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COMMITTEE ON FISHERIES

Thirty-sixth Session

8–12 July 2024

INTEGRATED WATER RESOURCES MANAGEMENT (IWRM) FOR FISHERIES AND AQUACULTURE (WCP)[1]

Executive Summary

Inland fisheries and aquaculture are vital for food production, cultural heritage, and rural livelihoods. When implementing Integrated Water Resources Management (IWRM), it is crucial to consider that this sector relies on adequate water quality, quantity, and connectivity.

Integrating inland fisheries and aquaculture into IWRM frameworks is considered essential for sustainable, efficient, and effective water management. This holistic approach recognizes the interconnectedness of terrestrial and aquatic ecosystems and their common drivers of change. It encourages inclusive governance frameworks capable of addressing trade-offs in the management of water demands, to avoid worsening inequalities and conflicts.

Priority actions for FAO in integrating fisheries and aquaculture in an IWRM framework include ensuring inland fisheries and aquaculture are included in development agendas, promoting IWRM practices across fisheries, forestry, land use and water management processes, and fostering participatory management and best practices for sustainable use, biodiversity conservation, climate resilience, and ecosystem restoration. Actions may also involve infrastructure improvements to minimize impacts across sectors, such as modifying fish migration barriers and restoring natural flows. Additionally, preventing pollution from agricultural runoff through best management practices and sustainable farming methods is crucial, recognizing the interlinked nature of water resources across food production systems.

[1] A process which promotes the coordinated development and management of water, land, and related resources in order to maximise the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital eco-systems.

Suggested action by the Committee

The Committee is invited to:

(i) recognize the need to integrate fisheries and aquaculture into IWRM approaches and actions being designed and implemented.
(ii) welcome the suggested programmatic initiatives on Fisheries and Aquaculture for IWRM, and invite FAO to integrate them in related working areas.
(iii) encourage FAO to enhance partnerships and mobilize resources to implement these programmatic initiatives.
(iv) consider the significance of integrating inland fisheries into global, regional, basin-level, and national development agendas by applying a multi-sectoral approach.
(v) acknowledge the importance of participatory management approaches that support biodiversity, ecosystem restoration, climate change adaptation and strengthen capabilities to manage inland fisheries and aquatic environments.

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I. INTRODUCTION

1. Inland fisheries and aquaculture play a crucial role in addressing food production, provisioning, and consumption, as well as job creation and rural livelihoods support. Traditional foods are important to both health and cultural identity of communities particularly indigenous peoples. The Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication (SSF Guidelines)[2] call upon all parties to ensure that the knowledge, culture, traditions, and practices of small-scale fishing communities, including indigenous peoples, are recognized and, as appropriate, supported, and that they inform responsible local governance and sustainable development processes. It calls upon all stakeholders to ensure that these communities actively participate in responsible local governance and sustainable development processes, thus promoting inclusive and culturally sensitive approaches.

2. For inland fisheries to be managed in an environmentally and socially responsible and sustainable manner, it must be recognized that factors external to the fisheries sector such as mining, pollution, agricultural runoff, habitat loss, water abstraction, sand dredging, climate-induced changes in flow and hydropower frequently have significantly larger impacts than fishing effort. Therefore, in line with the implementation of the Ecosystem Approach to Fisheries (EAF), integrated basin assessments that incorporate fisheries into the broader perspective of water resources management are critical. Examples include managing water infrastructure for fisheries benefit, managing forests for water quality, quantity, and timing. The FAO biennial theme 2024–25 – *Water resources management for the four betters: better production, better nutrition, a better environment and a better life, to achieve the 2030 Agenda for Sustainable Development* – represents an opportunity to build on these examples and support the sustainable development of inland fisheries and aquaculture.

3. COFI32[3] requested FAO to provide best practice guidance on the management of inland fisheries, particularly within broader planning frameworks. The ten steps to responsible inland fisheries,[4] endorsed by COFI32, include "Develop collaborative approaches to cross-sectoral integration in development agendas". The goal of this step is to collaborate with non-fishery water resource users to ensure inland fisheries are not overlooked in management decisions, and to find mutually beneficial outcomes across water sectors. At COFI34, FAO Members reaffirmed the fundamental role of inland small-scale and artisanal fisheries for achieving the Sustainable Development Goals (SDGs) and addressing hunger and poverty, achieving food security, and improving nutrition.

4. The impacts of water scarcity and water-related hazards, such as droughts and floods, on food security and nutrition must be addressed and managed by applying IWRM. This involves recognizing the critical linkages between aquatic and terrestrial ecosystems, water flows and use in agricultural sub-sectors (crops and livestock production, forestry, fisheries and aquaculture), and their common drivers, in securing food and nutrition. The growing demand for water across all sectors triggers the need for understanding trade-offs, water allocation and water rights through multi-stakeholder dialogues. Additionally, investments in water management infrastructures (such as fish passes), habitat restoration, effective management practices, and advancement in information, science, innovation, and technologies, are essential.

5. In the case of inland fisheries, flooding regimes are vital for fish habitat and their life cycle, which makes them highly susceptible to changes in the magnitude and frequency of flooding due to climate change and operations of major water infrastructures such as dams. Climate change impacts on flooding regimes is just one of the many examples in which it is impacting fish in freshwater systems, other impacts include changes in water temperature, changes to flow regimes due to changes in precipitation and loss of glaciers among others. However, climate change is not the only threat facing inland fisheries; land use changes and water infrastructures also pose significant risks leading to habitat loss and deteriorating water quality.

[2] www.fao.org/3/i4356en/i4356en.pdf
[3] https://openknowledge.fao.org/handle/20.500.14283/i6882en
[4] www.fao.org/3/i5735e/i5735e.pdf

6. Despite the adverse effects of altered magnitudes and patterns of flooding, there are also positive impacts. For instance, flooding can rejuvenate soil fertility and boost capture fisheries production. Therefore, flooding should not be viewed as a problem only, but as an occasionally natural phenomenon that could be effectively managed.

7. The impacts of water scarcity and water-related hazards, such as drought and flood, on food security and nutrition can be effectively addressed and managed by applying IWRM. This involves recognizing the critical linkages between water, land, climate change, ecosystems, biodiversity, energy, agricultural sub-sectors (crops and livestock production, forestry, fisheries and aquaculture) and food security and nutrition.

8. In this context, fisheries and aquaculture represent non-consumptive users of water, making essential contributions to food security and nutrition, particularly for vulnerable communities. Additionally, fisheries and aquaculture generate job opportunities and income, further enhancing their socio-economic importance. However, their sustainability hinges on water quality, quantity, flows and connectivity at the basin scale, necessitating effective and inclusive governance to prevent conflicts and inequalities in access mainly for the poorest and most vulnerable groups, such as smallholder farmers, fishers, pastoralists, Indigenous Peoples, youth, and women. In the worst cases, increased competition can lead to conflicts at all levels.

9. It is against this backdrop that FAO proposed, during the 43rd session of the Conference, IWRM as an integral and strategic approach to achieving each of the four betters – better production, better nutrition, a better environment, and a better life, leaving no one behind. The 43rd FAO Conference acknowledged that transforming agrifood systems to achieve the SDGs will require both sustainable and efficient water use in irrigated and rainfed agriculture within IWRM processes. IWRM is vital to achieving long-term social, economic, and environmental well-being by ensuring the sustainable utilization and conservation of water resources.

II. BACKGROUND

10. IWRM encourages stakeholder engagement and participatory governance, enabling the development of tailored solutions that reflect local needs and conditions. As such, integrating IWRM into inland fisheries and aquaculture policy and practice is vital for achieving food security, poverty reduction, and resilient rural livelihoods, contributing to the overarching goals of sustainable development and environmental conservation.

11. Inland fisheries take place in various water bodies worldwide, including lakes, ponds, rivers, streams and swamps as well as man-made fisheries environments like reservoirs, canals and rice fields. Consequently, they are widespread and are often accessible to people, including women, children, landless people, and Indigenous Peoples, who often use simple and low-cost fishing gears. Participation is consequently high, with 14 million people employed in inland fisheries at the harvesting stage alone. Additionally, there are around 36 million people in subsistence inland fisheries. Fishing for subsistence constitutes a livelihood safety net for poverty, malnutrition, and gender inequality for populations dependent upon aquatic foods around the world.[5] It also can be part of diversified livelihood strategies. Globally inland fisheries are responsible for producing 12 percent of the world fisheries production from less than 1 percent of global water resources[6]. Many of these fisheries are in Low-Income Food Deficit Countries and Land-Locked Developing Countries, where malnutrition can be a common threat.

12. Inland aquaculture (excluding plants and algae) at 59.1 million tonnes is responsible for 62.6 percent of global aquaculture production (mainly finfish aquaculture which makes up nearly 90 percent of inland production), and thus plays a vital role in food security.[7] The predominant culture system is earthen ponds although cage and pen culture are significant in a few countries. Inland aquaculture varies greatly regionally with Asia providing over 93 percent of global production.

[5] www.nature.com/articles/s43016-023-00844-4
[6] www.fao.org/documents/card/en/c/cc4576en
[7] FAO Fisheries and Aquaculture Department, Statistics and Information Service. FishStatJ: Universal software for fishery statistical time series. Copyright 2019.

Significant growth potential exists in other regions including Africa and Latin America. Continued sustainable growth of inland aquaculture will play a critical role in increasing the supply of aquatic food.

13. IWRM plays a pivotal role in the sustainable development of inland aquaculture, offering a comprehensive framework for the balanced use of water resources while safeguarding aquatic ecosystems. As aquaculture expands globally, addressing the sector's water needs in harmony with the environment is crucial. IWRM facilitates the equitable allocation of water, ensuring that aquaculture operations do not detrimentally impact other water uses, including drinking water supplies, agriculture, and industrial processes. This approach is essential for mitigating conflicts over water resources, promoting social equity, and enhancing economic efficiency. The adoption of IWRM principles in aquaculture optimizes water use efficiency and reduces the sector's environmental footprint through improved waste management and water recycling techniques.

14. Inland fisheries and aquaculture represent efficient, productive, and accessible sources of food and nutrition, enhanced by the production of culturally appropriate and important preserved products including dried, smoked or fermented fish and through informal, in-kind and non-market trade and exchange. The processing, sharing and trading of fish and fish products, including through important national and regional trade networks, increases the accessibility and availability of nutritious and culturally important foods. Inland fisheries and aquaculture are therefore an integral part of the FAO Blue Transformation vision[8] that supports better production, better nutrition, a better environment, and a better life, leaving no one behind.

III. FAO'S STRATEGIC AND COHERENT IWRM APPROACH TO THE FOUR BETTERS

15. **Better Production** – Enhanced efficiency in water use and sustainable water management improve agricultural productivity, livelihoods, and food security. Recognizing the importance of natural flood cycles for inland fisheries and biodiversity, it is crucial to manage water and ecosystems with these cycles in mind. Addressing climate extremes and exploring non-conventional water sources are essential for sustainable agricultural development.

16. **Better Nutrition** – FAO focuses on ending hunger and enhancing nutrition by promoting nutritious foods, including aquatic products, and improving access to healthy diets. Inland water fish, a nutrient-rich source significant in starch-heavy diets lacking in proteins and vitamins, are emphasized for their importance, especially in emergency food safety nets.

17. **Better Environment** – Better environmental management involves the stewardship of lands and water bodies to support fisheries and aquaculture, reduce flood and drought impacts, enhance water infiltration, and contribute to the conservation of biodiversity. This includes maintaining river flows, promoting aquifer recharge, and supporting terrestrial and marine ecosystems.

18. **Better Life** – A better life is envisioned through access to clean water, sanitation, food security, and improved living conditions for farmers and rural communities. Inland fisheries and aquaculture play a key role in building better lives by providing opportunities and connecting people with environments, knowledge, and culture, essential for securing resources and ensuring community well-being and gender equality.

[8] www.fao.org/3/cc0458en/cc0458en.pdf

IV. FAO ACTIVITIES ON INTEGRATED WATER RESOURCES MANAGEMENT (IWRM) IN AND FOR FISHERIES AND AQUACULTURE

19. In a proactive alignment with IWRM principles, FAO has been integrating fisheries and aquaculture into comprehensive management plans and activities beyond their immediate sector. This approach ensures that these vital resources are sustainably managed within the broader context of water use and conservation, reflecting FAO's commitment to fostering synergy between water resources management and the sustainable development of fisheries and aquaculture:

First Global Workshop between Regional Fishery Bodies (RFBs) and Basin Management Organizations (BMOs) for scaling up cooperation towards sustainable inland fisheries in the context of food security and nutrition, Entebbe, Uganda (6 – 8 December 2023)[9]

20. The workshop aimed to promote regional and basin-scale cooperation among Regional Fisheries Bodies (RFBs) and Basin Management Organizations (BMOs) to integrate inland fisheries management within catchment/basin management practices and strategies, addressing climate change, food security, and sustainable natural resources management. Participants included representatives from eight RFBs and five BMOs from Asia, Africa, Latin America and Europe, alongside several FAO divisions. Through engaging discussions, the workshop highlighted the common priorities shared by RFBs and BMOs in the development of inland fisheries and broader basin-level sustainable development goals, underscoring the necessity of collaborative frameworks to effectively tackle shared challenges and advance sustainable management practices. Key outcomes of the workshop included identifying areas for cooperation, such as ecosystem restoration, environmental flows, and water quality monitoring.

21. Participants called on FAO to lead coordination efforts by proposing the formation of a committee consisting of representatives of RFBs, BMOs and FAO to initiate activities which ensure the integration of the inland fisheries sector in basin assessments and management plans.

Resilient rivers: Watershed-based management of forests, freshwater, and inland fisheries

22. An e-learning course[10] was developed, to address the principles of IWRM, focusing on freshwater systems, to encourage managers, scientists, and community members to collaborate across different sectors for enhanced watershed management. The course enables learners to understand, monitor, and manage watersheds as integrated systems. Lessons begin with watershed function and then focus on forests, freshwater, and fisheries. In each case emphasizing interlinkages, spatial structure, seasonality, benefits to humans, and simple monitoring indicators. Project work in the upper Kafue River watershed, one of the headwaters of the Zambezi River in Zambia, and in the Magdalena and Atrato Rivers in Colombia, offer local perspectives and convincing case studies for understanding and managing on-the-ground conditions.

Aquaculture co-management

23. Aquaculture co-management represents a holistic approach that extends beyond the immediate boundaries of aquaculture farms, embracing the broader ecosystem to optimize production and sustainability. This concept is rooted in the principle of strategic and operational collaborative arrangements of the Ecosystem Approach to Aquaculture (EAA), where stakeholders share differentiated responsibilities, rights, and benefits. Such an approach is crucial in ensuring that aquaculture operations are sustainable, environmentally friendly, and socially equitable. Linking aquaculture co-management with IWRM further enhances this holistic approach. IWRM is a process that promotes the coordinated development and management of water, land, and related resources to maximize economic and social welfare without compromising the sustainability of vital ecosystems. By integrating aquaculture co-management with IWRM, stakeholders can ensure that aquaculture practices are not only productive but also harmonize with water use, quality, and ecosystem health in the surrounding areas. This integration facilitates a more sustainable use of water resources, aligns

[9] Organized in cooperation with the Regional Fishery Body Secretariats' Network, www.fao.org/fishery/en/rsn
[10] https://elearning.fao.org/course/view.php?id=944

with ecosystem conservation principles, and supports community livelihoods. FAO is currently developing a guidance document on the concept of aquaculture co-management, case studies showcasing best practices and an e-learning course, which will be additional tools to be used for the implementation of an IWRM approach.

V. INTEGRATED WATER RESOURCES MANAGEMENT IN FAO'S FUTURE WORK ON FISHERIES AND AQUACULTURE

24. The Biennial Theme 2024–25 underscores the crucial role of water management in achieving the Sustainable Development Goals (SDGs), particularly SDG 6: "Ensure availability and sustainable management of water and sanitation for all".[11] In response to the recommendations of the Evaluation of FAO's contribution to SDG 6, FAO developed a Conceptual Framework for Integrated Land and Water Resources Management, highlighting the necessity for FAO to adopt a coherent and strategic approach towards recognizing the central role of water resources management in agriculture, including fisheries and aquaculture. This includes strengthening the recognition of water resources management in the FAO Strategic Framework 2022–31 and the Programme Priority Areas. This conceptual framework, developed in collaboration with relevant technical divisions, centres, and offices, is informed by the findings of the *State of the World's Land and Water Resources for Food and Agriculture (SOLAW 2021)* report and a stocktaking of FAO's work, including experiences, good practices, lessons learned, and gaps. By integrating these efforts, FAO aims to advance its mission of achieving better production, better nutrition, a better environment, and a better life through sustainable water management, ensuring equitable access to water resources for all.[12]

25. Considering FAO's mandate encompassing water, land and agrifood systems (including fisheries, aquaculture, and forestry) the Organization is uniquely positioned in addressing the global water-climate-biodiversity crises while simultaneously striving for food security. Leveraging this mandate, FAO is committed to supporting the implementation of IWRM and scaling up solutions that interconnect water management with various aspects of climate change action, disaster risk reduction, fisheries management, zoning for aquaculture and fisheries, forest management, ecosystem restoration, biodiversity, soil and land management, nutrition, food safety, antimicrobial resistance, and One Water One Health initiatives.

26. Building upon the FAO's extensive experience and comprehensive work in water, fisheries and aquaculture, forestry, and other related sectors, and following the guidance provided by the Governing Bodies, the Organization is committed to increase efforts to intensifying collaboration and partnerships that include fisheries and aquaculture sector. This is to ensure fisheries and aquaculture are considered when IWRM activities are designed and implemented. It also recognizes the EAF as an important guiding principle for IWRM. This approach embraces the notions of comprehensiveness and sustainability across all ecosystem components, as well as the livelihoods of small-scale fishing communities. Furthermore, it ensures cross-sectoral coordination, as small-scale fisheries are closely linked to and dependent on many other sectors.

27. Many inland fisheries are located within dynamic and changing landscapes, affected by environmental, economic, and social change. Achieving more sustainable production and food systems requires inclusive integrated approaches harnessing the opportunities provided by inland fisheries. This includes leveraging technologies, practices and policies, prioritising investments, and aquatic habitat restoration initiatives. As inland fisheries and aquaculture face changes, it is crucial to identify and mitigate threats by acknowledging inland fisheries and aquaculture, along with their associated knowledge and capabilities, as vital resources. Promoting a more central role for fish, fisheries and aquaculture in development planning is essential.

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[11] C 2023/30 – Biennial Theme 2024–25: Water resources management for the four betters: better production, better nutrition, better environment, and better life, to achieve Agenda 2030 and the Sustainable Development Goals (www.fao.org/3/nm123en/nm123en.pdf)

[12] PC 137/6 – FAO's Conceptual framework for integrated land and water resources management (www.fao.org/3/nn077en/nn077en.pdf)

28. FAO has identified the following priority actions related to IWRM in the context of inland fisheries and aquaculture to achieve more sustainable agrifood systems:

- Support the integration of inland fisheries and aquaculture within global, regional, basin-level and national development agendas, including development of the basin approach for fisheries assessment linking inland fisheries productivity and threats to broader water management strategies.
- Identify and promote IWRM approaches and good practices and policies that support productive aquaculture, inland fisheries and responsible fishing and management to ensure inclusive, sustainable, secure and equitable benefits.
- Support the development of participatory management approaches in IWRM to sustain freshwater biodiversity conservation, environmental flow, facilitate ecosystem restoration, strengthen climate change adaptation and build capabilities to manage inland fisheries and aquatic environments, particularly in fluctuating and changing fisheries environments.
- Facilitate the development of best practices and policies, including integrated forestry-fisheries-water assessments, that can support integrated assessment and management at the basin or sub-basin scale to enhance the sustainability of basin ecosystems and associated communities.
- Implement sustainable infrastructure operations that minimize negative impacts on fish populations. This may involve modifying or removing barriers to fish migration, restoring natural flow regimes, and designing fish passages to facilitate safe passage around obstacles.
- Take measures to prevent and mitigate pollution from agricultural return flows, including implementing best management practices to minimize soil erosion and runoff impacting fisheries and aquaculture, promoting the use of sustainable agricultural practices, and implementing water treatment technologies where necessary.