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Organización de las Naciones Unidas para la Alimentación y la Agricultura

Regional Office for Latin America and the Caribbean
Avda. Dag Hammarskjöld 3241, Vitacura,
Santiago, Chile

www.rlc.fao.org

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CLIMATE CHANGE IN REGIONAL FISHERIES AND AQUACULTURE: PROGRESS AND SETBACKS

Introduction

Increased warming has caused irreversible changes that require urgent ocean-based measures to strengthen and accelerate climate change adaptation and mitigation measures, which makes it increasing urgent to adapt fisheries and aquaculture to climate change. This requires explicit consideration of climate forcings in fisheries and aquaculture management by linking adaptation plans and management or development measures, in particular, local and context-specific indicators associated with fisheries and aquaculture climate stressors.

There is a need for local- and country-level transformative adaptation plans that pay special attention to the most vulnerable groups using an inclusive and participatory approach and taking into account the needs and benefits of small-scale fisheries and aquaculture. These plans would benefit from the adoption of spatial management approaches informed by climate-related issues, the integration of equity and human rights considerations, as well as investments in innovation.

At the 26th Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC) in Glasgow (COP 26), the essential role of the oceans was reinforced, creating opportunities for fisheries and aquaculture to broaden their contribution to global efforts, sharing adaptation and mitigation solutions and raising the profile of inland fisheries and aquaculture in international climate-related discussions.

Climate change impacts on fisheries and aquaculture

Climate change is a planetary environmental event that goes beyond borders and demands coordinated actions by each and every one of the Earth's inhabitants. Coastal and riverine communities tied to fishing and aquaculture are currently facing a series of challenges to their productive work. Whether it is the increase in water temperature, strong and more frequent storm surges, a rising sea level, storms, floods, heat waves, ocean acidification, and changes in the distribution and/or abundance of some marine species, among many others, each and every one of these phenomena are causing—and will continue to cause—environmental, social and

economic consequences of the utmost importance for those engaged in fishing and aquaculture activities.

Fisheries and aquaculture are crucial to people struggling to maintain a reasonable livelihood within the sector. The artisanal fishing sector is considered to be one of the most vulnerable sectors to the impacts of climate change, which, when added to overexploitation, illegal, unreported and unregulated fishing, and marine habitat degradation and pollution, highlights the urgent need to take concrete actions in the short term. In this scenario, adapting to climate change is paramount for the sustainable development of fisheries and aquaculture.[1]

Effective climate change adaptation will be needed at all scales and in all sectors of fisheries and aquaculture in order to strengthen and maintain productive and resilient aquatic ecosystems and the benefits derived from them. Special attention must be paid to the most vulnerable groups if the sector is to continue contributing to meeting global poverty reduction and food security goals. Moreover, because poverty and marginalization are the main causes of their vulnerability, eradicating poverty and providing food security are key to making them more resilient to climate change.

Resilience of small-scale artisanal fisheries and aquaculture

People working in small-scale artisanal fisheries and aquaculture make a considerable contribution to food and nutrition security, poverty eradication and the sustainable use of natural resources. However, they are particularly vulnerable to the impacts of external events, such as climate change, health crises (pandemics), and economic crises.

Small-scale fisheries and aquaculture face a growing number of risks. The United Nations Framework Convention on Climate Change (UNFCCC) and the Paris Agreement recognize that climate change can be devastating for Small Island Developing States (SIDS), Least Developed Countries (LDCs) and other vulnerable states where small-scale fishing and farming communities are found.

Target 1.5[2] of the Sustainable Development Goals (SDGs) focuses on resilience in the context of climate-related extreme events and other economic, social and environmental shocks and disasters. Resilience also represents a key feature of SDG target 13.1 (strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries).

On ocean acidification and climate change (SDG target 14.3), FAO supports Members and the United Nations Framework Convention on Climate Change in monitoring and reporting the rate, magnitude and extent of change, as well as the full impacts of greenhouse gas pollution on ocean and fishery variables. The ability to inform climate-related decisions at management-relevant scales continues to pose challenges, although efforts to improve observations and share data and information are well underway.

[1] FAO 2018. *Impactos del cambio climático en la pesca y la acuicultura: Síntesis de los conocimientos y las opciones de adaptación y mitigación actuales*. Summary of FAO Fisheries and Aquaculture Technical Paper No. 627. Rome. 48 pp. www.fao.org/3/ca0356es/CA0356ES.pdf

[2] SDG Target 1.5: By 2030 build the resilience of the poor and those in vulnerable situations, and reduce their exposure and vulnerability to climate-related extreme events and other economic, social and environmental shocks and disasters.

The International Year of Artisanal Fisheries and Aquaculture (IYAFA 2022) promotes the attainment of the SDG targets by promoting the implementation of the features of the Voluntary Guidelines for Securing Sustainable Small-scale Fisheries in the Context of Food Security and Poverty Eradication (the SSF Guidelines) related to climate change and disaster risk and by promoting awareness raising and capacity building activities and job creation for fishing and aquaculture communities as part of planning for post-COVID-19 and building a better future. Cook, Rosenbaum, and Poulain (2021)[3] developed a guide aimed at helping policymakers, government agencies, development partners, and civil society organizations design and implement fisheries-related policies and programs that address disaster risks and climate change in the context of human rights. Similarly, the *Fisheries and Aquaculture response to emergencies* (FARE) E-learning course[4] offers similar support and prioritizes men and women engaged in small-scale fisheries and aquaculture.[5]

Adaptation of fisheries and aquaculture to climate change

The Intergovernmental Panel on Climate Change (IPCC) reiterated the acceleration of global warming in the Sixth Assessment Report (IPCC, 2021), stressing that the increase in warming has caused irreversible changes. The Glasgow Climate Pact (UNFCCC, 2021) resulting from the 26th Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC COP 26) underscores the urgent need for ocean-based action, and discussions on climate change reaffirmed the high capacity of aquatic ecosystems to store carbon. These recognitions call for strengthening and speeding up climate change adaptation actions and mitigation of its effects on fisheries and aquaculture as international climate dialogues progressively determine developments. Over the years, global climate discussions on fisheries and aquaculture have been supported by FAO guidance on adaptation (Poulain, Himes-Cornell and Shelton, 2018).[6]

FAO has identified five priorities to drive actions on the ground related to the adaptation of fisheries and aquaculture to climate change (FAO, 2022)[7]:

1. Incorporating climate change into fisheries and aquaculture management
2. Developing and implementing transformative adaptation plans
3. Adopting spatial management approaches based on climate issues
4. Integrating equity and human rights considerations
5. Investing in innovation

Countries are showing increasing interest in adapting fisheries and aquaculture to climate change. According to the latest FAO report on nationally determined contributions, 77 of the

[3] Cook, K., Rosenbaum, K. L. and Poulain, F. 2021. *Building resilience to climate change and disaster risks for small-scale fisheries communities.* A human-rights-based approach to the implementation of Chapter 9 of the Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication. Rome, FAO. https://doi.org/10.4060/cb7616en

[4] The e-learning course is available at: https://elearning.fao.org/course/view.php?id=789

[5] The course uses two sets of FAO guidance, best practices and standards as key resources - Cattermoul, Brown and Poulain (eds., 2014) and Brown and Poulain (eds., 2013).

[6] Poulain, F., Himes-Cornell, A. and Shelton, C. 2018. Methods and tools for climate change adaptation in fisheries and aquaculture. In: Barange, M., Bahri, T., Beveridge, C.M., Cochrane, K.L., Funge-Smith, S. & Poulain, F., eds. *Impacts of climate change on fisheries and aquaculture - Synthesis of current knowledge, adaptation and mitigation options*. FAO Fisheries and Aquaculture Technical Paper No. 627, pp. 535-566. Rome, FAO. www.fao.org/3/i9705en/i9705en.pdf

[7] FAO. 2022. *El estado mundial de la pesca y la acuicultura* 2022. Hacia la transformación azul. Rome, FAO. https://doi.org/10.4060/cc0461es

85 new or updated contributions submitted by countries (between 1 January 2020 and 31 July 2021) as part of their commitment to the Paris Agreement, included adaptation components, and 62 of those 77 (81%) made reference to adaptation in fisheries and aquaculture, in particular marine and coastal area management (Crumpler *et al*., 2021).[8] The five priorities described above can provide countries with highly relevant guidance when implementing their nationally determined contributions, with the ultimate goal of contributing to the attainment of the long-term adaptation goals of the Paris Agreement. As the COP 26 decision formally reinforces the maritime space in UNFCCC discussions, it is important that fisheries and aquaculture expand their contribution to global efforts by sharing adaptation and mitigation solutions relevant to the sector, while progressively addressing the insufficient attention given to fisheries and freshwater aquaculture in the context of international climate discussions.

Setbacks

Regarding the status of progress on the SDGs relevant to fisheries and aquaculture (apart from SDG 14), it is clear that many of the goals set out under the 2030 Agenda are not on track to be met by the deadline (United Nations, 2021). While there has been progress in key areas, there has been backsliding in others. In addition, the COVID-19 pandemic has reversed previously favorable trends, further delaying the attainment of targets and worsening lagging indicators. The underlying threats of climate change, loss of biodiversity, and pollution, along with direct threats from human conflict, call for decisive action, but the arrival of the pandemic and the lack of progress in many areas of international development and cooperation have exacerbated the problem.

Emerging research related to COVID-19 and climate change adaptation suggests that the pandemic impacts the Paris Agreement goals of "enhancing adaptive capacity," "strengthening resilience," and "reducing vulnerability" to climate change as countries prioritize health and economic recovery (UNEP, 2021).[9] It is essential to integrate social and environmental considerations (e.g., carbon emissions reduction and climate change resilience) into post-COVID-19 recovery plans by investing in activities that support blue economic recovery and build adaptive capacity (UNEP, 2021).

Status of adaptation of fisheries and aquaculture to climate change in Latin America and the Caribbean

Through a letter of agreement with FAO, the University of Concepción conducted a review for the region that included case studies for selected countries, as well as interviews with experts at the country level to validate some results and learn about their experiences and perceptions on aquaculture adaptation to climate change. The result of this activity is an FAO publication (*forthcoming*) entitled "Status of policies and plans for aquaculture adaptation to climate change in Latin America and the Caribbean."

The status of policies and plans for adaptation of aquaculture to climate change reveals that the countries in Latin America and the Caribbean have recognized the threats of climate change

[8] Crumpler, K., Abi Khalil, R., Tanganelli, E., Rai, N., Roffredi, L., Meybeck, A., Umulisa, V., Wolf, J. and Bernoux, M. 2021. 2021 (Interim) *Global update report: Agriculture, Forestry and Fisheries in the Nationally Determined Contributions.* Environment and Natural Resources Management Working Paper No. 91. Rome, FAO. https://doi.org/10.4060/cb7442en

[9] UNEP (United Nations Environment Programme). 2021. *The gathering storm – Adapting to climate change in a post-pandemic world*. Adaptation Gap Report 2021. Nairobi.

and established commitments and instruments for its management at the national level, conveyed mainly through nationally determined contributions and by establishing framework laws and strategies for inter-institutional coordination and management with an emphasis on the sectoral and/or territorial approach. Political will to institutionalize climate management is recognized.

The situation analysis indicates that out of the 45 countries in the region, twenty-six have established at least one general management instrument for climate change adaptation. Of these, only 15 have established specific management instruments linked to climate change adaptation in aquaculture. However, the design and formal implementation of climate change adaptation plans in aquaculture have not been consistent with the region's climate emergency scenario.

In most countries, initiatives, programs or projects have been developed sporadically and with limited impact. Only Chile's and Peru's sectoral plans include recommendations for specific adaptation actions for aquaculture, citing an emphasis on monitoring oceanographic and climatic conditions to establish extreme climate scenarios and strengthen good farming practices. In this context, it is possible to conclude that all countries are in the process of developing their instruments towards an ideal scenario that consists of integrating specific adaptation plans for aquaculture with other relevant plans in coastal areas and/or watersheds where production activities are carried out.

In general, it is perceived that the greatest difficulties in designing and implementing plans for aquaculture adaptation to the adverse effects of climate change are existing institutional capacities (including inter- and intra-institutional coordination) and the financial resources required to implement short- and medium-term actions.

Moreover, further efforts are required to disseminate and raise awareness regarding the potential effects of climate change and adaptation requirements at local levels (fishing and aquaculture communities) including women and minority groups (Soto and Quiñones, 2013).[10]

In the Caribbean, FAO provided technical assistance through the Eastern Caribbean Fisheries Sector Climate Change Adaptation Project (CC4FISH)[11] from January 2017 to August 2022, The project was intended to increase resilience and reduce vulnerability to climate change impacts in the Eastern Caribbean fisheries sector by introducing adaptation measures such as capacity building of fishers and fish farmers and mainstreaming climate change into fisheries governance.

In Chile, FAO implemented a project related to climate change in fisheries and aquaculture, entitled "Strengthening the Adaptive Capacity of the Chilean Fishing and Aquaculture Sector to Climate Change,"[12] which was executed by the Undersecretariat of Fisheries and

[10] Soto, D and Quiñones, R. 2013. *Climate change, fisheries and aquaculture in Latin America: Potential impacts and challenges for adaptation.* FAO/Centro de Investigación Oceanográfica en el Pacífico Sur Oriental (COPAS) Workshop, Universidad de Concepción, Concepción, Chile. FAO Fisheries and Aquaculture Proceedings. No. 29. Rome, FAO. 335 pp. www.fao.org/3/i3356s/i3356s.pdf

[11] FAO. 2020. Food and Agriculture Organization of the United Nations - Climate Change Adaptation in the Eastern Caribbean Fisheries Sector. In: Food and Agriculture Organization of the United Nations [online]. Rome. [Cited 10 March 2023]. www.fao.org/in-action/climate-change-adaptation-eastern-caribbean-fisheries/en/

[12] FAO, Ministry of the Environment and Undersecretariat of Fisheries and Aquaculture. 2021. *Lecciones aprendidas y recomendaciones de política pública para la adaptación al cambio climático en la pesca artesanal y la acuicultura de pequeña escala en Chile*. Policy guidelines. Santiago de Chile, FAO. https://doi.org/10.4060/cb6536es

Aquaculture (SUBPESCA) and the Ministry of the Environment (MMA), and implemented by the Food and Agriculture Organization of the United Nations (FAO), with funding from the Global Environment Facility (GEF). Its main objective was to reduce vulnerability and increase adaptive capacity to climate change in the small-scale artisanal fisheries and aquaculture sector. This initiative was carried out from February 2017 to August 2021, and was implemented in four pilot coves: Riquelme (Tarapacá), Tongoy (Coquimbo), Coliumo (Biobío) and El Manzano-Hualaihué (Los Lagos). The project contributed significantly to improving the livelihoods of artisanal fishermen and fish farmers, their resilience to the adverse effects of climate change, and their food security by strengthening adaptation to climate change.

In Mesoamerica, FAO is currently formulating the Concept Note of the project entitled "Strengthening resilience to climate change of coastal and island communities of Honduras dedicated to fisheries and aquaculture" to be submitted for funding from the Green Climate Fund; also, in 2021 the "Study of the Vulnerability of the Nicaraguan Caribbean Coastal Communities to Climate Change" was executed, and resulted in a climate change vulnerability assessment as a basis for determining a climate risk adaption and management strategy.

Vision for transforming aquatic food systems

Successful examples of restoring healthy fish stocks and securing livelihoods through proper management or expanded sustainable aquaculture operations continue to emerge. Greater understanding of the effects of climate change and other natural disasters and man-made crises can also serve to protect and expand the services provided by aquatic food systems. With this knowledge in mind, the 2021 Statement of the Committee on Fisheries identifies priority areas that will further transform fisheries and aquaculture and, in doing so, develop a 21st century vision for the sector that shares and expands on what has been achieved around the world, so that aquatic food systems move from being understood as a problem to providing a recognized solution for food and nutrition security, as well as environmental and social well-being.

Blue transformation is the vision and process by which FAO, its Members and partners can use current and new knowledge, tools and practices to secure and maximize the contribution of aquatic food systems (both marine and inland) to food security, nutrition and affordable healthy diets for all. Through blue transformation, aquatic food systems can support the resilience of aquatic food systems, which are greatly influenced by dynamic human and environmental processes, including those resulting from climate change.