systems) can be set to track the integration of climate risks in the fisheries management cycle. Climate change impacts of warming, deoxygenation and acidification of the ocean and reductions in snow, sea ice and glaciers have major negative impacts on fisheries, according to IPCC. These impacts affect food provisioning of food and directly threaten livelihoods and food security of vulnerable coastal communities and glacier-fed river basins. Climate change impacts on fisheries will be particularly high in tropical regions, where reductions in catch are expected to be among the largest globally, leading to negative economic and social effects for fishing communities and with implications for the supply of fish and shellfish.
- **Technology shifts:** **High maturity** ▾
 - *Rationale:* Proven technologies exist, such as selective fishing gear, vessel monitoring, cold chain and processing upgrades, Early warning systems, recirculating aquaculture systems, alternative feeds, genetic improvement, renewable energy use, decarbonization programs for fishing vessels and algae production as bio-inputs (e.g., feed supplements for ruminants, biostimulants, waste management, fertilizers, seaweed-made food packaging) There also exist scalable nature-based technologies that have proven to be useful adaptation strategies to increase wild and cultivated food sources, such as seaweed and bivalve production, integrated aquaculture–agriculture (e.g., rice–fish, integrated multi-trophic culture (e.g., shrimp–tilapia–seaweed or finfish–bivalve–seaweed), integrated mangrove aquaculture, cultivation of brackish species (e.g., shrimp) in areas of salinization and desertification, and crop-livestock-forest-aquaculture integrated food production systems. Scaling requires wider access and investment. Also, to better understand and address barriers to adoption, it is recommended to include cost-benefit or return-on-investment (ROI) analyses when promoting these technologies.
- **Knowledge & Capacity building:** **Medium maturity** ▾

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- *Rationale:* 600 million people rely on aquatic foods for livelihoods, yet many lack access to climate finance literacy and training on climate-resilient practices. Extension services exist but remain uneven. Digital and remote learning platforms (e.g. FAO elearning Academy) may also complement in-person training to deliver accessible and scalable capacity building opportunities to fishers and fish farmers. Local and traditional knowledge, long a cornerstone of fisheries, must be valued and mobilized to guide adaptation decision-making. According to IPCC, climate resilience in the fishing sector involves recognising gender and other social inequities, and ensuring that all stakeholders are equally involved in the capacity-building programmes.
- **Inclusive decision-making governance & design:** Medium maturity ▾
 - *Rationale:* Co-management models have proven their effectiveness, yet small-scale and indigenous actors remain underrepresented in decisions affecting their climate resilience. It may also be beneficial to develop metrics that assess the inclusiveness of climate decision-making processes (e.g. % of small-scale or indigenous actors participating in these processes). According to IPCC, lacking sufficient stakeholder participation, large-scale land acquisitions have had mostly negative implications for vulnerable groups and climate change adaptation.
- **Standards & Taxonomies:** Medium maturity ▾
 - *Rationale:* Technical guidance on adaptation and integration into NDCs/NAPs/NBSAPs and National Sustainable Taxonomies is available but adoption is uneven. GHG inventory and life cycle assessment methods need standardization to better capture mitigation benefits.
- **Supply:** High maturity ▾
 - *Rationale:* IPCC forecasts increasing sea surface temperature will lead to changes in fish size, growth rates and survival, with global fisheries catches forecast to decrease by between 3.4% and 24.1% by the end of the century. The resulting geographical redistribution of fish stocks will be uneven. According to FAO, 35% of marine fish stocks were fished at biologically unsustainable levels in 2021. Fisheries management efforts are not keeping pace with accelerating rates of exploitation. Acidification of oceans is threatening key marine ecosystems, including coral reefs, which harbor a very high diversity of marine species and are also critical for the livelihoods of millions of people. Increasing phosphorous and nitrogen pollution from agriculture, aquaculture, urban wastewater, and industry threatens freshwater and marine ecosystems. Pollution load produces hypoxia (low oxygen conditions) or “dead zones” along the coast, adding to pressures on marine ecosystems. The number of dead zones has been doubling every decade in the past 50 years, and today more than 500 hypoxic zones threaten the health of the majority of the world’s large marine ecosystems. On the other hand, aquaculture shows fast growth while capture fisheries remain stable, with proven practices to enhance climate resilience. Supply chains are increasingly supported by sustainable feed innovation and post-harvest infrastructure, though equitable distribution and scaling remain priorities.
- **Demand:** Medium maturity ▾
 - *Rationale:* Aquatic foods already supply over 20% of animal protein for 3.2 billion people with a relatively low carbon footprint. Demand is rising, but affordability, uneven awareness of climate and nutrition benefits, and sustainability concerns for some species limit broader uptake. Programs oriented at market signals and consumer behavior have had only limited success in driving demand towards sustainable seafood. This highlights the need for stronger investments in consumer awareness campaigns to be complemented by policy incentives that can effectively shift consumption patterns toward sustainability.

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- **Trade:** High maturity ▾
 - **Rationale:** International trade on Aquatic food and non food biological products has reached a record USD 204 billion (UNCTAD, 2025), mainly driven by aquaculture growth; changes towards low carbon, nutritious and plant-based diets; and new non-food uses of aquatic species, but this trade is currently subject to significant tariff and geopolitical uncertainty that will affect trade flows. Options for South-South and Regional trade are becoming the way out to deflect impacts.
- **Public/private finance:** Low maturity ▾
 - **Rationale:** The sector faces a USD 4.5 billion annual adaptation finance gap. Global agrifood systems require annual investments of \$1.1 trillion over the next five years to transition to sustainable, resilient food production models that secure employment and align with the goals of the Paris Agreement. However, current annual investment is severely lacking, reaching only 5% of the required amount. The fisheries sector remains notably underserved, receiving only 0.5% of investments in agrifood systems, followed only by investments in “food loss and waste” with less than 0.1%. Global philanthropic funding for ocean conservation activities was between \$1.4 billion and \$2.2 billion in 2022, and while this has more than doubled over the past decade, this represents less than 1% of global philanthropic funding (over 2010–22, 21% of such amount have been invested in fisheries and aquaculture). Existing global funds provide solid mechanisms to channel investments to fisheries and aquaculture adaptations – such as Global Environment Facility (GEF), Green Climate Fund (GCF), Special Climate Change Fund (SCCF), Least Developed Countries Fund (LDCF), Adaptation Fund, Fund for responding to Loss and Damage (FRLD), Tropical Forests Forever Fund (TFFF) – but years of climate commitments have not translated into adequate financing or real-world implementation in fisheries and aquaculture. Innovative finance instruments are also emerging (e.g. blue bonds, green bonds, blended finance, sustainable taxonomies) but not yet at scale.
- **Partnerships and collaboration:** N/A ▾
 - **Rationale:** Collaboration among science, finance, policy, and communities, as well as multi-stakeholder initiatives (e.g. UNFCCC Marrakech Partnership ocean group, Aquatic Blue Food Coalition, UN Global Seaweed Initiative) are growing, though continued co-design and scaling are needed for greater impact.
- **Policy & regulatory:** Medium maturity ▾
 - **Rationale:** Countries are increasingly integrating aquatic foods into NDCs, NAPs, and national policies, but coherence across climate, biodiversity, and food security agendas remains limited. Significant enforcement and compliance challenges also persist, particularly in ensuring equitable implementation between small-scale and industrial fisheries and aquaculture.
- **Public opinion:** Medium maturity ▾
 - **Rationale:** Recognition of aquatic foods as low-carbon, nutritious options is growing, but their role as climate solutions is still underrepresented in public narratives. This underscores the need for stronger communication, education, and advocacy efforts to highlight their contribution to mitigation, adaptation, and resilient food systems. Conservation actors often emphasize unsustainable dimensions of aquatic food production, highlighting the need for nuance in both narrative and sectoral development. There is also a significant lack of public understanding of the social relevance of aquatic food systems worldwide and the high climate vulnerability of fishing communities. FAO

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estimates that 600 million people depend on fisheries and aquaculture for their livelihoods, out of whom 500 million rely on small-scale fisheries, including 53 million involved in subsistence fishing. When analysing impacts of climate change in the oceans, the IPCC states categorically that “small-scale fisheries livelihoods and jobs are the most vulnerable to climate-driven changes in marine resources and ecosystem services”, adding that large-scale fisheries, though still vulnerable, are more able to adapt to climate change due to greater mobility and greater resources for changing technologies. The IPCC also affirms that the vulnerability of communities to losses in marine ecosystem services varies within and among communities, but highlights that populations with strong cultural identity linked to the ocean face more difficult times. Furthermore, climate-change impacts exacerbate existing inequalities already experienced by some communities, including Indigenous Peoples, Pacific Island countries and territories and marginalised peoples, such as migrants and women in fisheries and fish farming. These inequities increase the risk to their fundamental human rights by disrupting livelihoods and food security, while leading to loss of social, economic and cultural rights.

Expected impact of this plan on the 2030 targets (if any): High -

By 2028, this plan aims to drive measurable progress through four main impact pathways:

1. Increasing uptake of climate-resilient practices and technologies:

Expand sustainable fisheries and aquaculture management, supported by innovation and technologies such as low-carbon feeds, disease-resistant breeds, digital monitoring, and ecosystem approaches to boost resilience and food security for 3.2 billion people who rely on aquatic animal foods for at least 20% of their per capita protein supply from all animal sources.

2. Strengthening governance and inclusive participation:

Integrate aquatic foods into NDCs, NAPs, NBSAPs and national food or climate related strategies, while ensuring meaningful participation of smallholders, women, youth and other vulnerable groups in decision-making and benefit-sharing.

3. Addressing tariff and non tariff measures as well as distorting measures that hinder aquatic food trade growth:

Map and identify options to enable and facilitate trade in low carbon, nutritious and sustainable aquatic foods, particularly from developing countries.

4. Mobilizing finance for aquatic food systems transformation:

Scale public and private investment to close the aquatic foods adaptation finance gap estimated to be 4.5 billion USD per year, and

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de-risk investments including through blended finance, insurance schemes, and capacity building to strengthen human and institutional systems, especially for small-scale producers.

Expected contributions to global processes:

- **Global Stocktake (GST):** addresses key gaps in integrating food systems into climate action, highlighting adaptation and mitigation potential of aquatic foods
- **2030 Climate Solutions targets:** supports nutrition for billions in climate-vulnerable regions and attracts investment into low-carbon, resilient aquatic food systems
- **SDGs:** contributes directly to SDG 1 (No Poverty), SDG 2 (Zero Hunger), SDG 12 (Responsible Consumption and Production), and SDG 14 (Life Below Water)
- **UN Ocean Conference outcomes and voluntary commitments** as well as to the implementation of the **5th UN Ocean Forum recommendations**.

In addition, kindly note that this PAS is closely linked to the AG7 PAS on “Blue Package” under Axis 2, as part of the Blue Package also addresses elements related to aquatic food systems and draws on the levers, outputs, and actions outlined in this PAS.

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Output	Action Scope	Action	Type of action	Implementation Lever	Responsible	Time horizon	Stakeholder engagement	Committed Stakeholders
Ensure 100% of fish stocks are placed under effective management to restore them to levels capable of producing maximum sustainable yield (MSY)	Global aquatic food systems	Develop and implement plans for effective fisheries management	Existing a... ▾	Supply ▾ Policy & regul... ▾ Risk-informed... ▾	FAO Blue Transformation	Novem... ▾	Countries ▾ Companies ▾ Regulators & ... ▾ Multi-stakehol... ▾ Technical insti... ▾	Aquatic Food Breakthrough CGIAR Climate Action Science Program via WorldFish Aquatic Blue Food Coalition
Achieve 30% growth in global aquaculture by 2030 (ref. 2021) with quality foods, produced sustainably	Global aquatic food systems	Promote adoption of climate-resilient practices and technologies in aquaculture (e.g. low-carbon feeds, RAS, seaweed/ bivalves, renewable energy)	Existing a... ▾	Supply ▾ Technology sh... ▾ Knowledge & ... ▾	FAO Blue Transformation	Novem... ▾	Countries ▾ Companies ▾ Investors ▾ Technical insti... ▾	Aquatic Food Breakthrough CGIAR Climate Action Science Program via WorldFish Aquatic Blue Food Coalition
Increased and more inclusive returns through less waste, losses and discards, value addition and better access to markets	Global aquatic food systems	Establish or improve national programs on aquatic foods cold chain, storage, processing, and food loss and waste reduction	Existing a... ▾	Demand ▾ Technology sh... ▾ Knowledge & ... ▾ Public/private ... ▾	FAO Blue Transformation	Novem... ▾	Countries ▾ Companies ▾ Investors ▾ Technical insti... ▾ Regulators & ... ▾ Multi-stakehol... ▾	Aquatic Food Breakthrough CGIAR Climate Action Science Program via WorldFish Aquatic Blue Food Coalition
Increased number of NDC 3.0, NAPs, or associated implementation plans that explicitly include aquatic	Global aquatic food systems	Disseminate technical guidance and evidence on the climate mitigation and adaptation potential of aquatic food	Existing a... ▾	Policy & regul... ▾	FAO Blue Transformation	Novem... ▾	Companies ▾	Aquatic Food Breakthrough CGIAR Climate

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foods-related priorities		systems, and support countries to integrate aquatic food priorities into NDCs, NAPs, and national climate strategies. as well as develop sectoral climate policies						Action Science Program via WorldFish Aquatic Blue Food Coalition
Achieve at least \$4 billion a year to support resilient aquatic food systems by 2030	Global aquatic food systems	Establish dedicated aquatic foods financing facilities and instruments to mobilize public and private finance and de-risk investment	Existing a... ▾	Public/private ... ▾ Partnerships ... ▾	Aquatic Food Breakthrough Novemb... ▾		Investors ▾ Countries ▾ Companies ▾ MDBs ▾	FAO Blue Transformation Aquatic Blue Food Coalition
20% of major fishing and aquaculture companies join the Race to Zero and decarbonize their value chain	Global aquatic food systems	Support companies to adopt sustainability standards, GHG accounting, and decarbonization roadmaps	Existing a... ▾	Supply ▾ Technology sh... ▾	Aquatic Food Breakthrough	Novem... ▾	Companies ▾ Investors ▾	FAO Blue Transformation Aquatic Blue Food Coalition