Solving Sustainability Challenges at the Food-Climate-Biodiversity Nexus

SOLVING FCB
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Feeding a growing population sustainably requires integrated action on food security, climate change and biodiversity loss (FCB). Yet, policies remain **siloed**.

The Solving-FCB partnership brings together researchers, communities, and institutions to develop integrated, practical pathways for achieving sustainability goals. We work through five international case studies, using a transdisciplinary and inclusive approach that recognizes multiple ways of knowing and valuing the ocean to generate solutions that are evidence-based, culturally grounded, and policy-relevant. Our efforts focus on four cross-cutting themes: 1) **Healthy and sustainable seafood**; 2) The **co-existence of biodiversity, fisheries and aquaculture**; 3) **Ecosystem-based and climate-resilient management**; 4) **Bridging knowledge, policy and action**.

Healthy and sustainable seafood

Overfishing and climate change have significantly reduced fish stocks in many regions, threatening the availability of nutritious seafood. As climate change impacts intensify, risks to nutritional insecurity are expected to grow. Warmer waters also increase the risk of contamination in seafood, affecting food safety.

Policy-relevant research

Solving-FCB researchers assess innovative approaches such as land-sea integrated governance, circular aquaculture systems, and climate-resilient food strategies to inform policies that ensure safe, equitable, and sustainable access to seafood.

Tla'amin Nation/Canada

Tla'amin Nation government has established clear goals in its Modern Treaty and its Comprehensive Nation Plan. We co-develop climate and food security strategies that support Tla'amin to advance Indigenous food sovereighty.

The Netherlands

Regenerative and circular aquaculture practices are likely to improve biodiversity and ecosystem services and reduce waste. Our research assesses how these innovations contribute to healthier diets and more resilient aquatic food systems.

Costa Rica

Coastal communities in the Gulf of Nicoya are enhancing seafood security through land-sea governance and women-led, nature-based solutions. We co-develop community pathways to improve ecosystem health, climate resilience, and social equity for small-scale fishers and producers.

Ghana and Nigeria

Plastic pollution, climate change, and illegal fishing threaten seafood safety. In West Africa, we study how these stressors interact to impact food security and biodiversity, aiming to inform policies that protect coastal fisheries amid growing environmental challenges.

China

Mariculture has the potential to establish a sustainable seafood supply system. We explore how to harness farmed seaweed's capabilities as both a nutritious food source and an effective nature-based solution.

Co-existence of biodiversity, fisheries, and aquaculture

Small-scale fishers and aquaculture producers play a critical role in delivering food, conserving biodiversity, and supporting local economies. However, they are disproportionately impacted by climate risks and ecosystem degradation.

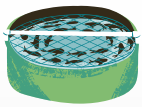
We identify and support strategies that reduce the environmental footprint of food production while strengthening the viability of small-scale actors—who often deliver higher social and ecological returns than industrial operations.

Policy-relevant research

Developing a Marine Action Plan

Tla'amin Nation/Canada

We co-develop marine plans that include cultural and harvest areas and ecological restoration zones. The plans aim to advance Indigenous food sovereignty and ecosystem health.



Investigating the benefits of well-sited mariculture

China

Our research explores ecological and economic benefits of mariculture for seaweed and other species. The outcomes can help producers design well-sited mariculture systems that enhance biodiversity and support sustainable livelihoods.

Reducing eutrophication and hypoxia to support fisheries

Costa Rica

We use new modeling tools to evaluate land-based management strategies that reduce nutrient runoff and dead zones caused by agriculture. These strategies aim to restore the Gulf of Nicoya's capacity to support biodiversity and productive fisheries.

Improving spatial planning for food systems

The Netherlands

Our research examines how spatial planning of nature-inclusive food systems can help identify areas for low-impact production that avoid conflict with biodiversity hotspots.

Promoting local species in aquaculture

West Africa

In collaboration with small-scale fishers, our research supports the integration of diverse local species in aquaculture to mimic natural ecosystems, where waste from one species sustains another.

Ecosystem-based and climate-resilient management

Ocean governance must reflect the complex interactions between ecosystems and human communities. Fragmented management approaches limit our ability to respond to climate impacts and biodiversity decline.

We model and test climate-smart, ecosystem-based management approaches that draw from scientific and traditional knowledge, offering effective governance strategies for sustainable, adaptive, and inclusive decision-making.

Policy-relevant research

Uplifting traditional practices

Tla'amin Nation/Canada

With a Two-Eyed-Seeing approach, our research supports the Nation's efforts in advancing climate-smart, culturally inclusive, and ecosystem-based initiatives that will increase food security in a changing world while uplifting Indigenous youth.

Exploring Integrated Multi-Trophic Aquaculture (IMTA)

China

IMTA systems help mitigate environmental impacts and address climate change. Our research examines the inclusion of IMTA in ecosystem-based and climate-resilient management to support sustainable development while reducing economic risks through multi-species farming.

Managing land-based pollution of marine habitats

Costa Rica

We model land-based management strategies to reduce coastal hypoxia and restore marine habitats in the Gulf of Nicoya. By evaluating their performance under climate scenarios, we aim to inform fisheries management for coastal communities and biodiversity.

Supporting the implementation of nature-based solutions

The Netherlands

Our research examines the use of regenerative and circular food systems by small-scale producers that emphasize polyculture, native species, and adaptive practices to strengthen climate resilience.

Enhancing collaborative management

West Africa

Illegal, Unreported and Unregulated (IUU) fishing and marine plastic pollution are major threats to biodiversity. In Nigeria, we co-create solution options through participatory workshops to address these challenges and support more equitable fisheries governance.

Bridging knowledge, policy and action

Inclusive ocean governance must reflect diverse worldviews and experiences. Solutions are most effective when they are co-developed with local communities, Indigenous Peoples, and underrepresented voices, especially women.

Through international partnerships and a Two-Eyed Seeing approach, we braid Indigenous and local knowledge with scientific research, supporting policies that are equitable, legitimate, and actionable across multiple governance levels.

Policy-relevant research

Tla'amin Nation/Canada

This research involves Tla'amin Knowledge Holders and harvesters to better account for the community's needs and challenges. While Tla'amin Knowledge Holders define the new path for the Modern Treaty negotiations, Tla'amin harvesters share their experience into the development of the Marine Plan.

Solving FCB workshop with Tla'amin harvesters. Photo credit: Sachi Ouchi

China

Because the ecosystem services offered by mariculture--especially Integrated Multi-Trophic Aquaculture systems--have been largely overlooked, delving deeper into this field could help producers, policymakers, and the general public appreciate the advantages of multi-species integrated mariculture systems.

Recreational angler in mariculture area in China. Photo credit: Liu Yue

Costa Rica

Our project empowers small-scale fishers to co-create sustainable ocean solutions, integrating local knowledge with science to shape inclusive, ecologically sound, and socially just ocean governance through participatory research.

Small-scale fisheries, Pacific Coast of Costa Rica. Photo credit: David García

West Africa

Insufficient investment in and use of gender-specific data is an obstacle to effective policy development in Sub-Saharan Africa. We bridge this gap by gathering information that intersects gender, climate change and illegal, unreported and unregulated fishing.

Women fish traders in Cameroon. Photo credit: Ayodele Oloko

This brochure is based on research conducted through the Solving FCB partnership, funded by the Social Sciences and Humanities Research Council of Canada. The partnership brings together over 20 collaborators and partnering organizations across the world.

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Social Sciences and Humanities Research Council of Canada
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Learn more about the Solving-FCB Partnership and see a full list of our collaborators at **SolvingFCB.org**:

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