

A blue foods mandate for agriculture and food security

We, the undersigned stakeholders, welcome the opportunity to share our views on the elements of the joint work referred to in paragraphs 14–15 of FCCC/CP/2022/L.4, including views on topics for the workshops referred to in paragraph 15(b), for consideration by the subsidiary bodies at their fifty-eighth sessions (June 2023).

We are writing to request that aquatic food production systems, or “blue foods,”¹ be included in the Sharm El-Sheikh Joint Work on Implementation of Climate Action on Agriculture and Food Security, both in the elements of the work program and as a workshop topic, by:

- Engaging with UNFCCC processes already generating outcomes on blue foods.
- Including blue foods in reporting and evaluation under FCCC/CP/2022/L.4 paras. 14(f) and 15(a).
- Holding a workshop on enhancing climate action in aquatic food systems.

I. Background: blue foods and climate action

Blue foods are a central consideration for climate action related to agriculture and food security. Their role in the global food system is becoming increasingly recognized, especially in providing affordable and accessible nutrition to those who most need it.² Globally, production of aquatic foods is currently 214 million metric tons: 178 million tonnes of aquatic animals, with capture fisheries and aquaculture each contributing about half of this total, and 36 million tonnes of aquatic plants.³ Together, aquatic animal source foods from fisheries and aquaculture accounted for \$151 billion USD in exports in 2020.⁴ They also provide at least 20% of animal source protein for 3.3 billion people around the world and 50% or more in Cambodia, Sierra Leone, Bangladesh, Indonesia, Ghana, Mozambique and some SIDS.⁵ In addition to their value as protein and commodities, aquatic source foods often have very high nutritional value and lower carbon footprints than meat from land-based production systems.⁶ However, blue food systems are also vulnerable to the adverse effects of climate change, and the sustainable development and food security benefits they provide rely on strengthening climate action.⁷

¹ According to the Blue Food Assessment, blue foods are “food derived from aquatic animals, plants, or algae that are caught or cultivated in freshwater and marine environments.” <https://bluefood.earth/>

² Michelle Tigchelaar et al., “The Vital Roles of Blue Foods in the Global Food System,” *Global Food Security* 33 (June 1, 2022): 100637, <https://doi.org/10.1016/j.gfs.2022.100637>.

³ FAO, *The state of world fisheries and aquaculture 2022: Towards blue transformation* (Rome: FAO, 2022), <https://doi.org/10.4060/cc0461en>.

⁴ FAO.

⁵ FAO.

⁶ Christopher D. Golden et al., “Aquatic Foods to Nourish Nations,” *Nature* 598 (September 2021): 315–20, <https://doi.org/10.1038/s41586-021-03917-1>; Jessica A. Gephart et al., “Environmental Performance of Blue Foods,” *Nature* 597, no. 7876 (September 2021): 360–65, <https://doi.org/10.1038/s41586-021-03889-2>.

⁷ Michelle Tigchelaar et al., “Compound Climate Risks Threaten Aquatic Food System Benefits,” *Nature Food* 2, no. 9 (September 2021): 673–82, <https://doi.org/10.1038/s43016-021-00368-9>.

1.1 Fisheries and aquaculture are threatened by climate change

Aquatic food production is highly vulnerable to the effects of climate change, making the impact of climate change on fisheries and aquaculture an important food security concern. The world's oceans are becoming warmer, less oxygenated, and more acidic, which is reshaping marine ecosystems on a global level. As a result, production from marine fisheries is expected to decrease, with tropical countries projected to experience the biggest losses.⁸ **This places a large adaptation burden on blue food systems in tropical developing countries**, where wild fisheries are well placed to address existing deficiencies in micronutrient intake (often referred to as “hidden hunger”), but may not be able to meet these needs under advanced climate change scenarios.⁹ In general, marine fisheries production is most vulnerable to climate hazards in tropical Africa, Central America, and Southeast Asia, while **water-stressed regions like North Africa and the Middle East are home to the most vulnerable freshwater fisheries.**¹⁰

Aquaculture production in marine systems (mariculture) is relatively less vulnerable to climate change, in part because most mariculture takes place in temperate, developed countries with higher adaptive capacity and lower levels of physical risk.¹¹ Nonetheless, **aquaculture systems remain vulnerable to drought, flood, and storm events, water shortages, and supply chain disturbances, as well as aquatic diseases and harmful algal blooms.**¹²

Generally, **tropical developing countries are more reliant on aquatic foods for nutrition, food security, livelihoods, and economic development, and are also the most strongly impacted by climate change.**¹³ Political factors, such as good governance, human rights, and social justice are also important considerations for understanding the climate vulnerability of aquatic food systems.¹⁴

1.2 Adaptation solutions exist, but they need to be mainstreamed within the UNFCCC

Aquatic food producers are already adapting to the adverse impacts of climate change, but they are doing so with very little support. According to the OECD's database of bilateral climate finance commitments,¹⁵ **only \$2 billion, or less than 4% of the total amount committed to adaptation in the agriculture sector, were committed to climate change adaptation for fisheries between 2000 and 2020.** This low sum is compounded by the

⁸ William W. L. Cheung et al., “Structural Uncertainty in Projecting Global Fisheries Catches under Climate Change,” *Ecological Modelling* 325 (April 2016): 57–66, <https://doi.org/10.1016/j.ecolmodel.2015.12.018>.

⁹ Eva Maire et al., “Micronutrient Supply from Global Marine Fisheries under Climate Change and Overfishing,” *Current Biology* 31, no. 18 (September 2021): 4132–4138.e3, <https://doi.org/10.1016/j.cub.2021.06.067>.

¹⁰ Tigchelaar et al., “Compound Climate Risks Threaten Aquatic Food System Benefits.”

¹¹ Tigchelaar et al.

¹² Nesar Ahmed, Shirley Thompson, and Marion Glaser, “Global Aquaculture Productivity, Environmental Sustainability, and Climate Change Adaptability,” *Environmental Management* 63, no. 2 (February 2019): 159–72, <https://doi.org/10.1007/s00267-018-1117-3>.

¹³ Tigchelaar et al., “Compound Climate Risks Threaten Aquatic Food System Benefits.”

¹⁴ Christina C. Hicks et al., “Rights and Representation Support Justice across Aquatic Food Systems,” *Nature Food* 3, no. 10 (October 2022): 851–61, <https://doi.org/10.1038/s43016-022-00618-4>.

¹⁵ Climate Change: OECD DAC External Development Finance Statistics, <https://www.oecd.org/dac/financing-sustainable-development/development-finance-topics/climate-change.htm>.

already dangerously slow pace of adaptation finance along with developing countries' unmet needs for technical, capacity-building, and financial support.¹⁶

Despite the lack of support for adaptation in the fisheries and aquaculture sectors, **resources exist that can support the new Sharm el-Sheikh joint work to include aquatic foods** in its efforts to strengthen climate action for agriculture and food security. Working Group II of the Intergovernmental Panel on Climate Change, in its Sixth Assessment Report, identified a repertoire of interventions that can strengthen the resilience of aquatic food systems.¹⁷ These include participatory governance, livelihood diversification, transboundary management of marine and aquatic resources, habitat restoration, protected area conservation, and making production more sustainable. Supporting the diversity and adaptive capacity of small-scale actors in both fisheries and aquaculture can also confer resilience to aquatic food systems.¹⁸ The new joint work can also draw on the UN Food and Agriculture Organization's (FAO) compilation of climate action tools for aquaculture and fisheries in each region of the world,¹⁹ guidelines for co-creating climate adaptation plans for fisheries and aquaculture,²⁰ and recommendations for the inclusion of fisheries and aquaculture in National Adaptation Plans.²¹

1.3 Blue foods can contribute to climate mitigation

Shifting production and consumption to focus more heavily on certain blue foods, such as small pelagic fishes and farmed seaweeds and shellfish, **could reduce GHG emissions while providing valuable nutritional benefits to people.**²²

However, **aquatic food production systems are also in need of decarbonization.** Some aquaculture systems generate GHG emissions on par with land-based animal agriculture due to land use change and feed inputs.²³ Some capture fisheries, especially those that drag heavy gear across the seafloor, generate high emissions due to fuel use when compared with pelagic fisheries, although their carbon footprint is still lower than many land-based production systems.²⁴ It has been theorized that bottom-contacting fisheries may increase the net transfer of carbon from the ocean surface to the atmosphere by disturbing the organic carbon stored in

¹⁶ Krystal Crumpler et al., 2021 (*Interim*) *Global Update Report: Agriculture, Forestry and Fisheries in the Nationally Determined Contributions*, Environment and Natural Resources Management Working Paper 91 (Rome: FAO, 2021), <https://doi.org/10.4060/cb7442en>.

¹⁷ IPCC, *Climate Change 2022: Impacts, Adaptation, and Vulnerability*. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change, ed. Hans-Otto Pörtner et al. (New York: Cambridge University Press, 2022), <https://www.ipcc.ch/report/ar6/wg2/>.

¹⁸ Rebecca E. Short et al., "Harnessing the Diversity of Small-Scale Actors Is Key to the Future of Aquatic Food Systems," *Nature Food* 2, no. 9 (September 2021): 733–41, <https://doi.org/10.1038/s43016-021-00363-0>.

¹⁹ Manuel Barange et al., eds., *Impacts of Climate Change on Fisheries and Aquaculture: Synthesis of Current Knowledge, Adaptation, and Mitigation Options*, FAO Fisheries and Aquaculture Technical Paper 627 (Rome: FAO, 2018), <https://www.fao.org/documents/card/en/c/I9705EN/>.

²⁰ Thuy Thi Thanh Pham et al., "Guidelines for Co-Creating Climate Adaptation Plans for Fisheries and Aquaculture," *Climatic Change* 164, no. 3 (February 27, 2021): 62, <https://doi.org/10.1007/s10584-021-03041-Z>.

²¹ Cecile Brugere and Cassandra De Young, *Addressing Fisheries and Aquaculture in National Adaptation Plans. Supplement to the UNFCCC NAP Technical Guidelines* (Rome: FAO, 2020), <https://doi.org/10.4060/ca2215en>.

²² Gephart et al., "Environmental Performance of Blue Foods."

²³ Gephart et al.

²⁴ Robert W. R. Parker et al., "Fuel Use and Greenhouse Gas Emissions of World Fisheries," *Nature Climate Change* 8, no. 4 (April 2018): 333–37, <https://doi.org/10.1038/s41558-018-0117-x>.

marine sediments. However, more research is needed to understand the movement of carbon throughout the ocean following a disturbance event and the effects on ocean fluxes across a range of fishing scenarios and ecosystem types before credible quantification of the atmospheric carbon dioxide contribution can be made.²⁵

Fisheries management can also enhance carbon sequestration while still providing food security benefits, for instance by limiting the exploitation of large-bodied species²⁶ or designing marine protected areas to facilitate blue carbon solutions that have co-benefits for food security and sustainable development.²⁷

II. Mandate: a sound basis for considering blue foods

The text that establishes the four-year Sharm el-Sheikh joint work on implementation of climate action on agriculture and food security commits to “promoting a holistic approach to addressing issues relating to agriculture and food security.”²⁸ **Such a holistic approach cannot afford to exclude blue foods.**

Including blue foods as part of its mandate would harmonize the Sharm el-Sheikh joint work with other workstreams and initiatives under the Convention and beyond, helping to achieve the goal of “promoting synergies and strengthening engagement, collaboration, and partnerships” among relevant stakeholders, processes, and initiatives.²⁹

- The Glasgow Climate Pact invited work programs and constituted bodies to “integrate and strengthen ocean-based action in their existing mandates and workplans.”³⁰
- The Ocean and Climate Change Dialogues³¹ have discussed the importance of ocean-based adaptation for food security.³²
- The Sharm el-Sheikh Implementation Plan explicitly highlighted the importance of freshwater and marine systems and the many roles they play in climate action.³³
- The Constitution (Art.1, para.1.) of the UN Food and Agriculture Organization (FAO) defines ‘agriculture’ and its derivatives to include fisheries and marine products.³⁴

Addressing blue foods would also help fulfill the Koronivia Joint Work on Agriculture’s (KJWA) emphasis on integrated water management,³⁵ which should be understood to include

²⁵ Graham Epstein et al., “The Impact of Mobile Demersal Fishing on Carbon Storage in Seabed Sediments,” *Global Change Biology* 28, no. 9 (2022): 2875–94, <https://doi.org/10.1111/gcb.16105>.

²⁶ Gaël Mariani et al., “Let More Big Fish Sink: Fisheries Prevent Blue Carbon Sequestration—Half in Unprofitable Areas,” *Science Advances* 6, no. 44 (October 2020): eabb4848, <https://doi.org/10.1126/sciadv.abb4848>; Jonathan E. Falciani, Maria Grigoratou, and Andrew J. Pershing, “Optimizing Fisheries for Blue Carbon Management: Why Size Matters,” *Limnology and Oceanography* 67, no. S2 (2022): S171–79, <https://doi.org/10.1002/lno.12249>.

²⁷ Emilia Jankowska et al., “Climate Benefits from Establishing Marine Protected Areas Targeted at Blue Carbon Solutions,” *Proceedings of the National Academy of Sciences* 119, no. 23 (June 7, 2022): e2121705119, <https://doi.org/10.1073/pnas.2121705119>.

²⁸ FCCC/CP/2022/L.4, para. 14(a).

²⁹ FCCC/CP/2022/L.4, para. 14(c); cf. para. 14(b).

³⁰ Decision 1/CP.26, para. 60.

³¹ Established by decision 1/CP.26, para. 61.

³² Available at <https://unfccc.int/documents/615101>.

³³ Decision 1/CP.27, paras. 21, 45–46.

³⁴ Food and Agriculture Organization (FAO), 2017. Basic texts of the Food and Agriculture Organization of the United Nations, <https://www.fao.org/3/mp046e/mp046e.pdf>.

³⁵ FCCC/CP/2022/L.4, para. 2(o, g).

aquaculture, integrated agriculture-aquaculture systems, and source-to-sea management of aquatic pollution.

As the subsidiary bodies convene a renewed joint work addressing issues related to agriculture and food security, the documents governing this process give every indication that **food security cannot be limited to land-based production alone. Blue foods should be given a central role in the new Sharm el-Sheikh joint work.**

III. Elements: integrating blue foods in the Sharm el-Sheikh joint work

The Sharm El-Sheikh joint work on implementation of climate action on agriculture and food security should include blue foods by (1) engaging with other relevant bodies and workstreams of the UNFCCC; (2) including blue foods in its evaluation of climate action related to agriculture and food security; and (3) holding a thematic workshop on blue foods.

1. **Engage with UNFCCC processes already generating outcomes on blue foods.** The Sharm El-Sheikh joint work should note the key outcomes of other UNFCCC processes that have a food security focus, such as the Ocean and Climate Change Dialogues³⁶ and aspects of the Nairobi Work Program. For instance, one key message of the 2022 ocean dialogue³⁷ was to “create climate resilient fisheries and aquaculture.” Other key messages were also relevant to agriculture and food security. The Sharm el-Sheikh joint work could further promote the mainstreaming of these key messages and support their implementation³⁸ by formally engaging with existing processes like these.
2. **Include blue foods in reporting and evaluation.** The new joint work’s evaluation of “progress in implementing and cooperating on climate action to address issues related to agriculture and food security”³⁹ and the annual synthesis report prepared by the secretariat to support that evaluation⁴⁰ should include efforts and developments having to do with blue foods. This could include evaluating the financial entities’ approach to aquatic foods as a vital element of agriculture and food security. It could also include a review of key outcomes from other UN bodies working on these issues, such as FAO.
3. **Hold a workshop on blue foods.** Considering the central role blue foods play in agriculture and food security, their vulnerability to the adverse effects of climate change, and the potential for blue carbon solutions that have co-benefits for food security and sustainable development, the Sharm el-Sheikh joint work should hold a workshop⁴¹ on blue foods. This workshop could include subtopics on adaptation, decarbonizing production systems, small-scale fisheries and aquaculture, and nutrition-sensitive governance. It could also include equity, gender, and human rights as cross-cutting themes.

³⁶ Decisions 1/CP.26, para. 61; 1/CP.27, para. 45.

³⁷ Available at <https://unfccc.int/documents/615101>.

³⁸ Pursuant to FCCC/CP/2022/L.4, paras. 14(b–d, g)

³⁹ FCCC/CP/2022/L.4, para. 14(f).

⁴⁰ FCCC/CP/2022/L.4, para. 15(a).

⁴¹ FCCC/CP/2022/L.4, para. 15(b).

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