

Blue foods – foods that are wild-caught or farmed from oceans, rivers, and lakes – are critical to the nutrition, health, livelihoods, economies, and cultures of billions of people worldwide. They can be an important part of sustainable food systems by reducing the environmental footprint of nutritious diets and relieving pressures on over-taxed terrestrial systems. Yet blue foods are often overlooked in climate discussions. To meet global climate targets, climate decision-makers will need to harness the opportunities of climate-smart blue foods that contribute to reducing carbon emissions while protecting blue food systems and the people who depend on them from the impacts of climate change.

Integrating blue foods into climate strategies

1. Embed blue foods in the climate agenda.

As food systems continue to gain prominence on the climate agenda, it is important to ensure blue foods are recognized and included. There are several opportunities within existing United Nations Framework Convention on Climate Change (UNFCCC) processes to ensure that food and climate action is not solely focused on land-based production, such as: organizing a blue foods workshop under the Sharm El-Sheikh Joint Work, including blue foods and conclusions from the 2023 Ocean and Climate Change Dialogues¹ in the Global Stocktake (GST), progressing the achievement of the 2030 Breakthrough for Aquatic Foods² under the Marrakech Partnership, and incorporating blue food systems in the Global Goal on Adaptation.

2. Integrate low-carbon blue foods into Nationally Determined Contributions (NDCs).

Food systems contribute nearly one third of global greenhouse gas emissions, but clear guidance on how to implement food-related climate mitigation strategies is lacking. The GST could offer guidelines on how to bring fisheries and aquaculture into NDCs. Strategies to stay below 1.5 °C could include plans to adopt low-carbon production practices, minimize food loss and waste, and promote sustainable diets and consumption. Within blue food systems, countries can enforce carbon mitigation requirements for aquaculture and fisheries, promote shifts toward context-appropriate nutritious and low-carbon blue food diets, or adopt circular economies. To raise ambitions, NDCs could also include targets for restoring and conserving blue carbon ecosystems like mangroves, seagrasses, and salt marshes.

1 <https://bit.ly/2023OCD>

2 <https://racetozero.unfccc.int/system/oceanbreakthroughs>

3. Include blue foods and the people that depend on them in National Adaptation Plans (NAPs).

Through climate-smart blue food systems, it is possible to adapt to climate change and develop healthy, prosperous, and resilient communities. NAPs can draw on UNFCCC technical guidelines³ to design strategies that safeguard blue food ecosystems and the livelihoods of small-scale actors, with a particular eye toward equity. This could involve strengthening coastal ecosystems like mangroves to mitigate storm surge and sea level rise, creating climate-smart agreements to manage shifting fish stocks, enhancing climate-resilient fisheries management, implementing gender-transformative approaches for adaptation, and delivering climate information services, including early warning systems for extreme events.

4. Increase investments in adaptation and resilience.

Substantial investments in nature, infrastructure, technology, and governance are needed to enable the low-carbon potential of blue food systems and bolster their resilience. However, countries are falling short in their commitments to invest in adaptation and resilience. Currently, only 4% of public climate finance is allocated to food systems and Sustainable Development Goal (SDG) 14 “Life Below Water” is still the least-funded SDG. Funders, including governments and multilateral funds, can support strategies like conservation financing, climate insurance, debt-for-nature swaps, fiscal reforms, and blue carbon ecosystem restoration, as well as expand access to finance for small-scale actors on the frontlines of a changing climate.

3 Brugere, C. and De Young, C. 2020. Addressing fisheries and aquaculture in National Adaptation Plans. Supplement to the UNFCCC NAP Technical Guidelines. Rome, FAO. <https://www.fao.org/documents/card/en/c/ca2215en>

Read more about blue foods and climate change

1. Blue foods are rich and diverse sources of nutrition.

More than 2,500 species or species groups of blue foods are caught and harvested. These foods offer sustainable and affordable nutrients, including protein, essential micronutrients, and omega-3 fatty acids. Blue foods can also be a healthier source of animal protein than terrestrial animals – for instance, farmed bivalves like oysters and mussels offer 76 times more vitamin B-12 and five times more iron compared to chicken. They are rich in healthy fats and can help reduce obesity and non-communicable diseases.

2. Blue foods generally have lower environmental footprints than terrestrial animal-source foods, and there are opportunities to improve production practices.

Across a diverse sector, details matter. Certain production systems like bottom trawling or prawn aquaculture produce high emissions. However, shifting to lower-impact species can help reduce environmental footprints. In aquaculture, farmed bivalves have low emissions while in fisheries, small pelagic fish like sardines and anchovies have the lowest carbon emissions. Reducing feed usage and switching to deforestation-free inputs could reduce emissions from aquaculture by half, while the use of low-fuel gear could reduce greenhouse gas emissions in some fisheries by 61%.

3. Blue food production supports more than 600 million livelihoods, and nearly half of the workforce are women.

Small-scale actors are the cornerstone of blue food systems, as about 90% of jobs in fisheries are small-scale.⁴ These actors contribute over half of global fish catch and more than two-thirds of blue foods consumed directly by people. Despite their significance, they are often excluded from decision-making processes. Actively involving and empowering these actors – including women, Indigenous communities and other marginalized groups – in environmental governance can enhance the effectiveness of environmental policies and improve food system outcomes.

4. Blue food systems are not without challenges.

An important initial step to harnessing the potential of blue foods is to identify and reform policies and practices that hinder transformation. This includes stopping or redirecting subsidies and production methods that enable overfishing and other unsustainable practices. One third of marine fish stocks are still overfished. Aquaculture, too, can contribute to habitat destruction, excess nutrient and pathogen production, antibiotic use, and reliance on wild-caught fish and agricultural crops for feed. Recognizing these challenges while seeking to increase the contributions of blue foods to global goals is necessary to integrate them safely and sustainably into food systems transformation.

5. Climate change threatens the nutritional, economic, and cultural contributions of blue foods.

Climate hazards endanger the productivity, quality, and safety of blue foods, particularly for wild-capture fisheries. These hazards include droughts, warmer waters, intensifying storms, ocean acidification, and shifting fish stocks. Regions that heavily rely on blue foods, such as Africa, South and Southeast Asia, and the Indo-Pacific, are particularly vulnerable. Under a high-emission scenario, by 2050 over 50 countries that heavily depend on blue foods will face high climate hazards yet have limited capacity to adapt – creating a “triple jeopardy”.⁵

The **Stanford Center for Ocean Solutions** is a lead science partner of the Blue Food Assessment, which brought together over 100 scientists from more than 25 institutions around the world. Read Blue Food Assessment research at: bluefood.earth/science/

Contact: Michelle Tigchelaar, Research Scientist, Stanford Center for Ocean Solutions mtigch@stanford.edu

The **Aquatic Blue Food Coalition**, catalyzed by the 2021 U.N. Food Systems Summit, aligns more than 40 members including governments, civil society, private sector, producer organizations, and more to raise the profile of blue foods and integrate them into food systems decision-making. aquaticbluefood.org

Contact: Karly Kelso, Secretariat, Environmental Defense Fund kkelso@edf.org

Explore blue food events at COP28: bit.ly/COP28BEvents

Learn more about climate-smart blue foods: bit.ly/ClimatBF

⁴ FAO, Duke University & WorldFish. 2023. Illuminating Hidden Harvests – The contributions of small-scale fisheries to sustainable development. Rome. <https://doi.org/10.4060/cc4576en>

⁵ <https://bluefood.earth/science/climate>

The Stanford Center for Ocean Solutions catalyzes research, innovation, and action to improve the health of the oceans for the people who depend on them most. The Center is part of the Woods Institute for the Environment at the Stanford Doerr School of Sustainability.