Climate strategies must identify actions that can maintain food systems resilience in the face of climate change and transition them towards net-zero emissions. Blue foods—foods from oceans, rivers, and lakes—are vital to this transition, yet they are persistently underrepresented in national and international climate policies and at global conferences like COP27. In the transformation to net-zero, we need to look at food systems as a whole, both green and blue. Low-carbon food system pathways include: (1) dietary shifts, (2) optimization of production practices, (3) blue foods and blue carbon, and (4) land and water interactions.

Pathways toward low-carbon food systems

Done right, blue foods can make key contributions to resilient, net-zero food systems.

Currently, food systems produce about 30% of all global greenhouse gas (GHG) emissions. Many blue food species can be produced with GHG footprints that are lower than terrestrial animal-sourced foods. However, these systems face sustainability challenges and must adapt to climate hazards like heat extremes, ocean acidification, and rising sea levels. It's critical to consider all dimensions of sustainability—nutrition, health, justice, gender, and economics—when balancing tradeoffs toward decarbonization. Here, we identify four main pathways for blue foods to be part of low-carbon food systems.

1. Shift to blue food species that are more nutritious and lower carbon.

More than 2,500 species or species groups of blue foods are caught or harvested. These diverse foods are a rich source of sustainable and affordable nutrition, providing protein, essential micronutrients, and omega-3 fatty acids. Shifting from terrestrial meat sources to blue foods, and from high- to low-emission blue foods, can offer win-wins for both climate and nutrition goals. For example, unfed aquaculture of bivalves generates negligible emissions and can improve water quality while providing foods with high densities of calcium, iron, and Vitamin A.

2. Improve current blue food production practices.

While many species are already low-carbon, blue food systems can be decarbonized further. For fisheries, reducing food loss and waste—an estimated 35% of global harvests—can cut emissions along supply chains, and switching to low-fuel gears can reduce emissions by up to 61%. Targeted breeding of low-carbon species, feed composition advancements, and circular economies offer opportunities for aquaculture. For example, switching to deforestation-free inputs can reduce emissions from aquaculture by half.

3. Conserve blue carbon ecosystems that support blue foods.

Blue carbon ecosystems like mangroves, seagrasses, and marshes are a critical component of nature-based solutions that can combat emissions and support blue foods. Protecting and restoring these ecosystems enhances carbon storage, protects nursery habitats, supports small-scale fishers, and preserves nutrients. Blue food production systems have the potential to be nature-positive, protecting ecosystems as they supply nutrition and support economies. Combining ecosystem health and blue food production, such as through shrimp-mangrove integration, offers opportunities for enhanced carbon sequestration, organic aquaculture, and livelihood diversification.

4. Manage land and water systems together.

Land-based and blue food systems, while often managed separately, are tightly connected in ecosystems, markets, diets, and feeds. For example, excess nutrients from agriculture pollute rivers and cause coastal dead zones, undermining fisheries. Recognizing feed interdependencies can reduce emissions in both terrestrial and aquatic systems: Adding macroalgae to cow feed can reduce methane emissions by as much as 68% and insects are a promising alternative protein source in fish feed.

Recommendations for action

Food systems are more prominent at COP27 than ever before. Blue foods are a vital part of global food systems, but to achieve their potential we need better choices in policy and practice. At COP27, government decision-makers should take the following actions to make blue foods a central component of climate action.

Recognize fisheries and aquaculture in the Koronivia Joint Work on Agriculture (Koronivia Process, KJWA).

Despite fisheries and aquaculture being defined as part of agriculture by the Food and Agriculture Organization of the United Nations (FAO), they are not included in the only formal mechanism that puts food security and agriculture on the climate agenda. Negotiations for implementing KJWA at COP27 must recognize blue foods as a critical subject in the fight against climate change, and as a crucial addition to their framework that will have sweeping, positive impacts on the potential to create comprehensive solutions encompassing all sectors of the food system—not just that of the terrestrial.

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

While most countries mention food systems in their NDCs, few have included targets to reduce emissions from the sector through more sustainable production, reducing food loss and waste, or promoting sustainable diets and consumption. NDCs can include measures to support blue carbon ecosystems, impose carbon mitigation requirements for blue food production, promote low-carbon blue foods in dietary guidelines, and decrease emissions from fishing vessels and ports. To operationalize these ambitions, countries should regulate high-emissions practices like trawling and invest in climate-smart infrastructure, management practices, and nutrition policies. Streamlining regulations and access to financial services is necessary to spur inclusive innovation in the private sector.

Include blue foods and the ecosystems they depend on in National Adaptation Plans (NAPs).

NAPs can utilize UNFCCC-provided technical guidelines to design strategies to protect blue food ecosystems and reduce risk for blue food producers, for instance by devising climate-smart agreements for transboundary resources, and developing climate information services like early warning systems for extreme events. It is critical that marginalized groups, including women and Indigenous communities, are at the table in these processes to ensure just transitions that recognize cultural, social, and religious preferences and support community needs. When used together, climate adaptation and mitigation policies can ensure access to low-carbon blue foods while securing livelihoods and reducing barriers to blue food benefits.

Increase investments in adaptation and resilience.

Blue foods can only play a role in net-zero food systems if they are climate-adaptive, yet countries are falling short on their investments in adaptation and resilience. Currently, only 3% of public climate finance goes toward food systems. Investments are urgently needed, particularly in Africa, South and Southeast Asia, and Small Island Developing States. Innovative strategies that are being piloted include conservation financing, climate insurance, debt-for-nature swaps, fiscal reforms, and blue carbon ecosystem restoration. These strategies should be designed to ensure they reach the millions of small-scale blue food actors who are at the frontlines of a changing climate.

Multiple events at COP27 will highlight the importance of blue foods, including:

Building nutrient-dense global food systems
Nov 12 | 14:00-15:20 EET | Food Systems Pavilion

Aquatic foods as a climate-smart source of nutrition
Nov 14 | 10:00-10:45 EET | Food Systems Pavilion

Unlocking blue prosperity: How blue food communities can survive and thrive in the climate emergency
Nov 16 | 14:00-15:00 EET | Resilience Hub

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