



联合国
粮食及
农业组织

Food and Agriculture
Organization of the
United Nations

Organisation des Nations
Unies pour l'alimentation
et l'agriculture

Продовольственная и
сельскохозяйственная организация
Объединенных Наций

Organización de las
Naciones Unidas para la
Alimentación y la Agricultura

منظمة
الغذية والزراعة
للأمم المتحدة

E

COMMITTEE ON FISHERIES

SUB-COMMITTEE ON FISHERIES MANAGEMENT

First Session

15-18 January 2024

CLIMATE RESILIENT FISHERIES

Executive Summary

Climate change is affecting aquatic ecosystems and fisheries worldwide. Although there is an increasing number of examples where climate change considerations are being incorporated into fisheries policies and decision support tools, successful implementations of climate resilient fisheries management across scales are still limited. The purpose of this document is to provide an overview of the activities undertaken by FAO to support Member countries in transitioning to a climate resilient fisheries management as well as existing gaps, and recommendations for future work. The document follows a scale approach, examining national/local, regional and global levels in alignment with the structure of the FAO Strategy on Climate Change 2022-2031 and its Action Plan 2022-2025.

Suggested action by the Sub-Committee

The Sub-Committee is invited to:

- review progress made on COFI 35 requests;
- share lessons learned and national experiences towards integrating climate change into national and multilateral fisheries management and governance; and
- provide recommendations on areas of work that need further development, including data needs, knowledge management, and increasing the adaptive capacity of fisheries operations and assets.

Queries on the substantive content of this document may be addressed to:

Tarub Bahri

Fishery Resources Officer

E-mail: Tarub.Bahri@fao.org

Documents can be consulted at www.fao.org

NN952e

I. INTRODUCTION

1. The impact of climate change on aquatic ecosystems and the services they provide, as well as the livelihoods that depend on them, is today profound and pervasive and is expected to be exacerbated in the future.¹ Climate-driven shifts in the geographical distribution and changes in the productivity of fish stocks challenge fisheries worldwide,² and failing to adapt current fisheries management frameworks will lead to social risks and vulnerabilities in terms of loss of livelihood and food and nutrition insecurity,³ thus threatening the achievement of Sustainable Development Goals (SDGs) that address poverty, hunger, and life below water, among others.

2. Evidence has shown substantial distribution shifts of marine organisms,⁴ and projections indicate shifts in transboundary stocks for most exclusive economic zones (EEZs) worldwide.⁵ Ocean warming has also led to changes in catch yields and potential,⁶ with tropical regions experiencing greater declines than the global average.⁷ In many freshwater ecosystems, climate change has also a pronounced effect,⁸ posing a threat to approximately 50 percent of global freshwater fish species.⁹ Changes in the distribution and productivity of marine and freshwater resources will carry far-reaching consequences throughout the fisheries value chain, from net to plate (i.e., harvesting, processing, distribution, marketing, and consumption). Small-scale fisheries are particularly vulnerable to the impacts of climate change, as is demonstrated by the exponential increase in the number of scientific articles relating to climate change and small-scale fisheries, particularly since 2016.¹⁰ To address climate change in agrifood systems, including aquatic food systems, an FAO Strategy on Climate Change 2022-2031 was endorsed by the FAO Council at its 170th Session in June 2022.¹¹ The Strategy is built upon three main pillars: advocacy at global and regional levels, policy support at country level, and scaling up action at local level. The Strategy is supported by an Action Plan that was presented at the 35th session of the Committee on Fisheries (COFI35) that recommended the development of a set of FAO actions focused on climate resilient fisheries and aquaculture.¹² The development of a climate change action plan for fisheries and aquaculture is underway, it is aligned with the FAO Action Plan for the implementation of FAO Strategy on Climate Change 2022-2025 and with the components of the Blue Transformation. It is expected to map activities that can contribute to mainstreaming climate action in fisheries, aquaculture and value chains. Moreover, COFI35 highlighted the need for guidance on climate resilient fisheries management. FAO has initiated a range of activities in response to these requests.

II. ADAPTATION INTERVENTIONS

3. Adaptation policy frameworks for resilient fisheries exist,¹³ including the FAO Adaptation Toolbox for fisheries and aquaculture,¹⁴ as well as guidance on good practice criteria and a compilation of good practices to climate proof the fisheries management cycle.¹⁵ However, examples of successful implementation are limited¹⁶ due to several factors, including: (1) lack of effective fisheries management resulting in weak adaptive capacity to climate change and other external stressors; (2) limited awareness

¹ https://www.ipcc.ch/site/assets/uploads/sites/3/2022/03/SROCC_FullReport_FINAL.pdf; <https://doi.org/10.1038/s41586-023-05737-x>

² <https://doi.org/10.1093/icesjms/fsz031>

³ <https://doi.org/10.1038/s41586-021-03917-1>

⁴ https://www.ipcc.ch/site/assets/uploads/sites/3/2022/03/SROCC_FullReport_FINAL.pdf

⁵ <https://doi.org/10.1111/gcb.16058>

⁶ <https://doi.org/10.1126/science.aau1758>

⁷ <https://www.fao.org/3/i9705en/i9705en.pdf>

⁸ <https://www.fao.org/3/i9705en/i9705en.pdf>

⁹ <https://doi.org/10.1038/s41467-021-21655-w>; <https://doi.org/10.1111/brv.12480>

¹⁰ <https://doi.org/10.4060/cc4576en>

¹¹ <https://www.fao.org/3/cc2274en/cc2274en.pdf>

¹² <https://doi.org/10.4060/cc3652en>

¹³ <https://doi.org/10.1111/faf.12630>

¹⁴ <https://www.fao.org/3/i9705en/i9705en.pdf>

¹⁵ <https://doi.org/10.4060/cb3095en>

¹⁶ <https://doi.org/10.1111/faf.12586>

about the impacts of climate change and the adaptation options for increasing resilience; (3) lack of context-specific information to perform climate risks and vulnerabilities assessments and inform adaptation strategies; (4) difficulties in modeling the combined ecological and socio-economic implications of climate change for ecosystems and societies; and (5) mismatch of spatial and temporal scales between climate research and management policies.¹⁷

4. An effective fisheries management system is often the best adaptation and the first foundation of climate-resilient fisheries.¹⁸ FAO has been actively promoting the adoption of participatory, adaptive, and precautionary fisheries management systems across the world through dedicated capacity development programmes.¹⁹ Despite the progress made in some jurisdictions, still many areas of the world face problems caused by ineffective management systems, including the overfishing of stocks and illegal fishing.²⁰ Integrating climate change adaptation into national and local fisheries management and the use of climate data and information, including results from climate risk assessments and monitoring²¹, in decision-making are a critical element of climate resilient fisheries management.

5. Disaster Risk Reduction (DRR), especially in view of escalating disaster risks impacting fisheries, exacerbated by climate change, also requires this type of approach. Incorporating DRR into fisheries legislation; aligning national legislation, policies and practices with global frameworks for DRR and sustainable development; and developing appropriate institutional arrangements are critical. Strengthening fishing communities and national governments with development and implementation of disaster preparedness plans is also crucial.

6. Enhancing the adaptive capacity and resilience of fishers and fisheries can also be achieved through the development of climate-proofed fisheries infrastructure, such as ports, jetties, slipways, fish buying stations and fish markets. Various international development banks and FAO are supporting Member countries with the design and construction of climate-proofed fisheries infrastructure and to build-back-better after natural disasters. Besides, the integration of early warning systems directly adapted for fishers, for example, in the form of local weather monitoring with information delivered to fishers through smartphones and radio, or during community meetings, can provide lifesaving information about upcoming strong weather events. Moreover, considering the escalating climate change and disaster risks, it becomes imperative to provide fishers with safety training and develop and promote fishing vessel safety standards. Developing practical guidelines, such as global standards and checklists for seaworthiness and safety inspections of small-scale fishing vessels, can contribute to safety of small-scale fishing vessels. In addition, linking early warning systems with shock-responsive social protection programs not only increases the access of fishers to assistance, insurance, and financial services but also plays a key role in ensuring climate resilient development.²² To disseminate fishing safety innovations in support of sectoral adaptation to climate change, FAO, together with partners, is organizing the 6th International Fishing Industry Safety and Health Conference (IFISH6) on 8-12 January 2024 in Rome, Italy²³. Ports also provide important infrastructure for fisheries, and climate proofing these is one of the critical elements of the FAO led Blue Ports Initiative. This Initiative supports networks of ports to implement mitigation and adaptation actions, with some ports clearly emerging as leaders in this area (e.g. The port of Vigo).

7. Improved monitoring and early warning systems are also crucial for managing harmful algal blooms (HABs) and mitigating their impacts. To address the complexity that climate change adds to

¹⁷ <https://doi.org/10.1093/icesjms/fsz031>

¹⁸ <https://doi.org/10.4060/cb3095en>

¹⁹ Examples include the EAF-Nansen programme (<https://www.fao.org/in-action/eaf-nansen/en/>), the CLME+ project, relevant Mediterranean projects, and activities in the Philippines under the Norad project. For more information on these projects, see: <https://www.fao.org/fi/static-media/MeetingDocuments/WECAFC/NBSLME2018/prospectus.pdf>; <https://www.fao.org/3/cb6509en/cb6509en.pdf>; <https://doi.org/10.4060/cb7506en>

²⁰ <https://doi.org/10.1126/sciadv.abq2109>

²¹ <https://doi.org/10.1038/s41558-022-01437-y>

²² DOI: 10.1017/9781009325844.001

²³ <https://ifishconference.ca/>

HAB prediction, FAO, in collaboration with partner organizations, developed a Joint Technical Guidance for the Implementation of Early Warning Systems for HABs.

8. Another crucial aspect of adaptation is the integration of fisheries into local and national climate change adaptation planning and implementation, which can be accomplished through mechanisms such as the Nationally Determined Contributions (NDCs) and National Adaptation Plans (NAPs). A clear example of this integration is found in Albania's NDC, which recognizes developing sectoral adaptation plans, including for the fisheries sector, as a high-priority adaptation measure.²⁴ Other examples include Chile,²⁵ Saint Lucia,²⁶ Senegal,²⁷ and the Philippines.²⁸ Out of the 85 new or updated NDCs submitted (as of 31 July 2021) by countries as part of their commitment to the Paris Agreement, 62 of the 77 (81 percent) with adaptation components referred to adaptation in fisheries and aquaculture, including ocean and coastal zone management.²⁹ There is also an increasing recognition of the importance of integrating traditional and local knowledge into climate solutions in the fisheries management cycle, and FAO has captured relevant cases from the Pacific and the Amazon in the report "Indigenous Peoples' food systems. Insights on sustainability and resilience from the front line of climate change".³⁰

III. MITIGATION INTERVENTIONS

9. Despite being a minor contributor to global carbon emissions, fisheries can adopt mitigation measures along the value chain to contribute to the 1.5 degrees climate goal. These include the use of renewable energy, enhancing vessels energy efficiency through practices such as reducing trawling speed, fishing gear modifications (lighter ground gear and trawl doors, different mesh sizes, lighter netting materials and other trawl components), hull modifications, timely cleaning of the hull bottom from fouling and timely servicing the engine. FAO, in close collaboration with the Bay of Bengal Programme – Intergovernmental Organization (BOBP-IGO), has been promoting in 2022-2023 simple fuel-saving measures in Sri Lanka and India using a technical manual.³¹ Electrification of the industrial fishing fleet consists of equipping vessels with lithium-ion batteries; hydrogen fuel cells, and/or solar-power. Tests are ongoing in a few places with governmental support to overcome hesitations of early adaptors and innovators among the vessel owners to invest in electrification. Several hybrid solutions are also being tested, such as vessels equipped with battery packs and a diesel engine that power the vessel together for a full day of operation.³² Furthermore, post-harvest activities can optimize their operations by using renewable energy and climate-smart technologies, like solar dryers or biodigesters. These practices are being tested in field projects targeting women and fostering access to more efficient ovens for fish smoking.³³ A recent FAO publication has identified opportunities for renewable energy interventions along the small-scale fish value chains and discussed challenges associated with cost and financing, policy environment and local capacity, awareness.³⁴

10. There are also opportunities for fisheries to contribute to carbon sequestration and blue carbon ecosystems through holistic fisheries management (aligned with the Ecosystem Approach to Fisheries) implementing measures such as mangrove preservation and restoration. Estuaries and nearshore canyons also serve as valuable habitats for multiple species and actively sequester carbon. With support from the Norwegian Agency for Development Cooperation (NORAD), FAO supported the development of a climate smart Small Pelagic Fisheries Management Plan in the Philippines, which includes coastal and

²⁴ <https://unfccc.int/sites/default/files/2022-08/Albania%20Revised%20NDC.pdf>

²⁵ <https://www4.unfccc.int/sites/NAPC/Documents/Parties/Plan-Pesca-y-Acuicultura-CMS.pdf>

²⁶ <https://www4.unfccc.int/sites/NAPC/Documents/Parties/SLU-Fisheries-SASAP-May-2018.pdf>

²⁷ <https://chm.cbd.int/api/v2013/documents/A0E18B74-831F-6EEB-3AAA->

[1A7C07F3F3AC/attachments/207058/Plan%20National%20Adaptation%20Principal_2016.pdf](https://chm.cbd.int/api/v2013/documents/A0E18B74-831F-6EEB-3AAA-1A7C07F3F3AC/attachments/207058/Plan%20National%20Adaptation%20Principal_2016.pdf)

²⁸ <https://pdp.neda.gov.ph/>

²⁹ <https://doi.org/10.4060/cb7442en>

³⁰ <https://doi.org/10.4060/cb5131en>

³¹ <https://www.fao.org/documents/card/en?details=98995c6b-bd40-56c7-bcf5-768c1d8eccc1>

³² <https://doi.org/10.4060/cc7468en>

³³ <https://www.fao.org/voluntary-guidelines-small-scale-fisheries/resources/detail/en/c/1607567/>

³⁴ <https://doi.org/10.4060/cc4903en>

marine ecosystems restoration. The project is expected to improve fisheries governance, restore coastal habitats, and protect critical ecosystems, hence alleviating climate change impacts on ecosystems.

IV. FINANCIAL INTERVENTIONS

11. Climate finance is indispensable for the implementation of adaptation and mitigation solutions. FAO has conducted a sectoral review of NDCs and NAPs, with a specific focus on identifying the adaptation funding gap in the aquatic food sector. A total of 85 countries have submitted NDC adaptation priorities or NAPs, and of these 32 have identified costs for the fisheries and aquaculture sector. An analysis of these finds that fisheries and aquaculture costs average 5 percent of total adaptation costs (though the percent values are much higher for island states). From this, costs to all developing countries have then been extrapolated based on the size of each country's fishery sector. This indicates that the costs of adaptation for fisheries and aquaculture for all developing countries could be USD 4 billion per year by 2030. These costs are estimated to rise strongly towards 2050.³⁵ An analysis has also been made of the public international adaptation finance flows to the fisheries and aquaculture sector, based on analysis of the OECD Development Assistance Committee (DAC) database and bilateral and multilateral flows. It finds that finance flows have averaged only USD 0.2 billion per year (2017 - 2021) for fisheries. This identifies a significant adaptation finance gap, between estimated costs and actual public international flows.³⁶

12. With financial support from the Green Climate Fund (GCF), Global Environment Facility (GEF) and bilateral funds, FAO is currently implementing a field programme on adaptation that puts climate solutions for aquatic food into practice in Africa, Latin America, the Caribbean, Southeast Asia, and Pacific Small Island Developing States (SIDS). An increasing number of FAO-led GCF projects are aiming at supporting the increased resilience of ocean and riparian livelihoods and ecosystems, both through readiness and preparatory support (4 ongoing projects in Belize, Cabo Verde, Saint Lucia, and Sri Lanka) and larger support (one ongoing project in The Gambia, and projects in Cabo Verde, Saint Lucia, and Sri Lanka currently being designed). GEF-funded projects are underway in Bangladesh, Cambodia, Kiribati, Malawi, Myanmar, and Timor-Leste. Work is also ongoing with projects implemented by FAO with bilateral funds from Canada, Norway, and the European Union, supporting countries to build the resilience of aquatic food systems to climate change and natural disasters to attain sustainability.

13. During the UNFCCC Ocean Dialogue 2023, ensuring access to climate finance for small-scale aquatic food producers emerged as a significant concern. Addressing this concern necessitates equipping small-scale producers with the know-how to effectively access funds. It is also essential to enhance the awareness and capacity of funding institutions like GEF and GCF to facilitate easier access to climate finance for vulnerable communities. In line with this objective, FAO is developing relevant climate finance training materials to provide guidance, frameworks, and tools for accessing climate finance for fisheries and aquaculture projects. FAO is also seeking to identify opportunities to engage with the private sector to drive aquatic food climate solutions at a larger scale, leveraging the FAO Strategy for Private Sector Engagement 2021-2025.³⁷

V. REGIONAL AND GLOBAL PROCESSES IN SUPPORT OF IMPLEMENTATION

14. Regional and global governance processes provide important support for implementing actions across adaptation, mitigation and finance. At the regional level, climate change is leading to distributional shifts of fish stocks, thereby challenging current management systems for shared fishery

³⁵ Sectoral approach using data from FAO (Barange et al., 2018). This includes costs for marine protected areas, and also safety at sea. Costs of ocean acidification are not included

³⁶ This analysis was funded by FAO under the NORAD-funded Project on Assisting partner countries and key stakeholders to adapt to climate change effectively (GCP/GLO/352/Nor, component 2).

³⁷ <https://www.fao.org/3/cb3352en/cb3352en.pdf>

resources. Regional Fisheries Management Organizations (RFMOs) and Regional Fisheries Advisory Bodies (RFABs) - collectively referred to as regional fishery bodies (RFBs) - are increasingly aware of the challenges posed by climate change, and some have³⁸ actions such as public awareness-raising initiatives, policies, management plans, events and projects³⁹. However, most organizations have been slow in engaging in the topic of climate change despite the existence of good science, according to relevant discussions during the 9th meeting of the Regional Fishery Body Secretariats' Network (RSN) held in conjunction with COFI35. In response to COFI35 request, FAO will convene workshop(s) on climate change in collaboration with RFBs Secretariats. The first workshop focused on RFBs from the Indo-Pacific region (Chennai, India on 17-19 October 2023) and the second workshop, scheduled for early 2024, will concentrate on RFBs from the Atlantic region, ensuring a balanced number of RFBs for each workshop and to maintaining ecosystem continuity and connectivity. The outcomes are expected to include a compilation of good practices and lessons learnt, as well as the identification of key entry points and opportunities for RFBs to integrate climate change into multilateral fisheries management. The workshops will build on ongoing climate discussions undertaken by RFBs. For instance, the International Commission for the Conservation of Atlantic Tunas (ICCAT) held a virtual expert meeting on climate change (11-12 July 2023)⁴⁰. The General Fisheries Commission for the Mediterranean (GFCM) has also initiated activities to address climate change, in line with its 2030 Strategy for sustainable fisheries and aquaculture. These include the organization of a hybrid meeting on the decarbonization of the fishing industry (14-15 March 2023, Rome, Italy), a climate change vulnerability assessment for fisheries in all Mediterranean subregions to identify management measures, a pilot study on non-indigenous species (NIS) in the eastern Mediterranean and a research on blue crabs in the Mediterranean, along with a dedicated NIS observatory, as well as including climate change as a dedicated theme in the upcoming GFCM Forum on fisheries science (FishForum). Additionally, the RSN Secretariat circulated a call for inputs to RFBs to gather information regarding their climate work and received feedback from 20 RFBs, the results of which are presented in the RSN Magazine No. 22.⁴¹

15. At the global level, the nexus between climate change, aquatic ecosystems, and aquatic food production is receiving increasing attention. The 26th session of the Conference of Parties (COP26) of the United Nations Framework Convention on Climate Change (UNFCCC) mandated annual Ocean Dialogues, officially including the ocean under the UNFCCC multilateral process.⁴² The aquatic food sector has been instrumental in generating this momentum, and the Ocean Dialogue, held on 13-14 June 2023 in Bonn, Germany, selected "fisheries and food security" as one of the two topics for deep-dive discussions,⁴³ thus recognizing the potential of the aquatic food sector in providing climate solutions while ensuring food security.⁴⁴ Emphasized throughout the Ocean Dialogue was the vital need to develop a draft roadmap for the aquatic food sector to be integrated into relevant work programmes and constituted bodies under the UNFCCC, as well as other relevant UN bodies and processes.⁴⁵

16. To address the knowledge gap hindering the implementation of climate resilient fisheries management worldwide, FAO is investing efforts in improving understanding of climate change risks and vulnerabilities as well as mitigation and adaptation potentials. An example of a related activity is the guide on building resilience to climate change and disaster risks for small-scale fisheries communities, which supports the implementation of the Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication (SSF Guidelines), with special attention to a human rights-based approach.⁴⁶ In addition, FAO is working on locating global information that can be used and scaled down to regional and national levels to inform policymaking. Relevant activities include a planned review of the implications of the IPCC-AR6 findings for the

³⁸ <https://doi.org/10.1016/j.marpol.2020.104284>

³⁹ <https://doi.org/10.4060/cc4686en>

⁴⁰ <https://secretariat.iccat.int/index.php/s/W53aaRtOrP6PjEF>

⁴¹ FAO 2023. Changes from changing climate. Regional Fishery Body Secretariats' Network Magazine No. 22. Rome.

⁴² <https://unfccc.int/topics/ocean#The-ocean-at-COP-26->

⁴³ <https://unfccc.int/topics/ocean/ocean-and-climate-change-dialogue>

⁴⁴ <https://doi.org/10.1038/s41586-023-05737-x>

⁴⁵ https://unfccc.int/sites/default/files/resource/Ocean%20dialogue_informal%20summary%20report_SB58_2023%20UNFCCC%20webpage%20publication%20%282%29.pdf

⁴⁶ <https://doi.org/10.4060/cb7616en>

aquatic food sector, and the co-convening of the session “Managing fisheries in a world of shifting stocks, integrating biological, policy, behavioral, social, and economic aspects” at the 9th World Fisheries Congress (3-9 March 2024, Seattle, the USA).

17. FAO also interacted with a number of partners on additional initiatives aiming at enhancing the integration of climate change considerations into fisheries management responses. For example, FAO is contributing to the Marine Stewardship Council (MSC)’s project on assessing risks of climate change to seafood sustainability (e.g. MSC ecolabeling) by participating to and co-funding, through the Common Oceans Tuna Project⁴⁷, an expert workshop (December 2022, Rome, Italy). Another FAO-led initiative of global relevance is the GEF-funded Common Oceans Program⁴⁸ that has ecosystem-based management accounting for environmental variability and climate change, as a central theme in all of its five projects. Moreover, FAO is collaborating with the Fisheries and Marine Ecosystem Model Intercomparison Project (FishMIP) team, which is a global network of marine ecosystem modelers and scientists, on a FAO fisheries and aquaculture technical paper that summarizes marine ecosystem modelling progresses. Key points discussed in this technical paper include future changes in ocean biomass at global and regional scales under different climate scenarios, as well as how modelling outputs can be used to inform decision-making on climate action and to answer policy-relevant questions on key risks, conservation, and food security and nutrition. The FAO fisheries and aquaculture technical paper is linked to the “Past and Future of Marine Ecosystems” Special Collection in the journal *Earth’s Future*.

⁴⁷ <https://www.fao.org/in-action/commonoceans/what-we-do/tuna/en/>

⁴⁸ <https://www.fao.org/in-action/commonoceans/what-we-do/activities/en/>