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INLAND FISHERIES: ENABLING POSITIVE OUTCOMES FROM FISHERIES AND INTEGRATED WATER RESOURCE MANAGEMENT

Executive Summary

This information paper complements Working Paper COFI:FM/I/2024/2 by providing specific information on the nature of inland fisheries and the livelihoods that they support, with an emphasis on Land Locked and Low-Income Food Deficit Countries where these fisheries can be particularly important. The paper describes the contributions of inland fisheries and identifies opportunities to improve the sustainability of inland fisheries. This includes both through the effective management and governance of inland fisheries, and in the context of multiple use of landscapes and integrated water resource management.

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I. INTRODUCTION

1. While there are some large-scale fisheries in inland waters, for example in large lakes and reservoirs in Africa and Asia, 99 percent of total inland capture production comes from small-scale fisheries¹. Small-scale fisheries (SSF) in inland fisheries are widespread, occurring in lakes, ponds, rivers, streams and swamps as well as in man-made waterbodies including reservoirs canals and ditches. These fisheries are also highly productive, producing 12 percent of world fisheries production from less than one percent of available water¹.
2. Many inland fisheries are in Landlocked Developing countries and Low Income Food Deficit Countries (LLDC and LIFDC). Indeed, LIFDCs' account for 40 percent of the total global inland fish catch². Although they are often overlooked in development policies, they are particularly important for people in these countries and to achieving the Sustainable Development Goals (SDGs).
3. Inland fisheries provide important sources of nutritious food and livelihood opportunities through fishing and associated activities. Recent FAO food balance sheet data reveal the scale of this importance, with freshwater and diadromous species globally accounting for 40 percent of per capita aquatic food consumption. This is achieved with relatively small greenhouse gas emissions compared to alternatives². In this and other more direct ways, inland fisheries also contribute to global environmental and conservation targets and maintaining ecosystem health in inland waters³.
4. Inland aquatic environments can be dynamic, and fish and fishers respond to changing conditions. Contributing to this responsiveness are the connectivity of these environments and the relationships between people dependent upon inland fisheries. This reality emphasises the growing need to place inland fisheries management and governance within wider integrated water management approaches.
5. The 35th Session of COFI in 2022 “encouraged increased work on small-scale fisheries sustainable use and management”⁴. The committee also “called upon all countries to enable fishers and fish workers in small-scale fisheries to participate in the process of decision-making concerning fisheries management”⁴, including women, youth and Indigenous Peoples as well as local communities. Furthermore, the Rome Declaration: Ten Steps to Responsible Inland Fisheries⁵ highlighted the need for an action plan to support sustainable and responsible use and healthy inland aquatic environments. This paper responds to this by identifying key management and governance priorities, including in the context of integrated water resource management. In doing so, it complements the document COFI:FM/I/2024/2 “Current fisheries management practices with special considerations for small-scale fisheries”.

II. INLAND FISHERIES: DYNAMIC, CONNECTED AND ECOLOGICALLY RESILIENT

6. Inland fisheries, particularly in tropical aquatic environments, are typically characterised by targeting a high number of species with different life cycles. These systems are frequently dynamic and as environmental conditions change; they may demonstrate highly variable seasonal abundance. Furthermore, the environments in which fisheries operate are diverse, with fishing taking place in rivers, lakes, ponds and streams and as well as man-made aquatic environments including reservoirs, canals and ditches.

¹ <https://doi.org/10.4060/cc4576en>

² <http://www.fao.org/3/ca0388en/CA0388EN.pdf>

³ e0000065 <https://doi.org/10.1371/journal.pstr.0000065>

⁴ <https://doi.org/10.4060/cc3652en>

⁵ <http://www.fao.org/3/a-i5735e.pdf>

7. Inland fisheries are often accessible to poorer people, including women, vulnerable and marginalised and landless people using simple and low-cost gears. Many of these waterbodies are in shallow water, streams and ditches and may be located close to where people live or work⁶. Fish can also become abundant or concentrated at certain times as flood waters recede, for example in rice fields, or fish aggregate to spawn or migrate. Fishers will frequently respond to changing productivity by changing gears and altering the spatial and temporal distribution of effort.

8. Ecological boundaries can shift, e.g. due to river flow alteration through humans, and as a result inland fisheries may become parts of larger interconnected environments. Fish species have adapted to the dynamic nature of many inland aquatic environments, including to aspects such as temperature and oxygen availability. Others will migrate as conditions change. This suggests that inland fisheries can often be highly resilient to environmental change and capable of rapid recoveries. In multi-species fisheries, yield and catch composition can change⁷. Consequently, many inland fisheries, e.g. in floodplains, may be more resilient to overexploitation than marine fisheries⁸. For example, in isolated seasonal waterbodies where fish mortalities would naturally be high, fishing pressure may not be as problematic as in perennial waterbodies and riverine deep pools that provide ecological refuges. While concern about overfishing is warranted, in contrast with many marine fisheries the risks of overfishing for inland fisheries may be less than the risks originating from pressures outside the sector.

9. Indeed, experiences from inland fisheries related to the ways people live with, and adapt to, changing environments demonstrate sustainable resource use and examples of ecosystem restoration. This information paper provides an overview of inland fisheries from this perspective, highlighting their contributions to livelihoods, food security and nutrition and the opportunities they can represent. It also places inland fisheries in context of wider land and water management, identifying some of the key challenges and approaches that have been developed to address them.

III. INLAND FISHERIES AND LIVELIHOODS RESILIENCE: ACCESS AND ADAPTATION

10. The study *Illuminating Hidden Harvests (IHH)*⁹ provided new evidence, mainly at an aggregated level, of how inland small-scale fisheries contribute to food security and nutrition, employment and livelihoods. It is in relation to livelihoods, economies and environmental stewardship that inland fisheries merit greater attention. Placing them in this context helps illustrate transformative pathways to sustainability.

11. The 35th Session of COFI in 2022 emphasized “the need for increased access to resources and support to small-scale fisheries livelihoods and income”¹⁰. Many traditional management arrangements for inland fisheries play an important role in enabling rather than restricting access, recognising that being able to benefit from productive fisheries can be important in fluctuating environments. For example, inland fisheries can be an important safety net when crops fail or when there are changes in other sectors of the economy. For instance, the fishery in Lake Nasser played an important role when land reforms led large numbers of small tenant farmers to leave the agricultural sector. In floodplains, rivers, streams and rice fields, management objectives, user rights and tenure arrangements may change over the course of the flood cycle and between years as environmental conditions and social priorities change. This creates flexibility in access arrangements and can provide opportunities for subsistence users and outsiders to benefit from the fisheries.

12. Physical accessibility of many inland fisheries can represent a key strength. Fishing can take place in shallow water close to the shore or river bank and many waterbodies are located within agricultural

⁶ <http://www.fao.org/3/ca0388en/CA0388EN.pdf>

⁷ <https://doi.org/10.4081/jlimnol.2014.818>

⁸ <https://doi.org/10.1098/rstb.2010.0168>

⁹ <https://doi.org/10.4060/cc4576en>

¹⁰ <https://doi.org/10.4060/cc3652en>

and silvicultural landscapes and fishing is often pursued alongside other livelihood activities, for example fishing within rice-field canals while undertaking farming activities. Fishing, farming and off-farm activities are thus frequently connected within livelihood strategies. For example, in the northern part of Lake Chilwa, Malawi, fishing is important for part of the year but, as the waters recede in the dry season, recession farming and labouring become more important. These connections, and the opportunities that they provide, are another important aspect of inland fisheries.

13. While proximity to inland fisheries can be an important factor in the ability to benefit from fish and fishing,¹¹ issues of access and rights extend beyond fishers to also include a wider spectrum of beneficiaries (FAO, 2016). Processed fish products from inland capture fisheries, including dried and fermented fish, often produced by women, allow fish to be available throughout the year or as condiments that can increase the nutritional value of meals¹². Indeed, preserved fish products are a more common feature in inland fisheries than in marine due to the very seasonal nature of many inland fisheries. Thus, it is also important to consider how access is affected by post-harvest processing and exchange and cultural behaviours associated with fish consumption. This includes the role of informal exchanges, such as the gifting of fish within and between households and communities, that can play important roles for certain groups. Fresh and processed fish also underpin extensive national and regional trade networks that can be distinct from those for marine fish, increasing the availability of nutrient-rich fish products across large and even regionally significant areas.

14. Inland fisheries may also contribute to important collective benefits. These include supporting community development (investments in school buildings, clinics and electricity) where other opportunities for generating community revenue may be limited¹⁵, cultural heritage and social cohesion¹³. These relationships can represent important contributions to social welfare and social protection mechanisms and can be facilitated by forms of community-based management that are often associated with inland fisheries¹⁴. For example, ‘fishing days’ and ‘fishing festivals’ found across South and Southeast Asia and in parts of Africa promote participation in fishing, often using traditional small-scale gears. These events are about coming together in ways that are facilitated by fishing. They reinforce relationships and provide opportunities to share and pass on skills and knowledge..

IV. FISHERIES MANAGEMENT AND GOVERNANCE: ENABLING RESILIENCE

15. While the management measures that can be applied to inland fisheries are, in principle, similar to marine fisheries, the context, drivers and responses are different. The ecological connectivity, variability and relative importance of environmental drivers in inland water bodies lead to a greater emphasis on management measures such as seasonal fish refuges, stock enhancement and habitat restoration that can maintain and improve the productivity of fish stocks. This can enable sustainable intensification of fishing, for example focusing it within seasonal waterbodies, to be combined with subsistence use and conservation areas in ecologically important or vulnerable areas.

16. The COFI 35th session “stressed the importance of enabling policy and legislative environments, participatory processes and inclusive governance mechanisms involving small-scale fisheries organizations”. The connections between inland fisheries and other occupations mean that it is important to consider fisheries management in relation to integrated resource management, addressing these wider connections and provides a means to navigate and respond to change^{17,15}.

17. To be effective, management measures for inland fisheries also need to recognise the diverse demands on aquatic environments and the different decision-makers that may need to be involved. In Asia, reintroductions of fish species, restoration of traditional fish refuges and cultivation of less water intensive crops have successfully contributed to maintaining and enhancing fisheries productivity within

¹¹ <https://doi.org/10.1016/j.gfs.2020.100483>

¹² <https://doi.org/10.1016/j.foodpol.2016.02.005>

¹³ <https://digitalarchive.worldfishcenter.org/handle/20.500.12348/2039>

¹⁴ <https://doi.org/10.1002/9781118394380.ch39>

¹⁵ <https://DOI:10.1002/pan3.10403>

agricultural landscapes, with related livelihood benefits¹⁶. These measures can also provide important social protection mechanisms as preferential access may be given to poorer households and subsistence fishers.

18. During emergencies and shocks the combination of the widespread and diverse nature of inland waterbodies, low barriers to entry (for example low-cost gears and accessible waterbodies) and resilience of inland fish stocks because of their ecological adaptations to fluctuating environmental conditions can mean that they can play important roles as part of rapid emergency responses. Indeed, inland fisheries can make important and distinctive contributions as an accessible source of nutritious food and employment in such situations¹⁷.

19. The need for inclusive, integrated and responsive management can be addressed through the ecosystem approach to fisheries (EAF) promoted by the SSF Guidelines¹⁸. The EAF explicitly recognises the connection between ecological and livelihoods dimensions of inland fisheries and locates them in a wider context. The EAF is the basis of guidelines for fish-friendly infrastructure and nature-based solutions to maintain, enhance and restore aquatic environments for productive fisheries¹⁹. For example, managing agricultural infrastructure and flooding for fisheries and forest restoration in Africa and South America has provided benefits for fisheries and supported integrated livelihoods²⁰. The continued promotion of the EAF, for example through training programmes in Malawi, can help support integrated management and balance different interests.

20. The IHH²¹ and other studies have highlighted the scale and importance of inland fisheries, and the role fishers can and do play as active environmental stewards, caring for and sustainably managing aquatic environments and the fisheries that they support. Critically, the management of inland fisheries are intimately entwined with wider sets of livelihood activities and opportunities, and with broader social and cultural relations and values. It is in this context that fishing, and the opportunities that inland fisheries can provide and enable, need to be seen²². Traditional management arrangements in inland fisheries have provided examples of successful stewardship and integrated resource use and, consequently, there is need to learn how these can be built upon, for example through ongoing studies on indigenous peoples' fisheries in Central America and support to community fisheries in Southeast Asia.

V. INTEGRATED RESOURCE MANAGEMENT

21. Many pressures on inland fisheries originate outside the sector and are related to water resources management occurring at different scales and often requiring integrated responses at the basin level. With growing pressure on water and land resources and associated inland fisheries, negotiating priorities and agreeing measures can involve reconciling different interests, balancing areas of conflict and confrontation as much as facilitating collaboration and co-design. Within these processes, less powerful voices, including of women, subsistence users and migrant fishers, are frequently excluded and consequently the value and contributions of inland fisheries may not be fully accounted for. When inland fisheries are not adequately recognised there is a risk that fisheries enhancement measures, aquaculture and options outside of fisheries can be identified as mitigation measures or replacements for capture fisheries. However, experience indicates key differences between inland capture fisheries and aquaculture in accessibility, production, including nutritional benefits and environmental impact²³. These are aspects that require further attention to promote synergies and manage trade-offs.

¹⁶ <https://doi.org/10.1080/14888386.2010.9712644>

¹⁷ <https://www.fao.org/3/i3433e/i3433e.pdf>

¹⁸ <https://www.fao.org/documents/card/en/c/14356EN>

¹⁹ <https://www.fao.org/documents/card/en?details=cc7082en>

²⁰ <https://www.fao.org/3/CA2675EN/ca2675en.pdf>

²¹ <https://doi.org/10.4060/cc4576en>

²² <https://doi.org/10.1111/faf.12602>

²³ <https://doi.org/10.4060/cc4576en>

22. It is important in this context to change the narrative that inland fisheries represent marginal, unproductive resources, sometimes considered as remnants of more primitive economies and even as an obstacle to realizing other interests²⁴. The Rome Declaration and the need to correctly value inland aquatic ecosystems and inland fisheries can help change this narrative. This includes gathering more evidence of the interlinkages and interdependencies between inland fisheries and other productive sectors and their respective contributions through ecosystem services and human and social capitals to development goals²⁵. This requires data collection and assessment methods that draw on local knowledge to value the fishery not just the fish, revealing and quantifying the rights, relationships and connections between inland fisheries and other productive sectors²⁶.

23. In addition to improved information about the value of inland fisheries, negotiating different interests requires governance frameworks that provides opportunities for participation and secure tenure rights, including for those not directly participating in fishing. This need is reflected in the Rome Declaration and in the Kunming-Montreal Global Biodiversity Framework (GBF). The IYAFA 2022 final report addressed this, recommending to “Integrate biodiversity and sustainable use considerations for the sustainability of small-scale artisanal fisheries and aquaculture: enable the active participation of small-scale artisanal and aquaculture actors in sustainable resource use, management and stewardship [and] increase integration and recognition of traditional and Indigenous Peoples’ knowledge”²⁷. Ensuring representation of different interests, experiences and values can support accountable decision making and the FAO SSF²⁸ and Voluntary Guidelines on the Responsible Governance of Tenure (VGGT)²⁹ can provide useful direction on inclusive governance.

24. The reality of negotiating change and competing land and water demands, including for agriculture, hydropower, urbanisation, industry and recreation can be challenging³⁰. These are aspects over which fisheries managers may have limited jurisdiction. This reality emphasises the growing need to place inland fisheries management and governance within wider integrated water management approaches. The Komadugu Yobe Basin, upstream of Lake Chad in northern Nigeria provides an all too rare example. The construction of dams in the basin altered river flows and led to environmental degradation. Fishing, farming, and pastoralist livelihoods were all adversely affected, contributing to increased tensions and conflict between user groups over resources. A participatory catchment planning initiative and Water Charter facilitated inclusive decision-making, providing stakeholders with a voice in water resource planning and the necessary tools to contribute. The approach provided a means to discuss restoring natural river flow patterns and to reduce conflict.

25. Fish distributions, species composition and abundance in inland water bodies can respond rapidly to change, providing useful indicators of aquatic ecosystem health and overall basin status. Fisher involvement in data collection can make valuable and potentially cost-effective contributions to ongoing sampling. This is particularly relevant in inland fisheries, where sampling is complex as water bodies are more dispersed and often located within more variable ecosystems and changing habitats. Furthermore, fishers, with their extensive ecological knowledge, can also be well placed to contribute wider perceptions of the nature and consequences of change.

VI. CONCLUSIONS

26. Inland fisheries remain highly productive resources that make significant contributions to livelihoods, particularly for poor and vulnerable groups. The livelihoods of those that engage in fishing can often involve multiple activities of which fishing is one but a critical component of the overall livelihood portfolio. Recognising this highlights the critical importance of an integrated approach to

²⁴ <https://www.fao.org/3/cc2760en/cc2760en.pdf>

²⁵ <http://www.fao.org/3/a-i5735e.pdf>

²⁶ https://link.springer.com/chapter/10.1007/978-3-030-89624-9_19

²⁷ <https://doi.org/10.4060/cc5034en>

²⁸ <https://www.fao.org/documents/card/en/c/I4356EN>

²⁹ <https://doi.org/10.4060/i2801e>

³⁰ <https://www.fao.org/3/cc2760en/cc2760en.pdf>

inland fisheries that places them as an important component and entry point for positive developmental transformations in the context of wider water and watershed management. Inland fisheries and the livelihoods they support are often highly resilient and capable of adapting to environmental and social change but can also be affected by pressures outside the sector. Thus integrated management needs to be addressed at different scales from the local to basin scale. The reality of inland fisheries management is inherently one of living with change and having to navigate multiple interests both within and outside the sector. Investments in managing inland fisheries to ensure that the Blue Transformation objective of placing all fisheries under management are critical to realise the transformative potential of these fisheries on which so many depend.

27. Identifying and addressing opportunities and threats, such as those associated with changing land and water use, including for agriculture, hydropower, urbanisation, industry and recreation, requires integrated forms of management and governance. The continued promotion of the EAF for inland fisheries can make important contributions, including realising opportunities for fish-friendly infrastructure and nature-based solutions to maintain, enhance, reconnect and restore aquatic environments for productive fisheries.

28. Integrated management requires negotiating competing interests. Inland fisheries have frequently been perceived as a marginal activity, overlooking the critical roles they can play in diversifying livelihood portfolios. To support Integrated Water Resource Management (IWRM) there is a need to develop capacity for data collection and analysis. This includes approaches to identify the opportunities, societal role and importance of inland fish and fisheries, the threats to them and the effectiveness of management measures developed for them.

29. IWRM also represents a governance challenge, and it is important to consider addressing the need for inclusive governance frameworks to support sustainable management. This includes ensuring that there are practical linkages between fisheries management and basin management organisations and opportunities for participation in decision-making with participation of affected groups. In all these aspects, there are important opportunities to draw on the accumulated knowledge and experiences of people dependent on inland fisheries as the basis for effective partnerships and transformative interventions.