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LINKAGES BETWEEN INLAND FISHERIES AND INTERNATIONAL INSTRUMENTS – OPPORTUNITIES FOR ENGAGEMENT



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LINKAGES BETWEEN INLAND FISHERIES AND INTERNATIONAL INSTRUMENTS – OPPORTUNITIES FOR ENGAGEMENT

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PREPARATION OF THIS DOCUMENT

This report was initiated by the Fisheries and Aquaculture Division (NFI) of the Food and Agriculture Organization of the United Nations (FAO) as part of its ongoing commitment to improving global understanding of the role and value of inland fisheries.

In response to the ecosystem approach to fisheries (FAO, 2003), there is a need to mainstream understanding of inland fisheries beyond the confines of the fisheries sector. This report assesses the degree to which various international instruments, frameworks or processes, other than those specific to fisheries, pay attention, or have relevance, to inland fisheries. It assesses the potential for awareness-raising of inland fisheries among them. This review aims to highlight the needs and opportunities for the diverse actors working in inland fisheries so they can engage more effectively in these international frameworks and processes that are relevant to their work.

ABSTRACT

The ecosystem approach to inland fisheries management (EAFM) requires the consideration of inland fisheries beyond the confines of the fisheries sector. Inland fisheries can be invisible in some fora and processes that can have major positive or negative impacts upon them. An ecosystem approach implies that inland fisheries should be considered beyond their subsector boundaries. Activities in other domains, such as land and water use, have major impacts on inland fisheries through, for example, habitat degradation and loss. Mainstreaming the values and needs of inland fisheries into these areas is required if their sustainability is to be achieved. The extent to which inland fisheries are included in, or are relevant to, the most directly relevant international conventions, processes and fora, is assessed. These are prioritized based on a combination of the relevance of their mandates, or work areas, and assessed priorities or opportunities for action.

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ABBREVIATIONS AND ACRONYMS

CBD	Convention on Biological Diversity
CITES	Convention on International Trade in Endangered Species of Wild Flora and Fauna
CMS	Convention on the Conservation of Migratory Species of Wild Animals
COP	Conference of the Parties
EAf	ecosystem approach to fisheries
EAIFM	ecosystem approach to inland fisheries management
EEZ	exclusive economic zone
FAO	Food and Agriculture Organization of the United Nations
GEF	Global Environment Facility
GPA	UNEP Global Programme of Action for the Protection of the Marine Environment from Land-based Activities
ICSF	International Collective in Support of Fishworkers
INBO	International Network of Basin Organizations
IPBES	Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services
IUCN/SSC/WI/FFSG	IUCN Species Survival Commission and Wetlands International Freshwater Fish Specialist Group Fish Specialist Group
IUU	illegal, unreported and unregulated (fishing)
IWMI	International Water Management Institute
IWRM	Integrated Water Resources Management
LIFDCs	low-income food-deficit countries
MAB	Man and the Biosphere Programme
MEA	multilateral environmental agreement
NBSAP	National Biodiversity Strategies and Action Plans
POPs	persistent organic pollutants
PoW	Programme of Work
REDD+	Reducing Emissions from Deforestation and forest Degradation and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries
RIS	Ramsar Information Sheet
RSIS	Ramsar Sites Information Service
SBSTTA	Subsidiary Body on Scientific, Technical and Technological Advice
SDG	Sustainable Development Goal
SLM	sustainable land management
SWW	Stockholm Water Week
TEEB	The Economics of Ecosystems and Biodiversity - for inland fisheries
UNCCD	United Nations Convention to Combat Desertification
UNECE	United Nations Economic Commission for Europe
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
WEF	the water–energy–food nexus
WGRI	Working Group on Review of Implementation
WWF	World Water Forum

EXECUTIVE SUMMARY

Inland water habitats provide a range of important benefits, of which the provision of fish and other aquatic animals is crucial for human well-being. Inland fisheries provide livelihoods, food security, nutrition and contribute to huge economic and recreational benefits. Too often, these key values and attributes have been overlooked in decision-making.

This review explores some of the most relevant global international instruments, frameworks and processes that are not specific to fisheries, to assess how they currently include attention to inland fisheries. Opportunities to integrate better attention to inland fisheries in them are identified. Better understanding of why many potentially relevant instruments, frameworks and processes are failing to pay sufficient attention to inland fisheries helps to identify how to target strategies to raise awareness and elevate the recognition of the value of inland fisheries to support their sustainability.

There is a fundamental need to raise awareness regarding the status and value of inland fisheries across a range of relevant international instruments, frameworks and processes. Part of this mainstreaming will require repackaging of existing information so that it is accessible and context-specific, with clear messages targeted at identified audiences. Likewise, there is a need for inland fisheries practitioners to be more aware of these frameworks, their relevance to inland fisheries and how to engage with them.

Previous assessments have pointed to data deficiencies as the root cause for much of the invisibility of inland fisheries. This review notes that important additional factors can include sector-based biases, power and influence imbalances and policy environments that do not fully prioritize poverty reduction, equity in development and sustaining the value of existing benefits. Assumptions made by other interest groups often originate from marine fisheries and do not automatically apply to inland fisheries. There is a need to dispel myths surrounding inland fisheries and promote recognition of their real values. Lack of data does not mean values are not high. Small catches per fishing unit that characterize inland fisheries do not indicate lower values. They provide benefits by increasing participation, livelihoods and equity. The food and nutrition security benefits of inland fisheries are far higher than the gross production figures imply. Inland fisheries are not necessarily in conflict with biodiversity conservation. In reality, considerable synergies exist between inland fisheries and biodiversity conservation objectives (Coates, 2003). Inland fisheries are not doomed to fail. Exploitation can be managed sustainably through community-based approaches that are more widespread and effective than those for offshore marine fisheries. Overall, the main drivers of loss of inland fisheries relate to environmental changes, and not fisheries exploitation.

Current ecosystem approaches operate at various levels. The most appropriate point of entry is at the cross-sectoral, landscape scale. The ecosystem approach to inland fisheries management (EAIFM) recognizes that inland fisheries exist within this broader setting and is targeted primarily at inland fisheries managers. Interests beyond fisheries may not automatically adopt an ecosystem approach promoted by other sectors and many have their own alternative frameworks. Adopting the terminology and approaches of the target audience, avoiding overtechnical entry points and focusing on mutual interests and achieving common objectives can be more practical strategies. Some tools to assist in identifying what needs to be considered, and how, include integrated water resources management (IWRM), environmental flows and sustainable land management, although in practice these can also be blind to inland fisheries, as well as the FAO Code of Conduct for Responsible Fisheries, including its guidelines on the ecosystem approach, and the FAO Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication.

Twenty-eight international global instruments, frameworks or processes, that are not specific to fisheries, are assessed. Each is evaluated (along a nominal scale of “Low” to “High”) against the relevance of its mandate, or work area, to inland fisheries and the potential for engagement leading to improved outcomes for inland fisheries. The most immediate highest priority opportunity rests with the UN Decade on Ecosystem Restoration (2021–2030). Six others with high relevance and priority are: The Convention on Biological Diversity (CBD), The Ramsar Convention, The FAO Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests, The Water–Energy–Food Nexus, The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) and The

International Network of Basin Organizations (INBO). Nine conventions or processes are rated low priority (for the current topic). The other 12 should not be discounted as opportunities exist with them and new opportunities may emerge. There are also some opportunities for improved awareness of inland fisheries within FAO itself, among its other divisions and activities.

Engagement with each of these stakeholders will require improved and more targeted audience-specific information, and in some cases better data. FAO has recently, and usefully, updated some of its information products on inland fisheries. These are a significant resource, but publishing the information is not enough. It is unrealistic to expect relevant processes to automatically take it on board. Proactive engagement is required, and the various fora require more targeted interventions. Most of the stakeholders identified are primarily interested in biodiversity conservation and/or sustainable development and human well-being. The key entry points into these fora are economics, interrelationships between ecosystems and drivers of change, and synergies between their interests and objectives for inland fisheries.

Producing an updated, more detailed and comprehensive study of *The economics of ecosystems and biodiversity – for inland fisheries*, or a similar theme, would be a valuable step forward to complement existing information and serve as a platform for more targeted messaging. However, this will require significant additional resources.

1. INTRODUCTION

Many specialists have long lamented that inland food fisheries in developing countries do not receive the level of attention commensurate with their importance. Although attention to them is improving, inland fisheries remain invisible to many policymakers (Funge-Smith and Bennett, 2019). Inland fisheries remain poorly represented in a range of international policy frameworks or processes. These can be influential on inland fisheries, for example by influencing changes in the resource base of inland fisheries or investment in them. This document focuses on the need to mainstream inland food fisheries in developing countries into these instruments, frameworks and processes. It is aimed at inland fisheries specialists and their networks, including a broader stakeholder group that recognizes the importance of inland fisheries as they relate to food security and poverty reduction in developing countries and the need to promote increased attention to and investment in them.

This document addresses some of the ways in which the ecosystem approach to inland fisheries management (EAIFM) (FAO, 2019a) can be operationalized to mainstream inland fisheries into the broader policy environment within a landscape setting. Other tools developed for fisheries by FAO can also support this. Relevant current international instruments, frameworks and processes are considered, including all of the major global mechanisms on the environment, natural resources management (particularly water) and sustainable development. Their implications for inland food fisheries and the needs and opportunities to mainstream inland fisheries into them, are considered. The level of diversity and variation that exists both in terms of inland aquatic ecosystems, the type of fishery they may support and the stakeholders involved means that the current assessment must be somewhat generic.

2. WHY ARE INLAND FISHERIES INVISIBLE?

Funge-Smith (2018) presented a simple generic list of reasons why inland fisheries receive limited official attention emphasizing issues with statistics as an underlying cause (Table 1). But this is only partly an explanation. For example, major associated factors influencing attention or perceptions can include:

- (i) Incorrect assumptions, including:
 - a. the status, trends and challenges observed in the much more widely promoted marine fisheries are directly transferable to inland fisheries, notably that they are in decline, destructive to biodiversity and the main issue is overfishing;
 - b. the tools and approaches developed for the assessment and management of marine fisheries should be directly applied in inland fisheries management;
 - c. gross catches, or formal employment, are the key indicators of levels of value, and by default, do not properly account for gender factors, food and nutrition security, contribution to livelihoods and family well-being as well as equity in resource access and use.
- (ii) Management objectives that overfocus on stock assessment whereas social, cultural and economic objectives are more immediately important regarding the values of the fisheries and opportunities for management, and that these can change over time.
- (iii) Failures in adaptive management as drivers of declines in inland fisheries, that are largely external, change over time.
- (iv) An overdependency of fisheries managers on statistical data generated “externally” to the fishery, partly because that is how marine fisheries are generally assessed; whereas the adoption of a participatory community-based co-management approach to information, that truly values local knowledge above statistics, would actually make most of the identified information gaps and needs identified in Table 1 redundant.
- (v) Unclear or inappropriate management objectives and failure to apply adaptive management in partnership with fisheries-dependent communities.

- (vi) Policies that prioritize investment for increasing visible (and recorded) production while neglecting the need to sustain what is already being produced.
- (vii) Sector-based dominance of policy and management.
- (viii) Power imbalances and inconvenient truths of the values of inland fisheries.

Table 1. Some key reasons why inland fisheries receive limited attention

Main reason	Underlying reason
Inland fisheries catches are often hidden or “invisible”	Inland capture fisheries landings tend to be low volume and widely dispersed.
	Often no centralized landing site and fish are sold locally or consumed by households.
	Catches are rarely recorded and production is often underestimated ¹ .
	Catches in rivers and associated wetlands are easy to underestimate because the contributions of numerous fisheries on smaller tributaries and waterbodies are generally overlooked ^{2, 3}
Governments do not consider inland fisheries important contributors to food security, the GDP and livelihoods	Monitoring of fisheries is typically only undertaken on commercial fisheries (to generate revenue) or at locations where substantive landings take place.
	Only key inland fisheries are subjected to regular surveys.
	Lack of monitoring/recording of fishing activities in river tributaries, minor waterbodies, small streams, floodplains.
	The costs of monitoring small-scale fisheries are not returned in revenues to the state.

Source: Funge-Smith, S.J. 2018. *Review of the state of world fishery resources: inland fisheries*. FAO Fisheries and Aquaculture Circular No. C942 Rev.3. Rome, FAO. 397 p.
www.fao.org/3/ca0388en/CA0388EN.pdf

Note: 1: FAO. 2011. *Review of the state of world fishery resources: inland fisheries*. FAO Fisheries and Aquaculture Circular No. 942, Rev. 2, FIR/C942, Rev. 2 (En).
www.fao.org/docrep/015/i2484e/i2484e.pdf; 2: Coates, D. 2002. *Inland capture fishery statistics of Southeast Asia: current status and information needs*. RAP Publication No. 11. Pp. 1–114. www.fao.org/3/ac487e/ac487e.pdf; 3: Molden, D. (ed.). 2007. *Water for food, water for life. A comprehensive assessment of water management in agriculture*. London, Earthscan; Colombo, Sri Lanka, International Water Management Institute.
www.iwmi.cgiar.org/assessment/files_new/synthesis/Summary_SynthesisBook.pdf

3. KEY FEATURES OF INLAND FISHERIES THAT HELP TO PROMOTE THEIR MAINSTREAMING

3.1 Transparency on threats and drivers of loss for inland food fisheries in developing countries

Many policies assume that the main problem with fisheries is overexploitation and therefore the problem lies within the fisheries themselves. This perception arises mainly from marine fisheries. This has detracted attention from the real problem – environmental degradation. Because there is a general perception that marine exploitation problems are difficult to overcome, this is then applied to inland fisheries resulting in a “why bother” mindset. In some circles being able to lay the blame within the fishery has provided a convenient distraction from managing the impacts of other sectors.

Although many inland fisheries are heavily exploited, and some species are overexploited, the bigger challenge they face is that the habitat upon which they depend suffers from multiple and competing demands on water and land use resulting in management trade-offs between fisheries and other sectors impacting on aquatic ecosystems (Welcomme *et al.*, 2010; Funge-Smith, 2018; FAO, 2020). Overexploitation is typically a secondary driver of loss of inland food fisheries, although this depends on the fishery in question. There is also some substantial evidence that major inland fisheries on tropical river floodplains are more resilient to overexploitation than marine fisheries (Welcomme *et al.*, 2010).

This connection with the broader environment creates strong linkages between inland food fisheries and other sectors or policymakers in developing countries, particularly those influencing water/land use and the environment. Communicating this fact by alerting other policy fora and development processes is key to mainstreaming inland fisheries and establishing the need to take note of them. It also implies the need for greater engagement by inland fisheries interests beyond the confines of their own subsector.

3.2 Communicating the values and benefits of inland fisheries

In this context, a persistent problem has been the weakness of official statistics and their limited scope in articulating the full and accurate nature of their values. National reports are the main, although not the only, source of data used to maintain and update FAO’s capture fishery database (FAO FishStatJ). However, the data submitted are often incomplete, inconsistent or do not comply with international reporting standards; marine fisheries data are usually more complete than their inland counterparts (FAO, 2020). There can be significant shortcomings in national statistics for inland fisheries with total catches and participation in the fishery being consistently and appreciably underreported (Coates, 2002). The Biodiversity Indicators Partnership (2020), for example, considers that insufficiently robust global-level information is available about the current state and sustainability of inland food fisheries to make useful assessments of trends.

These weaknesses are important because non-specialists, especially at the international level, use the statistics to gauge importance and, therefore, underestimate the need to pay attention to inland food fisheries. This is well recognized by inland fisheries specialists and there has been progress in rectifying this information imbalance in recent years. Funge-Smith (2018) presents the most recent and comprehensive review of the status and trends of inland fisheries, including an attempt to interpret the official statistics. Total catches (by weight or value) and the number of persons in full-time employment, even where they are known accurately, are not the best measures of the value of most inland food fisheries. Livelihood dependency by the poor and vulnerable and food and nutrition security are usually more relevant measures by far. Funge-Smith and Bennet (2019) introduced some optimism that these underlying values of inland fisheries are becoming increasingly recognized. About 95 percent of the world's reported inland fisheries catch comes from developing countries and 43 percent of that catch originates from low-income food-deficient countries (Funge-Smith and Bennett, 2019).

3.2.1. Total catches (production)

The latest assessment by FAO (2020) puts inland capture fisheries production (for 2018) at 12.02 million tonnes, about 12.5 percent of total capture fisheries production and 6.73 percent of total production, when aquaculture is included. These figures do not factor in possible underreporting of 65 percent, as calculated by Funge-Smith (2018).

3.2.2. Levels of participation: the contribution of inland fisheries to livelihoods and family well-being among the poor and vulnerable

One of the key features of inland fisheries, and a major difference compared to the marine commercial sector, is the level of participation. Inland fisheries are dominated by small-scale activities, with low individual catches (marine fisheries, on the other hand, are dominated by high catches, and low participation). Oddly, this has resulted in a perception that because individual catches are low they are less important. On the contrary, low catches are an advantage because they increase participation, equity and thus direct contribution to livelihoods and welfare. Inland fisheries in developing countries are also predominantly operated by the poorest and most vulnerable groups. Fishing in inland waters can be an important, if not critical, safety net for the poor and is often an occupation of last resort, especially where there is no access to land (HLPE, 2014). Women tend to dominate processing and marketing (De Graaf and Garibaldi, 2014), but often comprise between 20 percent to 35 percent of the overall inland fishing workforce (Funge-Smith and Bennett, 2019). More than half of the recorded workforce in inland fisheries comprises women, a higher proportion than marine fisheries (World Bank, 2012; Bartley *et al.*, 2015).

Global figures on formal employment in inland fisheries vary widely. Funge-Smith (2018) estimated that about 17 million people were employed in inland fisheries and 8 million in postharvest employment. However, World Bank (2012) estimated the postharvest workforce in inland fisheries to be about 39 million or about 6 percent of the global agricultural workforce. However, even figures on formal postharvest employment can be unreliable as the sector tends to be diffuse and small scale with fewer centralized operations enabling more accurate data collection. Inland fisheries tend to form part of mixed-livelihoods strategies and, therefore, formal full-time employment is not a good indicator of participation or dependency, even where it is known accurately. Much better indications can arise through more comprehensive local studies that are not biased by focusing on communities with high participation in fisheries. For example, Mousset *et al.* (2016), based on a broad agricultural survey not limited to known key fishing communities in Cambodia, reported that 21 percent of the adult population was engaged in fishing (36 percent male, 8.4 percent female), 39 percent (56.2 percent female and 21.1 percent male) was involved in fish processing and 11.3 percent (16.5 percent female) was involved in fish marketing. Fishing was shown to be a relatively low capital requirement activity and involvement was determined more by economic status than fishery resources availability, with dependency on fishing increasing with reduced economic status and capital assets.

3.2.3. Inland fisheries and food and nutrition security

The key factor for creating strong links to major frameworks and fora is food and nutrition security. There are considerable opportunities to improve awareness of the food and nutrition security benefits offered by inland capture fisheries. The contribution of inland fisheries to food security (globally) goes well beyond correcting the total production figures (as cited above). The contribution of inland fisheries to food security is far higher than the statistics alone suggest. For example, compared to marine catches, freshwater fish are mainly consumed in their entirety, with practically no discards and minimal wastage; produce is rarely exported, but consumed domestically, usually by local communities, but in some cases (such as dried inland fish in sub-Saharan Africa) it can be transported over large distances (Funge-Smith and Bennett, 2019). Based on estimated actual catches and the amount of produce actually consumed directly by humans as food, inland water catches contribute to a much higher proportion of global production (Coates, 1995).

More important is the contribution of inland fisheries to national and regional food security. A significant number of countries has no marine fisheries at all, and current and potential production comes entirely from freshwater resources. Of the 225 countries, or statistical units, where reports are available, for the majority, inland production exceeds that from marine waters. Of these countries, about one-fifth have no marine production at all. Comparisons of low-income food-deficit countries (LIFDCs) are particularly

relevant for food security analysis. Nearly half have higher inland than marine catches and for approximately one-third, production from inland areas accounts for more than 95 percent of total fisheries production. Funge-Smith (2018) presents a similar overview.

Nutrition security is an important added dimension for food security. Fish protein is more bioavailable than plant-based sources of protein (HLPE, 2014), but fish are also an important source of essential nutrients. Fish are high in vitamins and minerals essential for preventing micronutrient deficiencies that can result in childhood stunting, a variety of cardiovascular ailments, blindness, diabetes, anaemia and maternal mortality (Bennett *et al.*, 2018). Childhood stunting is a widely used indicator of malnutrition (Headley *et al.*, 2018) forging a strong link between inland fisheries and broader development goals. The accessibility and affordability of inland fish, and their close association with family-based activities among poor and vulnerable populations, are important added dimensions of these values. Many reviews have highlighted the importance of fish for nutrition (e.g. Béné *et al.*, 2016) and food, nutrition and health policies have tended to underrepresent the role of fish (Toppe, Beveridge and Graham, 2017). Even so, where fish do get attention, this tends to be dominated by marine fisheries despite many LIFDCs having populations disproportionately dependent on inland fisheries (Funge-Smith and Bennett, 2019).

3.2.4. Potential for management

When inland fisheries are operated by local communities, where distances to fishing areas are usually short, and in most cases are within the family or community land (or resource) area, this leads to a high level of community motivation for resources management, although they often lack power to address factors external to the fishery. Levels of existing “stewardship” for inland fisheries probably are, and in theory certainly potentially are, far higher than for marine fisheries. This represents a significant resource management asset; however, local communities often do not have control over the drivers of fishery degradation (such as wetlands conversion, water use, pollution) and this is a significant problem. Community-based fisheries management is widespread in the inland sector (although by no means comprehensive) and there are excellent models of best practices for managing stocks and exploitation based on a very extensive and high level of local knowledge. This, for example, is identified as a key factor in the successes achieved in ecosystem restoration for inland food fisheries (Coates, forthcoming).

3.2.5. Inland food fisheries and biodiversity conservation

The objectives of freshwater fish conservation and fishery exploitation are often viewed as antithetical, the perception again tending to originate mainly from marine fisheries. For example, the Aichi Biodiversity Target 6¹ and Sustainable Development Goal 14, Target 14.4,² emphasize the need to bring exploitation levels within sustainable limits as the key objective for fisheries. However, although large-scale negative impacts of overfishing do occur in inland waters they are mostly associated with high-volume, industrial and commercial fishing activities, typically in the largest lake systems (Allan *et al.*, 2005). Overfishing usually occurs in conjunction with other threats, such as habitat loss or interruptions of migratory routes that are often the primary drivers of stock depletion (Coates *et al.*, 2003). Recent in-depth studies show that although fishing pressure had been implicated in declines of some species it was never the major factor and key threats included reduced longitudinal and lateral connectivity, altered flows, loss of refugia, reductions in both flowing (lotic) and slack-water riverine habitats, degradation of wetland habitats, alien species interactions and loss of aquatic vegetation; conversely, fishing interests were a significant driver of stock rehabilitation (Koehn *et al.*, 2020). It is likely that many of these impacts are reversible through ecosystem restoration (Coates, forthcoming).

¹Decision X/2 of the Conference of the Parties to the Convention on Biological Diversity. www.cbd.int/decision/cop/?id=12268

² Resolution adopted by the General Assembly on 25 September 2015 ([A/70/L.1](#))70/1. *Transforming our world: the 2030 Agenda for Sustainable Development*.

There are strong synergies between inland fisheries and biodiversity conservation that need much better recognition to strengthen attention in many international policy frameworks and processes, particularly those focused on biodiversity, environment and/or sustainable development. The strong dependence of local communities on inland food fisheries in developing countries, their close association with the resource base and related high levels of traditional and local knowledge lead to, traditionally, high levels of resource stewardship. A diverse species base for tropical inland fisheries is important for sustaining the social benefits of fisheries. It creates diverse opportunities for participation in the fishery, using a wide variety of fishing gears across a wide range of habitats and inhibits the opportunity for limited gears, and fishery enterprises, to dominate the fishery (Coates *et al.*, 2003).

Inland food fisheries have been a major driver of the restoration of inland water ecosystems and have usually delivered broader biodiversity conservation co-benefits, including in adjacent terrestrial areas (Coates, forthcoming). Phang *et al.* (2019) demonstrated how inland fisheries contribute to improved broader biodiversity conservation objectives, and how involving communities in the management of the resource can effectively prevent overfishing and other undesirable practices. In addition, local inland fisheries provide a valuable food resource that often helps to reduce hunting pressure on terrestrial wildlife. In Cambodia, the fishery of Tonlé Sap Lake can be viewed as the main driver for forest conservation (Kummu *et al.*, 2006) although there are anecdotal reports that the construction of fishery-related gears (such as brush parks) can contribute to deforestation.

3.2.6. Potential for sustainability and increased production

A major perception regarding inland fisheries is that production cannot be increased and is declining. This can place these fisheries as a lower priority in fora that focus on ways to increase output. This perception misses the priority need to maintain what benefits already exist. It is interesting to note that figures presented in FAO (2020) suggested that over a longer term, and certainly recently, inland catches have actually increased although modestly (while marine fisheries are stagnating or declining); however, much of this information is due to changes in reporting. The assumption that production cannot be increased is also incorrect, at least at the local scale. For example, Coates (forthcoming) notes the potential for ecosystem restoration to increase the benefits of inland fisheries including examples of where production has been more than doubled in only two to three years. Similarly, the perception that the fisheries are doomed because of their inability to manage the fishing effort is also not borne out by the many examples of where, once empowered, local communities have demonstrated a high level of sustainable management.

4. SOME TOOLS TO SUPPORT MAINSTREAMING AND SUSTAINABLE INLAND FISHERIES MANAGEMENT

4.1. The FAO Code of Conduct for Responsible Fisheries (FAO, 1995)

The Code of Conduct for Responsible Fisheries (FAO, 1995) is the overarching framework for fisheries management. Although its focus is coastal and marine fisheries, with no mention of inland fisheries, most of its provisions in principle also refer to inland fisheries. The code recognizes that fisheries operate within a broader landscape and policy setting and therefore should be managed as such. For example, Article 6.9 indicates: "States should ensure that their fisheries interests, including the need for conservation of the resources, are taken into account in the multiple uses of the coastal zone and are integrated into coastal area management, planning and development." Despite concomitance, this is not explicit for inland fisheries and inland areas.

The code has subsequently been supported by further technical guidance, such as the ecosystem approach to fisheries (EAF), habitat rehabilitation and the Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries (see Section 4.3).

4.2 Ecosystem approaches

There are various iterations of an “ecosystem approach” and there are other similar concepts in use in other fora; for example, “integrated land and water use planning”. Which is “best” to use depends on the stakeholders involved, the audience and the level of entry. It is critical to identify all stakeholders, winners/losers and power structures in play.

All iterations of the ecosystem approach, although sound in principle, can be somewhat technocratic. For the purpose of engagement with other major fora, and engaging other stakeholder interests, there is probably more advantage in taking a simplified approach based on where the common interlinkages are on mandates, areas of interest and synergies as well as targeting messages to the particular audience of interest (see next section). In addition, a key premise of an ecosystem approach is that although it can be considered as it applies “to” inland fisheries, the broader need is the mainstreaming of inland fisheries into other sectors.

There is a hierarchy of applications, or entry points, of ecosystem approaches from the systems level to fisheries to inland fisheries in the following sequence.

4.2.1. *The ecosystem approach (Convention on Biological Diversity, CBD)*

The “ecosystem approach” is the primary framework for action under the CBD adopted in 2000 in Decision V/6³ as a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way. It is intended to be applied at the overall system level that is above the level of sectors, with the entry point being land, water and living resources. It is, therefore, if implemented, the most appropriate entry point for integrating inland fisheries across interests because it is applied across the whole spectrum of interests, including sectors, and not from within a specific interest area or sector. It is based on a set of 12 recognized principles (Box 1) accompanied by operational guidance that was provided in Decision VII/11.⁴

Being based on a decision of the Conference of the Parties (COP), the ecosystem approach is, technically, legally binding although the implications of this in practice vary among Parties. Nevertheless, it remains the potentially most powerful iteration of any ecosystem approach application. Although inland fisheries, or any other sector or subsector, is not specifically mentioned, in principle the ecosystem approach would require their recognition and consideration in any relevant contexts, frameworks or policies.

³ www.cbd.int/decision/cop/?id=7148

⁴ www.cbd.int/decision/cop/?id=7748

Box 1. The principles of the CBD ecosystem approach

Principle 1: The objectives of management of land, water and living resources are a matter of societal choice.

Principle 2: Management should be decentralized to the lowest appropriate level.

Principle 3: Ecosystem managers should consider the effects (actual or potential) of their activities on adjacent and other ecosystems.

Principle 4: Recognizing potential gains from management, there is usually a need to understand and manage the ecosystem in an economic context.

Principle 5: Conservation of ecosystem structure and functioning, in order to maintain ecosystem services, should be a priority target of the ecosystem approach.

Principle 6: Ecosystems must be managed within the limits of their functioning.

Principle 7: The ecosystem approach should be undertaken at the appropriate spatial and temporal scales.

Principle 8: Recognizing the varying temporal scales and lag-effects that characterize ecosystem processes, objectives for ecosystem management should be set for the long term. Rationale: Ecosystem processes are characterized by varying temporal scales and lag-effects. This inherently conflicts with the tendency of humans to favour short-term gains and immediate benefits over future ones.

Principle 9: Management must recognize that change is inevitable. Rationale: Ecosystems change, including species composition and population abundance. Hence, management should adapt to the changes. Apart from their inherent dynamics of change, ecosystems are beset by a complex of uncertainties and potential "surprises" in the human, biological and environmental realms.

Principle 10: The ecosystem approach should seek the appropriate balance between, and integration of, conservation and use of biological diversity.

Principle 11: The ecosystem approach should consider all forms of relevant information, including scientific, indigenous and local knowledge, innovations and practices.

Principle 12: The ecosystem approach should involve all relevant sectors of society and scientific disciplines.

The equivalent to the CBD ecosystem approach in the Ramsar Convention is the concept of “wise use” of wetlands. A useful comparison of these two approaches is made by Davidson and Coates (2011) which essentially identifies their commonalities.

4.2.2. The ecosystem approach to fisheries

The term “ecosystem approach to fisheries” (EAF) was a response by the fisheries sector to the ecosystem approach adopted under the CBD. It was adopted by the FAO Technical Consultation on Ecosystem-based Fisheries Management held in Reykjavik, Iceland, between 16 and 19 September 2002 and guidelines were subsequently published under the FAO Code of Conduct on Responsible Fisheries (FAO, 1995). Such an approach is not novel, but rather its roots lie in traditional fishery management as practised by local communities with a stronger awareness of sustainable ecosystem-based management (Garcia and Cochrane, 2005).

The EAF focuses on marine fisheries although most of its guidance also applies to inland fisheries. The goals of the EAF are “to balance diverse societal objectives, by taking into account the knowledge and uncertainties about biotic, abiotic, and human components of ecosystems and their interactions and applying an integrated approach to fisheries within ecologically meaningful boundaries” (FAO, 2003).

In line with its title, the focus of the EAF is fisheries management. It requires that fisheries management processes include a broader range of users in deliberations and decision-making and, through improved participatory processes, broader assessment and consensus among users, whose objectives frequently compete. It recognizes that the process will need to consider more effectively the interactions between

fisheries and ecosystems, and the fact that both are affected by natural long-term variability as well as by other, non-fishery uses. As the target is fisheries management, the extent of its influence beyond fisheries is open to debate, depending on who and what is included under “fisheries management”. Its most immediate use is providing guidance to fisheries interests on some of the relevant considerations when linking fisheries to other interests and, hence, providing guidance on mainstreaming fisheries into other processes.

4.2.3. The ecosystem approach to fisheries management – inland fisheries

Subsequent to the ecosystem approach to fisheries, a complete training course for sustainable inland fisheries management using the ecosystem approach was developed (FAO, 2019a). Its target is inland fisheries management and managers whereas the needs for mainstreaming inland fisheries are located in other frameworks and processes. It primarily provides guidance to fisheries interests on what inland fisheries issues are *vis-à-vis* broader land, water and natural resources policy and management, but these issues would need to be followed up on through mainstreaming inland fisheries into those areas.

An ecosystem approach to promote the integration and co-existence of fisheries within irrigation systems was described by Gregory, Funge-Smith and Baumgartner (2018).

4.3 The FAO Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication (FAO, 2015)

These guidelines were developed to provide complementary guidance with respect to small-scale fisheries in support of the overall principles and provisions of the Code of Conduct for Responsible Fisheries. The guidelines are intended to support the visibility, recognition and enhancement of the already important role of small-scale fisheries and to contribute to global and national efforts towards the eradication of hunger and poverty. Hence the guidelines provide a tool for mainstreaming inland fisheries (which are largely small scale) into international instruments and processes regarding hunger and poverty. The guidelines support responsible fisheries and sustainable social and economic development for the benefit of current and future generations; they have an emphasis on small-scale fishers and fishworkers, related activities and also address vulnerable and marginalized people, promoting a human rights-based approach.

4.4 Integrated water resources management

Integrated Water Resources Management (IWRM) is defined as: “a process which promotes the coordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems” (Global Water Partnership, 2000). As of 2012, 80 percent of countries had embarked on reforms to improve the enabling environment for water resources management based on the application of integrated approaches as stated in Agenda 21 and affirmed in the Johannesburg Plan of Implementation in 1992 (United Nations Environment Programme [UNEP], 2012). SDG Goal 6, Target 6.5, refers specifically to IWRM (“by 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate”).

Inland fisheries can be a major benefit provided by water resources but they are also very sensitive to changes in them. IWRM is one area of focus of water resources policy and management interests and hence a potential tool to integrate inland fisheries into relevant international instruments and processes dealing more explicitly with water. Unfortunately, the level of inclusion of inland fisheries in IWRM in practice is variable. They are rarely a priority and often invisible. Inland fisheries specialists should continue to achieve better integration of fisheries into IWRM, which would hopefully lead to better incorporation of them in relevant instruments using IWRM as a goal or planning tool.

4.5 Sustainable land management

Sustainable land management (SLM) is “the use of land resources, including soils, water, animals and plants, for the production of goods to meet changing human needs, while simultaneously ensuring the long-term productive potential of these resources and the maintenance of their environmental functions”

(UN Earth Summit, 1992). Put simply, it is the land equivalent of IWRM. Although linkages between water and inland fisheries are more obvious, there are nevertheless strong influences of land on inland fisheries. For example, land management has a major influence on water resources, and hence inland fisheries, and land conversion (e.g. wetlands) can directly impact habitats upon which fisheries depend.

SLM is considered an imperative for sustainable development and plays a key role in harmonizing the complementary, yet historically conflicting goals of production and environmental stewardship. This cross-sectoral approach to land resource management aims at enhancing the productivity and sustainability of land resource use across all production systems through improved governance, management and planning (FAO, 2014). It encompasses protection, conservation and sustainable use and restoration or rehabilitation of degraded resources and can be applied at a range of scales from local to catchment and national/transboundary levels. In principle, SLM can be important for supporting inland fisheries, particularly in a catchment context. However, in terms of IWRM, the inclusion of inland fisheries in SLM varies between users and organizations. For example, the *Sustainable Land Management Sourcebook* (World Bank, 2008) only recognizes links with coastal fisheries and ignores inland fisheries. For IWRM, inland fisheries specialists should continue to achieve better integration of fisheries into SLM, which would, hopefully, lead to better incorporation of them in relevant instruments using SLM as a goal or planning tool.

4.6 Environmental flows (eFlows)

Inland fisheries are highly sensitive to, and dependent on, the flows of water through catchments, from hill streams through lowlands and into estuaries, including lakes, wetlands, reservoirs and floodplains along the way. An environmental flow, or eFlow, is an assessment tool to calculate a specific flow regime in a river that is capable of sustaining a complex set of aquatic habitats and ecosystem processes. Estimates of eFlow requirements are being explicitly integrated into Indicator 2 for SDG Target 6.4 to generate national datasets for monitoring water stress (FAO, 2019b). The provision of environmental flows supports the achievement of other water-related goals and targets, such as those addressing food security and nutrition from fisheries and flood recession agriculture, and human health (Arthington *et al.*, 2018; Vörösmarty *et al.*, 2018).

There are similar but not necessarily identical concepts including “in-stream flow” needs, “ecological reserves”, “ecological demand” of water, “environmental water allocation” (or requirement), “compensation flow” or “minimum flow”. Most are used to calculate the amount of water, and its timing, to be allocated to or left in rivers to achieve a minimum level of environmental sustainability and ecological functionality; however now they are increasingly being used to undertake economic valuations and assess trade-offs (Poff, Tharme and Arthington, 2017). Interdisciplinary bridges between the ecohydrological and social sciences have enabled better integration of the multiple values of water (Jackson, 2017; Arthington *et al.*, 2018). The issues are not always just flow volume and area of habitat affected; for example, in many estuaries reduced fisheries production has been attributed to altered freshwater inflow, especially those dominated by rivers; the timing of flows and even the olfactory characteristics of the water can be critical to sustaining fish stocks and there are established methods for teasing out such relationships in order to inform e-Flow decision-making (Adams, 2012).

In practice, eFlows usually form a component of broader integrated water and land management approaches. However, eFlows can be applied quite narrowly, due to their origin, in sustaining or restoring the environment or biodiversity. These are different criteria to sustaining or restoring fisheries that relate not only to maintaining ecology, but also to overall productivity and the sustainability of fish stocks to support fisheries. Recently, eFlows have advanced by taking into account ecosystem services, but this is not universally applied yet. Coates (forthcoming) provides further information and case studies using eFlows, noting, for example, reservations about the relevance of “environmental reserves” for allocating overall benefits in a river basin and that managing environmental factors and ecosystem services provision, such as those from fisheries, are not the same. As for the other above-mentioned tools, inland fisheries specialists should continue to pursue better integration of fisheries into eFlow applications, which would hopefully lead to better incorporation of them in relevant instruments, frameworks or processes using

eFlows as a goal or planning tool. This requires quite detailed information on ecosystem service benefits provided by inland fisheries and their dependencies on hydrology.

5. INTERLINKAGES WITH INTERNATIONAL INSTRUMENTS, FRAMEWORKS AND PROCESSES

The following international instruments, frameworks and processes were assessed regarding interlinkages with, and opportunities for inland fisheries. This is not an exhaustive list, but covers those thought most relevant, or potentially relevant, to inland fisheries.

Each instrument, framework and process was reviewed and analysed with regard to its overall mandate, defined mechanisms, such as decisions, plans or resolutions, and specific relevance to inland fisheries. A commentary has been provided to highlight issues of convergence regarding the EAF and also to highlight initial considerations for potential synergies, even where these are not being realized.

The relevance to inland fisheries has been assessed on a relative scale using three broad criteria:

- High – there is direct consideration of inland fisheries and synergies are being realized or there is a high potential for realization.
- Moderate – there are indirect linkages with, or poorly realized consideration of inland fisheries and issues/activities that affect the fish resource, with modest scope for improving recognition.
- Low – limited or no consideration of inland fisheries; linkages are not made among issues/activities that affect the fish resource.

5.1 International conventions, treaties and frameworks

A variety of intergovernmental conventions and treaties have been established that consider the sustainable use of natural resources. Few of these international instruments and mechanisms make explicit reference to inland fisheries. However, many provide implicit links with inland fisheries or to issues that affect the fish resource, such as water pollution, habitat loss or conversion, or biodiversity conservation.

The global intergovernmental instruments, processes and mechanisms that were reviewed and analysed are listed below with their online sources. They are detailed in Tables 2 to 20.

- Antarctic Treaty 1959. www.bas.ac.uk/about/antarctica/the-antarctic-treaty/the-antarctic-treaty-1959 (Table 2).
- Ramsar Convention on Wetlands 1971. www.ramsar.org (Table 3).
- UNESCO Man and the Biosphere Programme 1971 (MAB). <https://en.unesco.org/mab>; *Convention concerning the Protection of the World Cultural and Natural Heritage 1972*. <https://whc.unesco.org/en/conventiontext> (Table 4).
- Convention on International Trade of Endangered Species of Wild Flora and Fauna 1973 (CITES). <https://cites.org> (Table 5).
- Convention on the Conservation of Migratory Species of Wild Animals 1979 (CMS). www.cms.int (Table 6).
- UN Convention on the Law of the Sea 1982. www.un.org/depts/los/convention_agreements/texts/unclos/unclos_e.pdf (Table 7).

- Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal 1989. www.basel.int/TheConvention/Overview/tabid/1271/Default.aspx (Table 8).
- UN Convention on Biological Diversity 1992 (CBD). www.cbd.int (Table 9).
- Helsinki Convention on the Protection and Use of Transboundary Watercourses 1992. <https://unece.org/environment-policy/water/about-the-convention/introduction> (Table 10).
- UN Convention to Combat Desertification (UNCCD) 1994. www.unccd.int (Table 11).
- UN Framework Convention on Climate Change (UNFCCC) 1994. https://unfccc.int/files/essential_background/background_publications_htmlpdf/application/pdf/conveng.pdf (Table 12).
- UNEP Global Programme of Action for the Protection of the Marine Environment from Land-based Activities (GPA) 1995. www.unenvironment.org/explore-topics/oceans-seas/what-we-do/addressing-land-based-pollution/governing-global-programme (Table 13).
- UN Convention on the Law of the Non-navigational Uses of International Watercourses 1997. https://legal.un.org/ilc/texts/instruments/english/conventions/8_3_1997.pdf (Table 14).
- Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade 1998. https://treaties.un.org/pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XXVII-14&chapter=27 (Table 15).
- Stockholm Convention on Persistent Organic Pollutants (POPS) 2001. https://treaties.un.org/pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XXVII-15&chapter=27 (Table 16).
- Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) 2012. www.ipbes.net (Table 17).
- The 2030 Agenda for Sustainable Development and Sustainable Development Goals (SDGs) 2015. <https://sdgs.un.org> (Table 18).
- Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests 2019. www.fao.org/3/i2801e/i2801e.pdf (Table 19).
- The Global Environment Facility (GEF). <https://www.thegef.org> (Table 20).

Table 2. Antarctic Treaty, 1959

Instrument or mechanism (resolution, decision, etc.)	Relevance to inland fisheries	Commentary
<p>Mandate: To ensure "in the interest of all mankind that Antarctica shall continue for ever to be used exclusively for peaceful purposes and shall not become the scene or object of international discord."</p> <p>Several conventions and agreements have been concluded under the aegis of the Antarctic Treaty, including:</p> <ul style="list-style-type: none"> • Agreed Measures for the Conservation of Antarctic Fauna and Flora; • The Convention for the Conservation of Antarctic Seals; • The Convention for the Conservation of Antarctic Marine Living Resources (CCAMLR); and • The Protocol on Environmental Protection to the Antarctic Treaty. 	None	<p>Includes protection of terrestrial, including wetland ecosystems.</p> <p>No known inland fisheries or aquaculture in Antarctica.</p>

Table 3. Ramsar Convention on Wetlands, 1971

Instrument or mechanism (resolution, decision, etc.)	Relevance to inland fisheries	Commentary
<p>Mandate: Conservation and wise use of all wetlands (inland and coastal; natural and human-induced). Desires to “stem the loss and degradation of wetlands now and in the future.”</p> <p>Mission: Conservation and wise use of all wetlands through local and national actions and international cooperation, as a contribution towards achieving sustainable development throughout the world.</p> <p>To achieve this mission it is essential that the vital ecosystem services, and especially those related to water and those that wetlands provide to people and nature through their natural infrastructure, are fully recognized, maintained, restored and wisely used.</p> <p>Delivered through three “implementation pillars”: (i) wise use of all wetlands; (ii) designation and management of Wetlands of International Importance (Ramsar Sites); and (iii) international cooperation (Ramsar Strategic Plan 2009–2015. Resolution X.1).</p>	High	Clear opportunities for further engagement around the EAI FM.
<p>Ramsar Strategic Plan 2015–2024 (Resolution XII.2)</p> <p>Vision: “Wetlands are conserved, wisely used, restored and their benefits are recognized and valued by all.”</p>	High	Since all inland fish, and fisheries, depend on wetlands, all implementation of the Ramsar Convention concerning inland wetlands is highly relevant to, and contributes to, the maintenance of inland fisheries.

Instrument or mechanism (resolution, decision, etc.)	Relevance to inland fisheries	Commentary
<p>Strategic Plan Goal 1: Addressing the Drivers of Wetland Loss and Degradation</p> <p>Target 1: Wetland benefits are featured in national/local policy strategies and plans relating to key sectors such as water, energy, mining, agriculture, tourism, urban development, infrastructure, industry, forestry, aquaculture and fisheries at the national/local level.</p>	High	<p>Fisheries specifically mentioned. And in the context of addressing drivers of loss.</p> <p>Since the terms of Goal 1 and Target 1 are very broad, it is impossible to determine, in their National Reports to COP, the extent to which Ramsar Parties are implementing this strategy in relation to inland fisheries. No National Report indicator under this strategy is specific to inland fisheries. Consideration, in discussion with the Ramsar Secretariat, might be given to proposing a more specific “sustainable fisheries” indicator, specifically in relation to the terms of Resolution IX.4, for future cycles of Ramsar National Reporting.</p> <p>Currently the indicator “% of Parties that have made assessment of ecosystem services of Ramsar Sites. (Data source: National Reports)” is used to assess progress towards this target. FAO could work with Ramsar on assisting national governments to generate information for this indicator regarding inland fisheries (an ecosystem service).</p>
<p>Wetlands of International Importance (Ramsar Sites): Strategic Framework and guidelines for the future development of the List of Wetlands of International Importance of the Convention on Wetlands (Ramsar, Islamic Republic of Iran, 1971) – 2012 revision (COP11 Resolution XI.8 Annex 2).</p>	High	<p>Broadly speaking, the 2 186 Ramsar Sites covering 208.5 million ha (as of November 2014) are the largest global network of protected areas; 1 155 (153 million ha) are inland wetlands.</p> <p>To qualify for designation (by a Ramsar Contracting Party) a wetland must meet one or more of nine (largely biodiversity-based) criteria. Two of the criteria specifically concern fish (Criteria 7 & 8). Other criteria are relevant to, or can include, fish (i.e. criteria 2, 3, 4 and 9).</p> <p>See A–C below.</p>

Instrument or mechanism (resolution, decision, etc.)	Relevance to inland fisheries	Commentary
<p>A. Designation Criteria directly concerning fish:</p> <p>Criterion 7: A wetland should be considered internationally important if it supports a significant proportion of indigenous fish subspecies, species or families, life history stages, species interactions and/or populations that are representative of wetland benefits and/or values and thereby contribute to global biological diversity.</p> <p>Criterion 8: A wetland should be considered internationally important if it is an important source of food for fish, a spawning ground, nursery and/or migration path on which fish stocks, either within the wetland or elsewhere, depend.</p>	High	<p>Many Ramsar Sites designated under Criteria 7 & 8 will, directly or indirectly, maintain wetlands important for inland fisheries.</p> <p>Of the 1 155 inland Ramsar Sites, 188 (71 million ha) have been designated under criterion 7 and 227 (72 million ha) under criterion 8; 115 Ramsar Sites covering 52 million ha have been designated under both criteria. It is highly likely that other inland Ramsar Sites may qualify under these criteria, but these have not yet been designated due to lack of relevant knowledge/information.</p>
<p>B. Human-induced wetlands – aquaculture ponds (Ramsar wetland classification: wetland type 1: Aquaculture (e.g. fish/shrimp) ponds.</p>	High	<p>22 Ramsar Sites (866 000 ha) include aquaculture ponds. For some this is the main wetland type in the Site; others include aquaculture ponds within the designated area.</p> <p>Nearly half (13) are in Eastern Europe – mostly traditionally managed fishponds. Elsewhere, there are two in North Africa, three in Central America and four in South and East Asia.</p> <p>In addition, 32 Ramsar Sites are, or include, “irrigated land” including rice fields. Some may support “rice–fish” cultures.</p> <p>Note that such human-induced wetlands included in the Ramsar List have been designated for other aspects of their international importance other than the human-induced wetland habitats, since Ramsar Criterion 1 can be applied only to “natural” wetland types.</p>

Instrument or mechanism (resolution, decision, etc.)	Relevance to inland fisheries	Commentary
<p>C. Ramsar Sites recognized as supporting inland fisheries/aquaculture</p>	<p>High</p>	<p>A considerable number of inland Ramsar Sites have been recognized in their Ramsar Information Sheets (RIS) as supporting capture fisheries and/or aquaculture. However, following recent redevelopment of the Ramsar Sites Information Service (RSIS), it is not currently possible to identify and report on these Ramsar Sites. This information will be sought subsequently.</p> <p>A review of all Ramsar Sites directly supporting inland capture fisheries and/or aquaculture could be the basis of an information paper aimed at raising the profile of the importance of Ramsar Sites for inland fisheries.</p> <p>As the requirement for such Sites is to “maintain their ecological character” it could be presumed that all such fisheries will (or should be) operating at sustainable levels. If some are indicated as being overexploited (unsustainable), advice to wetland managers on how to improve the management of such fisheries could be valuable.</p>
<p>The Ramsar Convention and conservation, production and sustainable use of fisheries resources COP9 Resolution IX.4, 2005</p>	<p>High</p>	<p>Implementation by governments of this resolution directly concerns sustainable inland fisheries.</p> <p>This is the only decision taken by Ramsar Contracting Parties that focuses on the Convention’s role in relation to fisheries. It covers both inland and coastal/nearshore marine fishery issues in relation to wise use and sustainability.</p> <p><i>It inter alia:</i></p> <ul style="list-style-type: none"> • Recognizes the 1995 FAO Code of Conduct for Responsible Fisheries and its associated range of technical guidelines, and that these instruments underscore the need to promote sustainable use of fisheries resources and mitigate the negative impacts of aquaculture practices; • Requests the (Ramsar) Secretary General to pursue appropriate partnerships with expert bodies or organizations such as FAO that are concerned with fisheries resources/resource

Instrument or mechanism (resolution, decision, etc.)	Relevance to inland fisheries	Commentary
		<p>conservation and sustainable use, in order for the Ramsar Convention to gain further advice and to fulfil its mandate;</p> <ul style="list-style-type: none"> • Invites relevant organizations to use the habitat and species conservation provisions of the Convention to support the introduction and/or continuance of management measures that mitigate the environmental impacts of fishing, including the use of spatial management approaches; and • Urges the Ramsar Secretariat to work with other conventions, instruments and organizations concerned with the conservation of biodiversity and the management of natural resources (including FAO at an international and regional level), in order to promote the synergy and alignment of planning and management approaches that benefit the conservation and sustainable management of fisheries resources. <p>The annex to the resolution lists 11 fishery issues (all of which are relevant to inland fisheries) and provides Recommendations to Contracting Parties on each, in relation to achieving the wise use of wetlands:</p> <ol style="list-style-type: none"> 1. Aquaculture; 2. rice cultivation (specifically rice–fish systems); 3. management of fisheries; 4. management of the fisheries resources (specifically invasive alien species); 5. sustainable management of wetland ecosystems for fisheries (specifically water management and environmental flows); 6. conflicts and multipurpose use; 7. increasing awareness of the importance of wetland management for fisheries; 8. enhancing international cooperation;

Instrument or mechanism (resolution, decision, etc.)	Relevance to inland fisheries	Commentary
		<p>9. applying existing international agreements (specifically the FAO Code of Conduct for Responsible Fisheries and its technical guidelines);</p> <p>10. the status of fisheries in Ramsar Sites (calling for systematic collection and reporting of fisheries data from Ramsar Sites);</p> <p>11. coverage of the Ramsar Site network for fish (recognizing the need to designate more Sites under Criteria 7 & 8 (see above).</p> <p>However, the extent to which the terms of the resolution have been implemented by Ramsar Contracting Parties in the sixteen years since 2005 remains opaque. No reporting on this specific resolution has been required or requested from Contracting Parties.</p> <p>This resolution provides the major potential entry point for FAO to engage more with Ramsar on inland fisheries issues. No subsequent Ramsar resolutions have substantively addressed wetlands and fisheries.</p> <p>There is a need to review the actions called for in the resolution in relation to inland fisheries.</p> <p>Also, to identify opportunities for FAO to support its implementation through its local, national (with governments) and global activities.</p> <p>Consideration might be given to conducting an implementation progress review and needs assessment with Ramsar Contracting Parties to identify priorities for future implementation support.</p>

Table 4. UNESCO Convention concerning the Protection of the World Cultural and Natural Heritage (World Heritage Convention), 1972

Mandate/mission	Relevance to inland fisheries	Commentary
<p>Mission:</p> <ul style="list-style-type: none"> • encourage countries to sign the World Heritage Convention and to ensure the protection of their natural and cultural heritages; • encourage State Parties to the Convention to nominate sites within their national territories for inclusion on the World Heritage List; • encourage State Parties to establish management plans and set up reporting systems on the status of conservation of their World Heritage Sites; • help State Parties safeguard World Heritage properties by providing technical assistance and professional training; • provide emergency assistance for World Heritage Sites in immediate danger; • support State Parties' public awareness-raising activities for World Heritage conservation; • encourage participation of local populations in the preservation of their cultural and natural heritage; and • encourage international cooperation in the conservation of global cultural and natural heritage. 	Moderate	<p>Some World Heritage Sites inscribed under the World Heritage Convention (both “natural” sites and mixed “natural/cultural” sites) are, or include, inland wetlands.</p> <p>Some of these are either partly or wholly also designated as Ramsar Sites and/or UNESCO biosphere reserves. A list of such jointly designated sites is maintained (but is currently inaccessible owing to recent redevelopment of the Ramsar Web site).</p> <p>Those inland/freshwater systems included in the World Heritage list receive considerable added public profile and attention. Some inland wetlands are, or have been, placed on the list of World Heritage Sites in Danger.</p> <p>No analysis has yet been done of which World Heritage Sites support inland fisheries. But some undoubtedly are of considerable inland fisheries importance, e.g. the Okavango Delta (Botswana), the Pantanal (Brazil), the Rift Valley lakes (Kenya), Lake Malawi (Malawi), the Danube Delta (Romania), Lake Baikal (Russian Federation), Lake Issyk Kul (Kyrgyzstan) and Doñana (Spain).</p> <p>An assessment of which World Heritage Sites support inland fisheries, and advice on their sustainability, could provide the basis for enhancing FAO engagement with World Heritage Convention processes.</p> <p>If any of these are also on the list of Sites in Danger, there is potential for FAO to contribute to any expert advisory missions to such Sites.</p>

Mandate/mission	Relevance to inland fisheries	Commentary
<p>Mandate: To establish a scientific basis for the improvement of relationships between people and their environments. It proposes interdisciplinary research, demonstration and training in natural resources management.</p> <p>Its World Network of Biosphere Reserves currently numbers 631 biosphere reserves in 119 countries worldwide.</p> <p>By focusing on sites internationally recognized within the World Network of Biosphere Reserves¹, the MAB programme strives to:</p> <ul style="list-style-type: none"> • identify and assess the changes in the biosphere resulting from human and natural activities and the effects of these changes on humans and the environment, in particular in the context of climate change; • study and compare the dynamic interrelationships between natural/near-natural ecosystems and socio-economic processes, in particular in the context of accelerated loss of biological and cultural diversity with unexpected consequences that impact the ability of ecosystems to continue to provide services critical for human well-being; • ensure basic human welfare and a liveable environment in the context of rapid urbanization and energy consumption as drivers of environmental change; and • promote the exchange and transfer of knowledge on environmental problems and solutions, and to foster environmental education for sustainable development. 	<p>Moderate</p>	<p>As biosphere reserves focus on the interactions between the natural environment and socio-economic issues, inland wetland biosphere reserves that support fisheries/aquaculture could provide a valuable suite of case studies in relation to how their management addresses inland fisheries.</p> <p>A joint list of wetlands which are biosphere reserves and are wholly or partially Ramsar Wetlands is maintained, and those which are inland wetlands could be the focus of any assessment of inland fisheries in relation to biosphere reserves. The current list comprises 142 biosphere reserves which include 162 Ramsar Sites (note that this list covers both inland and coastal wetlands)².</p> <p>Ramsar works closely with the MAB programme under the terms of a joint programme of work first agreed in 2002.</p> <p>Priority: medium/high.</p> <p>See commentary for suggestion on the next step for awareness-raising.</p>

Note: 1: www.unesco.org/new/en/natural-sciences/environment/ecological-sciences/biosphere-reserves/world-network-wnbr/ 2: <https://wli.wwt.org.uk/wp-content/uploads/2020/12/Sites-with-overlapping-Ramsar-and-UNESCO-designations.pdf>

Table 5. Convention on International Trade of Endangered Species of Wild Flora and Fauna (CITES), 1973

Instrument or mechanism (resolution, decision, etc.)	Relevance to inland fisheries	Commentary
<p>Mandate: CITES aims to ensure that international trade in specimens of wild animals and plants does not threaten their survival.</p> <p>CITES Strategic Vision 2008–2020 has three goals:</p> <p>Goal 1: Ensure compliance with and implementation and enforcement of the Convention.</p> <p>Goal 2: Secure the necessary financial resources and means for the operation and implementation of the Convention.</p> <p>Goal 3: Contribute to significantly reducing the rate of biodiversity loss and to achieving relevant globally agreed goals and targets by ensuring that CITES and other multilateral instruments and processes are coherent and mutually supportive.</p> <p>Its Vision is:</p> <p>“Conserve biodiversity and contribute to its sustainable use by ensuring that no species of wild fauna or flora becomes or remains subject to unsustainable exploitation through international trade, thereby contributing to the significant reduction of the rate of biodiversity loss and making a significant contribution towards achieving the relevant <i>Aichi Biodiversity Targets</i>.”</p>	<p>Moderate</p>	<p>Under CITES, any inland fishery which a) involves endangered fish species and b) exports their capture internationally should not be operating at unsustainable levels.</p> <p>A CITES-listed species database¹ hosted by UNEP-WCMC and a Checklist of CITES species² are available online. They could form the basis for assessment of which inland fish species are covered by CITES and the sustainability of their trade.</p> <p>Although there are some species of inland fish that are endangered by international trade, including some species in the ornamental trade, this is not a significant area of concern overall (although it can be for individual species). There are more threats through trade in endangered inland fish species at the national level, but this is not covered by CITES.</p>

Instrument or mechanism (resolution, decision, etc.)	Relevance to inland fisheries	Commentary
<p>CITES Appendices: CITES maintains three Appendices, with species included in each according to how threatened they are by international trade.</p>	High	<p>None of the species listed in CITES Appendices should be captured and exported at unsustainable levels.</p> <p>There is considerable similarity in the lists of inland fish species in CITES Appendices and Convention on Migratory Species (CMS) Appendices, but CITES lists a wider range of such species.</p>
<p>Of the fish species (or species groups) included in CITES Appendices I and II (no fish are currently listed under Appendix III) about 50 percent are freshwater or diadromous species including sturgeons and paddlefish, freshwater eels, pangasiid catfish, arapaimas, bonytongues (Osteoglossidae), armoured catfishes (Loricariidae) some carps (Cyprinidae), freshwater stingrays and Queensland lungfish.</p>	High	<p>CITES Secretariat has a 2002 Memorandum of Understanding with the CMS Secretariat; a CMS/CITES Joint Work Programme was conducted from 2012 to 2014, with joint activities for shared species with a focus, <i>inter alia</i>, on sturgeons.</p> <p>As for CMS Appendices, the reason for the absence of salmonids from CITES Appendices is unclear, because a number of such species are listed in the IUCN Red List as globally threatened and may be subject to capture fisheries and export.</p> <p>There is the potential to explore with the CITES Secretariat the possibility of preparing an analysis of the extent of international trade derived from inland capture fisheries and inland aquaculture for the fish species listed on CITES Appendices.</p>

Note: 1: www.speciesplus.net 2: <http://checklist.cites.org/>

Table 6. Convention on Migratory Species (CMS), 1979

Instrument or mechanism (resolution, decision, etc.)	Relevance to inland fisheries	Commentary
<p>Mandate: The CMS mandate covers the conservation of all taxa of species which are regarded as migratory, under a geopolitical definition of “migratory” species which habitually cross national boundaries on a regular and predictable basis: “Migratory species” means the entire population or any geographically separate part of the population of any species or lower taxon of wild animals, a significant proportion of whose members cyclically and predictably cross one or more national jurisdictional boundaries” (CMS text Article 1.1 a).</p> <p>The CMS adopted a new Strategic Plan for Migratory Species 2015–2023, aligned with the Aichi Targets for Biodiversity (see Table 9 for the CBD), at COP11 (Ecuador) in November 2014.</p> <p>Mission: The conservation and sustainable use of migratory animals and their habitats.</p>	<p>Moderate</p>	<p>The CMS is to some extent a “framework” convention. One strength is that it provides a flexible mechanism for establishing more specific agreements and memoranda of cooperation on taxonomic and/or geographical groups of migratory species listed in its Appendices. Such agreements are between “range states” which do not have to be signatories to the CMS itself, and become independent multilateral environmental agreements (MEAs) once in force.</p> <p>Migratory fish species are covered under the CMS mandate. While it covers species recognized as anadromous or catadromous, under its geopolitical definition of “migratory”, some other fish species might be included.</p> <p>Migratory fish, and fisheries, have however received very little attention to date under the CMS. None of its current agreements, memoranda or species action plans cover fish species, and relative to other vertebrate taxa only a few fish species are included in its Appendices. More attention to date has been given to marine elasmobranchs (sharks and rays).</p> <p>FAO has entered into joint work with the CMS, usually through memoranda of understanding on specific species or stocks – such as the Memorandum of Understanding on the Conservation of Migratory Sharks.</p> <p>The CMS remains a potentially important partner on specific species or stocks but is ranked “moderate” in importance here because addressing migratory fish is a small part of inland fisheries management needs (although it can be important locally and for some species).</p>

Instrument or mechanism (resolution, decision, etc.)	Relevance to inland fisheries	Commentary
<p>CMS Appendix 1: Lists five fish species (including elasmobranchs), two of which occur inland: The Mekong giant catfish <i>Pangasianodon gigas</i> (inland freshwaters); and The common sturgeon <i>Acipenser sturio</i> (anadromous, breeds in rivers).</p>	Moderate	<p>Covers species that are threatened with extinction. Both species support inland capture fisheries and, in the case of sturgeon, aquaculture.</p>
<p>CMS Appendix 2: Lists 27 fish species (including elasmobranchs), 16 of which occur inland: 15 sturgeon species (Acipenseridae) and the related Chinese paddlefish (<i>Psephurus gladius</i>).</p>	High	<p>Covers species that need or would benefit from international cooperative conservation efforts. Many of these species support inland capture fisheries and/or aquaculture. There might be merit in exploring whether there is interest in the CMS family for developing a memorandum on sturgeon species. Notably missing from the CMS Appendices are salmonids, many of which are highly migratory, and many other fish species in tropical rivers that migrate across international borders and support inland fisheries.</p>

Table 7. UN Convention on the Law of the Sea, 1982

Instrument or mechanism (resolution, decision, etc.)	Relevance to inland fisheries	Commentary
<p>Mandate: The Law of the Sea Treaty, formally known as the Third United Nations Convention on the Law of the Sea, or UNCLOS III, was adopted in 1982. Its purpose is to establish a comprehensive set of rules governing the oceans and to replace UNCLOS I and UNCLOS II from respectively 1958 and 1960.</p>	Low	<p>No direct relevance, possible indirect for anadromous and catadromous fish species.</p>
<p>The 1995 UN Agreement on Straddling and Highly Migratory Fish Stocks (UNCLOS): Sets out principles for the conservation and management of these fish stocks and establishes that such management must be based on the precautionary approach and the best available scientific information.</p> <p>The agreement elaborates on the fundamental principle established in the Convention that states should cooperate to ensure conservation and promote the objective of the optimum utilization of fisheries resources both within and beyond the exclusive economic zone (EEZ).</p>	Low	<p>UNCLOS and its agreements deal directly with oceans/the high seas only and not inland systems.</p> <p>However, this agreement would seem to have implications concerning the management of fish stocks of migratory fish species subject to inland fisheries, when they have migrated into marine/ocean systems. Examples would be eels and salmonids.</p> <p>No direct relevance, possible indirect relevance for anadromous and catadromous fish species.</p>

Table 8. Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, 1989

Instrument or mechanism (resolution, decision, etc.)	Relevance to inland fisheries	Commentary
<p>Mandate: To protect human health and the environment against the adverse effects of hazardous wastes.</p> <p>Its scope of application covers a wide range of wastes defined as “hazardous wastes” based on their origin and/or composition and their characteristics, as well as two types of wastes defined as “other wastes” – household waste and incinerator ash.</p>	Low	<p>Primarily concerned with impacts of hazardous wastes on people. Leachates and runoff from hazardous wastes can lead to pollution issues in inland wetlands, and hence fish and fisheries, but the magnitude of the issue is not clear.</p> <p>Low priority for any actions.</p>

Table 9. Convention on Biological Diversity (CBD), 1992

Instrument or mechanism (resolution, decision, etc.)	Specific relevance to inland fisheries	Commentary
<p>Mandate: Conservation and sustainable use of biodiversity and access to genetic resources and fair and equitable sharing of benefits from their utilization. “Biodiversity” covers genetic, species and ecosystem levels.</p>	High	The conservation and sustainable use of biodiversity should fully cover inland fisheries.
<p>Programme of work (PoW) on inland waters The PoW predates the Strategic Plan for Biodiversity 2011–2020 and Aichi Biodiversity Targets. It covers most aspects of the conservation and sustainable use of inland waters’ (aquatic) biodiversity with a focus on management of environmental pressures and sustaining the benefits of inland water ecosystems.</p>	High	Specific implications for inland fisheries are limited to ecosystem (habitat) protection and restoration and sustainable use.
“Sustainable use”	Low	<p>“Sustainable use” is a cross-cutting theme under the CBD – but as a topic has tended to be discussed largely with regard to bushmeat. Although, technically, the issues and needs are similar between bushmeat and (inland) fisheries, capture fisheries now get the most direct attention under Aichi Biodiversity Target 6.</p> <p>In addition, in many areas sustainable fisheries provide a viable and often preferred alternative to bushmeat and play an important role in reducing hunting pressures on terrestrial species.</p>
Nagoya Protocol on Access and Benefit Sharing	Low	Access and Benefit Sharing is relevant to inland capture fisheries largely with respect to wild relatives as genetic resources for species of potential use in aquaculture.

Instrument or mechanism (resolution, decision, etc.)	Specific relevance to inland fisheries	Commentary
<p>Strategic Plan for Biodiversity 2011–2020: (This plan will be superseded by the post2020 framework – see below for further details)</p> <p>Mission: “Take effective and urgent action to halt the loss of biodiversity in order to ensure that by 2020 ecosystems are resilient and continue to provide essential services, thereby securing the planet’s variety of life, and contributing to human well-being, and poverty eradication. To ensure this, pressures on biodiversity are reduced, ecosystems are restored, biological resources are sustainably used and benefits arising out of utilization of genetic resources are shared in a fair and equitable manner; adequate financial resources are provided, capacities are enhanced, biodiversity issues and values mainstreamed, appropriate policies are effectively implemented, and decision-making is based on sound science and the precautionary approach.”</p> <p>Vision: A world of “Living in harmony with nature” where “By 2050, biodiversity is valued, conserved, restored and wisely used, maintaining ecosystem services, sustaining a healthy planet and delivering benefits essential for all people”.</p>	<p>High</p>	<p>Note that the Strategic Plan for Biodiversity 2011–2020 and its Aichi Biodiversity Targets is the agreed framework for action with regard to biodiversity by all of the multilateral biodiversity-related environment agreements as well as for the UN system (adopted by the General Assembly as such).</p>

Instrument or mechanism (resolution, decision, etc.)	Specific relevance to inland fisheries	Commentary
The Aichi Biodiversity Targets		
<p>A. Specific to inland fisheries/aquaculture</p> <p>Target 6: By 2020 all fish and invertebrate stocks and aquatic plants are managed and harvested sustainably, legally and applying ecosystem-based approaches so that overfishing is avoided, recovery plans and measures are in place for all depleted species, fisheries have no significant adverse impacts on threatened species and vulnerable ecosystems and the impacts of fisheries on stocks, species and ecosystems are within safe ecological limits.</p>	High	<p>In theory Target 6 does not discriminate between categories of fisheries (marine/coastal/inland). In practice, attention to the target has been almost exclusively directed to marine fisheries (and to a lesser extent coastal counterparts).</p> <p>The wording of the target also reflects the fact that the major problem with fisheries is considered to be overexploitation. To a large extent this assumption has been applied across fisheries in general – whereas for inland fisheries the major driver of change (overall) is environmental degradation/habitat loss. And most of this degradation/loss does not originate from these fisheries.</p> <p>There has been no significant attention to inland fisheries in this target – either when it was developed and adopted or subsequently.</p> <p>The fourth edition of the Global Biodiversity Outlook (GBO-4) assessed progress towards achieving this target – based exclusively on data/information for marine fisheries.</p> <p>GBO-4 states: “Globally there is relatively little information on the management and harvest of aquatic invertebrates and plants, and there is little globally-consistent information on inland water fisheries. For these reasons, this assessment focuses mostly on marine fisheries.” In fact, it is unclear whether useful assessments can be made of trends in inland fisheries. Until a proper attempt is made this will remain uncertain.</p> <p>GBO-4, however, focuses on assessing trends which requires assessment based on indicators and data. Inland fisheries remain a relevant component of Target 6 but until information is available it will continue to be difficult to incorporate adequate attention to monitoring trends for Target 6.</p>

Instrument or mechanism (resolution, decision, etc.)	Specific relevance to inland fisheries	Commentary
<p>Target 7: By 2020 areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity.</p>	Moderate	<p>High implications for freshwater ecosystems because agriculture (land use, water use, pollution) is the key driver of ecosystem degradation/habitat loss.</p> <p>Direct relevance to inland fisheries is limited to culture-based fisheries (aquaculture) – where there is significant potential in inland waters.</p>
<p>B. Relevant to inland fisheries</p> <p>Target 1: By 2020, at the latest, people are aware of the values of biodiversity and the steps they can take to conserve and use it sustainably.</p>	High	<p>Inadequate attention to inland fisheries in policy processes (and so forth) is partly due to lack of awareness of (inland fisheries-related) biodiversity values.</p>
<p>Target 2: By 2020, at the latest, biodiversity values have been integrated into national and local development and poverty reduction strategies and planning processes and are being incorporated into national accounting, as appropriate, and reporting systems.</p>	High	<p>Inland fisheries are an important aspect of biodiversity values.</p> <p>The incorporation of inland fisheries values into national accounting and reporting systems is a major opportunity for the sector. In order to do this, most governments need guidance on how to value inland fisheries and incorporate them into national accounts – particularly in data-poor circumstances (e.g. using proxies for extent/importance of inland fisheries).</p>
<p>Target 4: By 2020, at the latest, governments, businesses and stakeholders at all levels have taken steps to achieve or have implemented plans for sustainable production and consumption and have kept the impacts of use of natural resources well within safe ecological limits.</p>	Low	<p>Important in the context of ecosystems because degradation/loss is driven indirectly by unsustainable production and consumption.</p> <p>(For fisheries, the exploitation dimension of sustainable production is covered more directly/explicitly in Target 6).</p>
<p>Target 5: By 2020, the rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero, and degradation and fragmentation are significantly reduced.</p>	High	<p>“Natural habitats” includes habitats for inland fisheries stocks.</p>

Instrument or mechanism (resolution, decision, etc.)	Specific relevance to inland fisheries	Commentary
Target 8: By 2020, pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem functions and biodiversity.	High	For example, reducing pollution impacts on freshwater ecosystems and resulting loss of inland fisheries production and biodiversity.
Target 9: By 2020, invasive alien species and pathways are identified and prioritized, priority species are controlled or eradicated, and measures are in place to manage pathways to prevent their introduction and establishment.	Moderate	Largely relevant to impacts of cultured species but covers those released to support culture-based fisheries. Although this aspect does not necessarily raise the profile of inland fisheries in policy/planning it is an important advantage for FAO due to experience with the topic and relevant databases (e.g. the Database on Introductions of Aquatic Species). Policy approaches largely covered by the Code of Conduct on Responsible Fisheries and Aquaculture.
Target 10: By 2015, the multiple anthropogenic pressures on coral reefs, and other vulnerable ecosystems impacted by climate change or ocean acidification are minimized to maintain their integrity and functioning.	Moderate	Technically this target refers to all vulnerable ecosystems which would include most wetlands (upon which inland fisheries are based). In practice – this target has so far been addressed largely, if not exclusively, with regard to coral reefs. The impacts of climate change on ecosystems upon which inland fisheries depend are not well assessed (information on relevant ecosystems is available – but there is limited assessment of the implications of this for trends in inland fisheries).
Target 11: By 2020, at least 17 percent of terrestrial and inland water, and 10 percent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well-connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes and seascapes.	High	Protected areas are important as habitat reserves for fisheries. There is also an opportunity to raise awareness of the extent to which protected areas are already in use in traditional inland fisheries management systems (in the sense of community-managed reserves and so forth).

Instrument or mechanism (resolution, decision, etc.)	Specific relevance to inland fisheries	Commentary
<p>Target 12: By 2020 the extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained.</p>	Moderate	<p>Moderate because many of the drivers of loss of threatened inland fisheries species arise from outside the fisheries sector. However, there are exceptions (mostly larger slow- growing species targeted/overexploited by certain fisheries – e.g. the Mekong giant catfish).</p> <p>For this aspect, more positively, the advantages of community-based management approaches in inland fisheries are examples of contributions to reducing the extinction of threatened species.</p>
<p>Target 13: By 2020, the genetic diversity of cultivated plants and farmed and domesticated animals and of wild relatives, including other socio-economically as well as culturally valuable species, is maintained, and strategies have been developed and implemented for minimizing genetic erosion and safeguarding of their genetic diversity.</p>	Moderate	<p>Of relevance regarding genetic resource reservoirs available under inland fishery resources (notably wild relatives).</p> <p>Some attention to this in FAO’s ongoing assessment of aquatic genetic resources under the <i>State of the world’s genetic resources for food and agriculture</i>.</p>
<p>Target 14: By 2020, ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and well-being, are restored and safeguarded, taking into account the needs of women, indigenous and local communities, and the poor and vulnerable.</p>	High	<p>The benefits of inland fisheries (such as food, nutrition, recreation) are ecosystem services. There are very strong links to health, livelihoods and well-being, the needs of women, indigenous and local communities, and the poor and the vulnerable.</p> <p>In reality, the benefits/values derived from inland fisheries are usually low compared to other service areas (notably regarding water use). Therefore, a critical need regarding inland fisheries aspects of Target 14 is to look at mutually reinforcing benefits across other ecosystem service areas. For example, a primary reason to restore wetlands is disaster risk mitigation. But such restoration efforts also benefit inland fisheries (inland fisheries as a co-benefit of restoration).</p> <p>The identification of “allies” in the pursuit of an increased profile for inland fisheries is probably one of the most important components of a strategy.</p>

Instrument or mechanism (resolution, decision, etc.)	Specific relevance to inland fisheries	Commentary
<p>Target 15: By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced through conservation and restoration, including restoration of at least 15 percent of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification.</p>	<p>Moderate</p>	<p>There are indirect links in play here. For example, how inland fisheries present a co-benefit of ecosystem approaches to climate change adaptation.</p> <p>Technically this target is a “subtarget” of Target 14 because carbon storage is an ecosystem service and it is ecosystem services that contribute to climate change mitigation and adaptation.</p> <p>Politically this target gets much attention because it is the origin of the quantified target for ecosystem restoration (Target 14 also refers to restoration).</p> <p>In practice, most attention has (so far) been given to forests.</p> <p>There are opportunities to draw links between forests and inland fisheries, notably with respect to the highly diverse and productive floodplain forest fisheries as a co-benefit of forest conservation/restoration.</p>
<p>Target 17: By 2015 each Party has developed, adopted as a policy instrument, and has commenced implementing an effective, participatory and updated national biodiversity strategy and action plan.</p>	<p>High</p>	<p>Technically, the Strategic Plan for Biodiversity 2011–2020 and Aichi Biodiversity Targets are supposed to be addressed primarily through National Biodiversity Strategies and Action Plans (NBSAPs). These policy instruments are to be developed through cross-sectoral participation and represent biodiversity strategies across all sectors and government agencies. They are, therefore, potentially powerful policy frameworks into which inland fisheries can (or should already) be mainstreamed.</p> <p>It is not clear to what the extent inland fisheries are adequately reflected in NBSAPs.</p>

Instrument or mechanism (resolution, decision, etc.)	Specific relevance to inland fisheries	Commentary
<p>Target 18: By 2020, the traditional knowledge, innovations and practices of indigenous and local communities relevant for the conservation and sustainable use of biodiversity, and their customary use of biological resources, are respected, subject to national legislation and relevant international obligations, and fully integrated and reflected in the implementation of the Convention with the full and effective participation of indigenous and local communities, at all relevant levels.</p>	High	Traditional knowledge systems (and so forth) tend to be highly advanced and often widespread in inland fisheries.
<p>Target 19: By 2020, knowledge, the science base and technologies relating to biodiversity, its values, functioning, status and trends, and the consequences of its loss, are improved, widely shared and transferred, and applied.</p>	Moderate	There are opportunities to more widely share and transfer knowledge regarding biodiversity values, function, status and trends, and consequences of their loss – e.g. inland fishery resources.
<p>The Post-2020 biodiversity framework: This will supersede the Strategic Plan for Biodiversity (2011–2020) and the Aichi Biodiversity Targets which expire in 2020. Much preparatory work has been undertaken and there is growing consensus on the form the framework might take but as yet there has been no official endorsement of its details¹. The framework will be considered at CBD COP15, in China, but this has been delayed, tentatively (at the time of writing) to the last quarter of 2021 owing to the COVID-19 pandemic.</p>	Very high	<p>FAO is already involved in the development of this framework and is an influential partner at CBD COPs.</p> <p>As noted above, inland fisheries do not have a high visibility in the current strategic plan (see, for example, comments on Aichi Biodiversity Target 6 above).</p> <p>The opportunity is to look for opportunities for inland fisheries, either directly or indirectly, to be better reflected in the post2020 framework.</p>

Note: www.cbd.int/conferences/post2020/post2020-prep-01/documents

Table 10. Helsinki Convention on the Protection and Use of Transboundary Watercourses (UNECE Water Convention), 1992

Instrument or mechanism (resolution, decision, etc.)	Relevance to inland fisheries	Commentary
<p>Mandate: Aims to strengthen national measures for the protection and ecologically sound management of transboundary surface waters and groundwaters.</p> <p>The Convention obliges Parties to prevent, control and reduce transboundary impact, use transboundary waters in a reasonable and equitable way and ensure their sustainable management. Parties bordering the same transboundary waters shall cooperate by entering into specific agreements and establishing joint bodies.</p> <p>The Convention includes provisions on monitoring, research and development, consultations, warning and alarm systems, mutual assistance, and exchange of information, as well as access to information by the public.</p>	Moderate/ low	<p>Initially negotiated as a regional instrument, the Convention was amended in 2003 to allow accession by all the United Nations member states.</p> <p>The amendments entered into force on 6 February 2013, turning the Convention into a global legal framework for transboundary water cooperation. It is expected that countries outside the Economic Commission for Europe (ECE) region will be able to join the Convention as of 2014.</p> <p>The specific implications for inland fisheries are not clear (see below) and likely to be indirect only, through wetland ecosystem maintenance.</p>
<p>Assessment of the water–food–energy–ecosystems nexus:</p> <p>Parties to the UNECE Water Convention decided on an assessment of a water–food–energy–ecosystems nexus to be carried out by the autumn of 2015. A representative set of transboundary basins in the pan-European region and beyond – based on proposals from the countries – was to be included. The assessment aimed at identifying, together with the concerned sectors and relevant stakeholders, 1) hindrances to and opportunities for additional and equitable sharing of benefits from stronger integration across sectors, and 2) practical solutions for improving security and for reconciling the different sectors’ needs. The process was designed to support ownership by the authorities, meaningful participation of various stakeholders, learning together and exchanging experience between basins.</p>	Moderate	<p>There is a need to check relevance to inland fisheries.</p> <p>Selected river basins: Alazani/Ganikh, Sava River, Isonzo/Soca, Narva, Syr Darya, Niger, Mekong and the Northwest Sahara Aquifer.</p> <p>There may be basin-scale insights into issues and trade-offs between inland fisheries and other sectors.</p>

Instrument or mechanism (resolution, decision, etc.)	Relevance to inland fisheries	Commentary
<p>Protocol on Water and Health: The main aim of the protocol is to protect human health and well-being through better water management, including the protection of water ecosystems, and by preventing, controlling and reducing water-related diseases. The protocol is the first international agreement of its kind adopted specifically to attain an adequate supply of safe drinking water and adequate sanitation for everyone, and effectively protect water used as a source of drinking water.</p>	Moderate	Focuses chiefly on disease, sanitation and safe drinking water, but recognizes the need to protect inland wetlands (“water ecosystems”) which may in turn contribute to the maintenance of fish populations and fisheries.

Table 11. Convention to Combat Desertification (UNCCD), 1994

Instrument or mechanism (resolution, decision, etc.)	Relevance to inland fisheries	Commentary
<p>Mandate/mission: The UNCCD is the sole legally binding international agreement linking environment and development to sustainable land management. The Convention addresses specifically the arid, semi-arid and dry subhumid areas, known as the drylands, where some of the most vulnerable ecosystems and peoples can be found.</p> <p>In the Ten-Year Strategy of the UNCCD (2008–2018) that was adopted in 2007, Parties to the Convention further specified their goals: "To forge a global partnership to reverse and prevent desertification/land degradation and to mitigate the effects of drought in affected areas in order to support poverty reduction and environmental sustainability."</p>	Low	<p>Since the dynamics of land, climate and biodiversity are intimately connected, the UNCCD collaborates closely with the other two Rio Conventions; the CBD and the UNFCCC to meet these complex challenges with an integrated approach and the best possible use of natural resources. There is much less collaboration with other biodiversity-related Conventions such as Ramsar, CMS or CITES, although there is a 1998 memorandum of cooperation between UNCCD and Ramsar.</p>
<p>UNCCD Strategy 2008–2018:</p> <p>Includes a Thematic Priority on: Identifying and taking action on the interlinkages between desertification, and degradation and drought; and</p> <p>key themes of biodiversity, climate change, food security, forests, gender and water.</p>	Low	<p>High relevance to freshwater ecosystems – while wetlands are crucially important everywhere, they are even more vital in drylands, for people’s food security and poverty alleviation.</p> <p>No specific mention or attention to wetlands in drylands. Food security may be taken to broadly cover inland fisheries.</p> <p>UNCCD does not seem to have paid any specific attention to inland fisheries in relation to land degradation.</p>

Table 12. Framework Convention on Climate Change (UNFCCC) 1994 (and The Paris Agreement on Climate Change)

Instrument or mechanism (resolution, decision, etc.)	Relevance to inland fisheries	Commentary
<p>Mandate: The primary focus of the UNFCCC (and the Paris Agreement) is on stabilizing greenhouse gas concentrations in the atmosphere at a level that will prevent dangerous human interference with the climate system. The Paris Agreement also addresses adaptation to climate change.</p>	<p>Low</p>	<p>The Intergovernmental Panel on Climate Change has repeatedly reported in its assessment reports that various inland wetland ecosystems are particularly vulnerable to, and are being affected by, climate change. However, the importance of the role of such wetlands in mitigating and adapting to climate change has received far less attention than that of forests.</p> <p>As much of the impacts of climate change will be, and are being, felt through alterations to the global water cycle, and adaptation is very largely about adapting to such changes in the quantity, quality and the timing (and increased unpredictability and extremes) of the movements of water around the globe, climate change is undoubtedly an issue for inland fisheries.</p> <p>However, the UNFCCC appears to have given little, if any, attention to inland fisheries. Inland fisheries would be an indirect beneficiary of adaptation measures that involve ecosystem restoration – particularly for wetlands.</p> <p>It is probably not realistic to try to mainstream inland fisheries into these agreements and activities. General awareness-raising of the importance of inland fisheries and their reliance on climate change-sensitive environments would assist.</p>

Table 13. UNEP Global Programme of Action for the Protection of the Marine Environment from Land-based Activities (GPA)

Instrument or mechanism (resolution, decision, etc.)	Relevance to inland fisheries	Commentary
<p>Mandate: The GPA is designed to be a source of conceptual and practical guidance to be drawn upon by national and/or regional authorities for devising and implementing sustained action to prevent, reduce, control and/or eliminate marine degradation from land-based activities.</p> <p>The GPA aims at preventing the degradation of the marine environment from land-based activities by facilitating the duties of states to preserve and protect the marine environment.</p> <p>The implementation of the GPA is primarily the task of governments, in close partnership with all stakeholders including local communities, public organizations, non-governmental organizations and the private sector.</p> <p>Formulation of national and regional programmes of action is a necessity for successful implementation. UNEP, as the secretariat of the GPA, and its partners will facilitate and assist governments in their tasks. Instrumental in this implementation process are the UNEP and the Regional Seas Conventions and Action Plans.</p>	<p>Moderate/ low</p>	<p>As the GPA addresses upstream–downstream linkages, its approach is relevant to inland fisheries insofar as it seeks to address a range of upstream (i.e. inland wetland) issues, but with a focus on their impact on the marine environment and so has potential relevance to, for example, anadromous and catadromous fish species.</p> <p>However, many of the activities recommended to governments by the GPA concern issues which are the subject of other more specific intergovernmental agreements (e.g. chemical pollutants; ecosystems, critical habitats and species, cf. CBD, Ramsar, CMS; and river basin management, cf. Ramsar’s suite of water-related guidance, and the two transboundary waters conventions).</p> <p>GPA contributes to several other initiatives including the Global Partnership on Nutrient Management (nitrogen and phosphorus) and the Global Wastewater Initiative.</p> <p>The extent to which the GPA is being implemented by governments is not clear.</p> <p>Low priority for action.</p>

Table 14. UN Convention on the Law of the Non-navigational Uses of International Watercourses, 1997

Instrument or mechanism (resolution, decision, etc.)	Relevance to inland fisheries	Commentary
<p>Mandate: Establishes a framework for the utilization, development, conservation, management and protection of international watercourses, while promoting their optimal and sustainable utilization for present and future generations, and accounting for the special situations and needs of developing countries.</p>	<p>Moderate</p>	<p>Adopted by the UN General Assembly in 1997 and entered into force in 2014.</p> <p>Although the Convention's main focus is on water itself, the Convention text contains several articles relating to environmental protection, including the general obligation to protect and preserve the ecosystems of international watercourses (Article 20).</p> <p>With regard to the UNECE Water Convention, any relevance to inland fisheries is likely to be only indirect, through any successful maintenance of transboundary water flows and associated wetland systems leading to maintenance of exploited fish populations.</p> <p>Specific implications for inland fisheries are not yet clear and likely to be indirect only, through wetland ecosystem maintenance.</p> <p>Not a priority for FAO inland fisheries attention – although its implementation should be monitored.</p>

Table 15. Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade, 1998

Instrument or mechanism (resolution, decision, etc.)	Relevance to inland fisheries	Commentary
<p>Objectives: To promote shared responsibility and cooperative efforts among Parties in the international trade of certain hazardous chemicals to protect human health and the environment from potential harm.</p> <p>To contribute to the environmentally sound use of these hazardous chemicals by facilitating information exchange about their characteristics, providing for a national decision-making process on their import and export and disseminating these decisions to Parties.</p> <p>The Convention covers pesticides and industrial chemicals that have been banned or severely restricted for health or environmental reasons by Parties and which have been notified by Parties for inclusion in the Prior Informed Consent (PIC) procedure.</p>	Low	<p>Since the chemicals listed in Appendix III are also those covered by the provisions of the Stockholm Convention, the Rotterdam Convention appears to work chiefly in a supportive role to that Convention.</p> <p>Low priority for any actions.</p>

Table 16. Stockholm Convention on Persistent Organic Pollutants (POPS), 2001

Instrument or mechanism (resolution, decision, etc.)	Relevance to inland fisheries	Commentary
<p>Mandate: To protect human health and the environment from chemicals that remain intact in the environment for long periods, become widely distributed geographically, accumulate in the fatty tissue of humans and wildlife, and have harmful impacts on human health or on the environment.</p> <p>Covers pesticides, industrial chemicals and by-products.</p>	<p>Moderate</p>	<p>As a number of POPS (e.g. dieldrin, endrin, polychlorinated biphenyls) are highly toxic to aquatic fauna, including fish, continued use of POPS threatens the viability of inland fish stocks and hence fisheries.</p> <p>Implementation of the Convention <i>de facto</i> reduces the risks of impact on inland fish and fisheries.</p> <p>FAO, in particular through its Plant Production and Protection Division and its regional offices, already provides support to countries to effectively implement and meet their obligations under the three chemicals conventions (Stockholm, Basel and Rotterdam).</p> <p>Moderate priority for attention. Recognition of the importance of the role of the Stockholm Convention in safeguarding the viability of inland fish and fisheries may suffice.</p>

Table 17. Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) (2012)

Instrument or mechanism (resolution, decision, etc.)	Relevance to inland fisheries	Commentary
<p>Mandate: The IPBES was established in April 2012 as an independent intergovernmental body open to all member countries of the United Nations. The members are committed to building the IPBES as the leading intergovernmental body for assessing the state of the planet's biodiversity, its ecosystems and the essential services they provide to society.</p> <p>The IPBES provides a mechanism recognized by both the scientific and policy communities to synthesize, review, assess and critically evaluate relevant information and knowledge generated worldwide by governments, academia, scientific organizations, non-governmental organizations and indigenous communities. This involves a credible group of experts in conducting assessments of such information and knowledge in a transparent way.</p> <p>The IPBES is unique in that it aims to strengthen capacity for the effective use of science in decision-making at all levels. The IPBES will also aim to address the needs of MEAs that are related to biodiversity and ecosystem services, and build on existing processes ensuring synergy and complementarities in each other's work.</p> <p>IPBES work programme</p> <p>The programme has four objectives:</p> <ol style="list-style-type: none"> 1. strengthen the capacity and knowledge foundations of the science–policy interface to implement key functions of the Platform; 	High	<p>FAO is an observer organization to the IPBES, and has contributed to its development, conceptual framework and various assessments.</p> <p>A global assessment of biodiversity and ecosystem services was published in 2019 (with regional subassessments). Fisheries are covered quite well. Inland fisheries are included but not in as much detail as marine. The need for applying the ecosystem approach is well-recognized. Relevant linkages between inland fisheries and water and land use (etc.) are recognized.</p> <p>The work plan to 2030 currently includes three priority assessments – nexus, transformative change and business and biodiversity as well as work on biodiversity and climate change. Of these the nexus assessment will be the most relevant to inland fisheries. It covers the thematic assessment of the interlinkages among biodiversity, water, food and health in the context of climate change.</p> <p>The main opportunity is to ensure that relevant inland fisheries considerations and data are incorporated into relevant assessments – particularly for the nexus. As FAO is already involved as a partner the main task for the Fisheries Division (inland fisheries subunit) will be to ensure adequate engagement within FAO's representatives in the IPBES processes, and the governments which are IPBES members and have a high degree of interest in inland fisheries.</p>

Instrument or mechanism (resolution, decision, etc.)	Relevance to inland fisheries	Commentary
<ol style="list-style-type: none"> 2. strengthen the science–policy interface on biodiversity and ecosystem services at and across subregional, regional and global levels; 3. strengthen the science–policy interface on biodiversity and ecosystem services with regard to thematic and methodological issues; and 4. communicate and evaluate Platform activities, deliverables and findings. 		

Table 18. The 2030 Agenda for Sustainable Development and Sustainable Development Goals (SDGs)

Instrument or mechanism (resolution, decision, etc.)	Relevance to inland fisheries	Commentary
<p>The 2030 Agenda for Sustainable Development (UN General Assembly Res A/Res/70/1)</p>	<p>High</p>	<p>Potentially, the overarching objectives of the SDGs, including poverty eradication, changing unsustainable and promoting sustainable patterns of consumption and production, and protecting and managing natural resources, are all directly relevant to the EAI FM. The SDGs are high profile in steering national government and UN agency policy and to some extent the activities of some organizations and the private sector.</p> <p>However, the explicit role of inland fisheries is currently poorly represented in the 17 goals of the SDGs.</p> <p>The key opportunity is to raise the profile of inland fisheries across the SDGs.</p> <p>Some specific targets of note are given below. Inland fisheries are potentially relevant to most of them.</p>
<p>Goal 2: End hunger, achieve food security and improved nutrition, and promote sustainable agriculture.</p> <p>By 2030 Goal 2 intends to double the agricultural productivity and the incomes of small-scale food producers, particularly women, indigenous peoples, family farmers, pastoralists and fishers, through, <i>inter alia</i>, secure and equal access to land, other productive resources and inputs, knowledge building, financial services, markets, and opportunities for value addition and non-farm employment.</p>	<p>Moderate</p>	<p>Direct reference to small-scale fishers as a key element in doubling food productivity.</p> <p>However, FAO could engage in a debate surrounding the nutritional and dietary benefits of inland fish to many communities.</p>

Instrument or mechanism (resolution, decision, etc.)	Relevance to inland fisheries	Commentary
<p>Goal 6: Ensure availability and sustainable management of water and sanitation for all.</p> <p>Specific relevant targets include:</p> <p>6.3 – by 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater, and increasing recycling and safe reuse by x% globally.</p> <p>6.5 – 2030 implement integrated water resources management at all levels, including through transboundary cooperation as appropriate.</p> <p>6.6 – by 2020 protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes.</p>	High	<p>Inland fisheries could benefit from the successful delivery of several Goal 6 targets, but explicit mention is either weak or missing.</p> <p>Improvements in water quality, IWRM and the restoration of water-related ecosystems could all deliver benefits to inland fisheries.</p> <p>Possible entry points for FAO in discussions include issues relating to IWRM (6.5) – which should include fisheries but currently they are usually overlooked – and the indirect benefit of ecosystem restoration (6.6), especially if consideration of inland fisheries was embedded in restoration targets.</p> <p>Condition of inland fisheries would be a potential indicator for these targets but data and assessments are currently weak.</p>
<p>Goal 14: Conserve and sustainably use oceans, seas and marine resources for sustainable development.</p>	Low	<p>Goal 14 limits itself to oceans, seas and marine resources. It specifically highlights the need to effectively regulate harvesting, and end overfishing, illegal, unreported and unregulated (IUU) fishing and destructive fishing practices; implement science-based management plans; and restore fish stocks in the shortest time feasible at least to levels that can produce maximum sustainable yields as determined by their biological characteristics. But this applies only to the marine sector.</p> <p>There is no equivalent goal for freshwater/inland ecosystems – despite their high value. This reflects an inherent bias towards marine programmes when considering aquatic resources. (Some references are made under Goal 15, below, for wetlands.)</p>

Instrument or mechanism (resolution, decision, etc.)	Relevance to inland fisheries	Commentary
<p>Goal 15: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss.</p> <p>Specific relevant targets include:</p> <p>15.1 – by 2020 ensure conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements.</p> <p>15.5 – take urgent and significant action to reduce degradation of natural habitats, halt the loss of biodiversity, and by 2020 protect and prevent the extinction of threatened species.</p> <p>15.6 – ensure fair and equitable sharing of the benefits arising from the utilization of genetic resources, and promote appropriate access to genetic resources.</p> <p>15.8 – by 2020 introduce measures to prevent the introduction and significantly reduce the impact of invasive alien species on land and water ecosystems, and control or eradicate the priority species.</p> <p>15.9 – by 2020, integrate ecosystems and biodiversity values into national and local planning, development processes and poverty reduction strategies, and accounts.</p> <p>15.a – mobilize and significantly increase from all sources financial resources to conserve and sustainably use biodiversity and ecosystems.</p>	<p style="text-align: center;">High to moderate</p>	<p>The goal itself refers to terrestrial ecosystems – but under the targets wetlands are briefly mentioned reflecting the assumption that they are “terrestrial”. Again, despite the evidence of the value of wetlands (and their services – including fish) they remain lower priority to more popular ecosystems such as forests.</p> <p>Inland fisheries could benefit from the successful delivery of several of Goal 15 targets, but explicit mention is either weak or missing.</p> <p>The explicit mention of freshwater ecosystems and their services (15.1) gives FAO a direct route into discussions relating to the protection, maintenance and enhancement of inland fisheries.</p> <p>Opportunities to increase the profile of inland fisheries also exist in taking steps to prevent the degradation and loss of biodiversity (15.5); to ensure that the fishery benefits from inland ecosystems are shared equitably (15.6); to engage in debates regarding the impact of invasive species on inland fisheries (15.8); to ensure that the value of inland fisheries are fully recognized and accounted for in national and local planning (15.9); and to ensure that adequate financial resources are available to protect and enhance inland fisheries (15.a).</p> <p>Again, data/information on inland fisheries are a potential indicator for many of these targets – but assessment methodologies and reporting are weak.</p>

Table 19. FAO Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security, 2012

Instrument or mechanism (resolution, decision, etc.)	Relevance to inland fisheries	Commentary
<p>Mandate: These guidelines were officially endorsed by the UN Committee on World Food Security on 11 May 2012.</p> <p>The guidelines promote secure tenure rights and equitable access to land, fisheries and forests as a means of eradicating hunger and poverty, supporting sustainable development and enhancing the environment.</p> <p>The guidelines serve as a reference and set out principles and internationally accepted standards for practices for the responsible governance of tenure. They provide a framework that states can use when developing their own strategies, policies, legislation, programmes and activities. They allow governments, civil society organizations, the private sector and citizens to judge whether their proposed actions and the actions of others constitute acceptable practices.</p> <p>For fisheries the guidelines cover:</p> <ul style="list-style-type: none"> • responsible tenure arrangements that are fundamental for securing the livelihoods of tens of millions of people who depend on marine and inland capture fisheries; • strengthened tenure rights and tenure arrangements, when coupled with good governance and the inclusion of the fishing industry and fishworkers' organizations, they help to ensure fisheries are exploited sustainably and benefits are shared equitably. 	High	<p>Access to resources and rights are key issues in inland fisheries.</p> <p>Although the guidelines aim at supporting primarily states, courts and government agencies, individuals and communities, civil society organizations, investors and tenure professionals, FAO should have a role in supporting their implementation.</p>

Table 20. Global Environment Facility (GEF)

Instrument or mechanism (resolution, decision, etc.)	Relevance to inland fisheries	Commentary
<p>The GEF is a partnership for international cooperation where 183 countries work together with international institutions, civil society organizations and the private sector, to address global environmental issues. The GEF serves as financial mechanism for the following conventions:</p> <ul style="list-style-type: none"> • Convention on Biological Diversity (CBD); • United Nations Framework Convention on Climate Change (UNFCCC); • Stockholm Convention on Persistent Organic Pollutants (POPs); • UN Convention to Combat Desertification (UNCCD); • Minamata Convention on Mercury; and • The GEF, although not linked formally to the Montreal Protocol on Substances That Deplete the Ozone Layer, supports implementation of the protocol in countries with economies in transition. <p>The GEF operates under six areas of work:</p> <ul style="list-style-type: none"> • biodiversity; • climate change; • chemicals and waste; • land degradation; • international waters; and • sustainable management of forests, REDD+. 	<p>Moderate</p>	<p>There are potential synergies among several of the work areas addressed by the GEF and also through the financial support mechanism to the conventions, particularly the CBD.</p> <p>The GEF has a subfocus on fisheries and promotes sustainable fishing practices and wider ecosystem stewardship on a regional level as well as through national investments that tie to regional commitments. The description of that element, however, refers only to oceans. Background information refers to fisheries being addressed under the international waters area – which could include inland waters (see below).</p> <p>The GEF has financed several projects which have both directly and indirectly contributed to the promotion and delivery of elements of the EAIFM.</p> <p>The GEF is primarily a funding mechanism and provides opportunities for FAO to work with member states to finance inland fisheries projects (including restoration). Funding opportunities are undoubtedly possible under the GEF to implement the EAIFM and to promote and raise the awareness of the importance of inland fisheries.</p> <p>Where appropriate, encourage GEF-funded projects to report on the value of inland fisheries and to communicate this information to FAO.</p> <p>There is some scope to work with the GEF Secretariat to raise awareness of the importance of inland fisheries but the most effective way to influence GEF policy is via member states.</p>

Instrument or mechanism (resolution, decision, etc.)	Relevance to inland fisheries	Commentary
<p>The GEF International Waters Focal Area Strategy includes support for the following:</p> <ul style="list-style-type: none"> • supply chain approaches for increased water efficiency and reduction of ecosystem pressures, such as through industry roundtables and interest groups; • efforts to increase water efficiency, reuse, and reduce point and non-point sources of pollution addressing both primary and emerging pollutants, along the source-to-sea continuum; • De-risk innovation in development through incremental finance and piloting of innovative technologies, e.g. for scalable water reuse, water efficiency and water pollution abatements, technologies and regulations; • Nature-based approaches to improve infiltration, avoid sedimentation and erosion through integrated watershed management and sustainable land management; • Protect and rehabilitate aquatic ecosystems, especially wetland areas, river banks, mangroves and other key habitats with multiple ecosystem services; • Establish minimum environmental flows to maintain healthy ecosystems and aquatic biodiversity; • Sustain freshwater fisheries and aquaculture via improved management strategies and policy formulation processes, including measures for prevention of IUU; and • Support fragile and/or conflict-affected countries, via a country-based pilot to fully engage in the transboundary process. 	<p>Moderate</p>	

5.2 International organizations and initiatives

5.2.1. Higher priority areas

The United Nations Decade on Ecosystem Restoration (2021–2030): The United Nations General Assembly has proclaimed 2021–2030 as the Decade on Ecosystem Restoration, following a proposal for action by over 70 countries from all latitudes. The UN Decade positions the restoration of ecosystems as a major nature-based solution towards meeting a wide range of global development goals and national priorities. The Decade arises from UN General Assembly Resolution A/RES/73/284. This explicitly mentions critical inland fisheries habitats, notably wetlands. The objective is to restore or sustain ecosystem services for the benefit of people and “biodiversity conservation” is seen as part of this process; that is, it is focused on restoring the sustainable use of ecosystems. It explicitly recognizes that the Decade will be a significant contribution to the 2030 Agenda for Sustainable Development and Sustainable Development Goals. UNEP and FAO are to lead the implementation of the Decade, in collaboration with the secretariats of the Rio conventions, other relevant MEAs and entities of the United Nations system.

As the Decade is just starting the action it leverages remains to be seen. But there are indications that the subject area of restoration is already receiving increased attention by member states. It is also anticipated that significant funding may be redirected towards restoration efforts. This will likely include significant amounts arising from the Paris Agreement on Climate Change, largely for ecosystem-based mitigation efforts but also for climate change adaptation. Climate funds are already emerging as major sources of potential finance. The Green Climate Fund, for example, is already among the largest sources of finance with the first replenishment period starting in 2020 (GCF-1); by mid-November 2019, USD 9.78 billion had been pledged by 28 countries and further contributions are expected over the course of GCF-1 (from 2020 to 2023) (see <https://climatefundupdate.org>).

Any ecosystem restoration efforts, whether on land or in aquatic systems, will likely lead to potential improvements in inland fisheries through improved water resource outcomes. Under climate-related funding it will be challenging to secure funding specifically for inland fisheries, but inland fisheries can be promoted, and are a stakeholder, as a co-benefit of any related ecosystem restoration efforts.

Ecosystem restoration will nearly always deliver multiple benefits. But there are two basic opportunities:

(i) Promote inland fisheries as an important co-benefit of broader ecosystem restoration efforts; this will not only increase the justification for restoration but also enable inland fisheries outcomes to be properly integrated into these efforts; and (ii) promote ecosystem restoration efforts that primarily focus on restoring inland fisheries as a major outcome.

The first is by far the major opportunity in terms of potential influence on outcomes and financing for inland fisheries. But the second can be important where justification and interest from financing exist.

Coates (forthcoming) provides an overview of ecosystem restoration and inland fisheries giving further background information.

Assessment of relevance to inland fisheries and opportunities:	Very high
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The water–energy–food (WEF) nexus: This is not a separate coherent forum as such, more of a common theme being adopted in other fora. This theme recognizes that the water, food and energy sectors are inextricably linked. The theme has been the basis of discussion in many conferences and meetings, particularly since 2010. It is gaining profile as a platform for discussion in the political arena, and has been clearly identified within financing mechanisms (e.g. the GEF). Examples of agencies that have adopted the topic as a framework include the International Institute for Sustainable Development (http://www.iisd.org/pdf/2013/wef_nexus_2013.pdf) and Stockholm Environment Institute (<http://www.sei-international.org/rio20/water-land-energy-nexus>). FAO itself has introduced the

framework (e.g. www.fao.org/3/a-bl496e.pdf). Recently, in some fora, it has been expanded to include climate. Although given scant mention, it is actually ecosystems that generate some of the key linkages (nexus points).

The topic received a boost in attention in the lead up to, and during, the UN Conference on Sustainable Development (Rio+20). Attention to it is being maintained although there is political resistance in some member states as it adds confusion to terminology around what might be considered a re-branding of previously well-known and discussed linkages. Nevertheless, the topic remains high profile. A number of governments such as Germany are keen on the topic as well as the European Union.

This review has been unable to find any significant attention to inland fisheries in any of these WEF nexus fora. This includes FAO; for instance, an overview document explaining FAO's approach (www.fao.org/3/a-bl496e.pdf) mentions the existence of fisheries incidentally, but does not include them in any significant way in the scope of its approach which is termed "... A new approach in support of food security and *sustainable agriculture*." The topic of such nexus fora is "food". Limiting this to agriculture reflects the lack of awareness of the importance of inland fisheries to food security and the significant linkages between that and water use.

The main opportunity is for FAO's Fisheries Division to engage with these various WEF forums to raise awareness that fisheries need to be better included. This would include both inland fisheries and coastal fisheries that can also be impacted significantly by water use. The obvious initial place to start might be with FAO's own engagement in the topic.

Assessment of relevance to inland fisheries and opportunities:	<p>High</p> <p>This is rated high because the forums and associated discussions and attention are becoming higher profile in some circles and influencing government policy and dialogue as well as technical assessments.</p>
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The International Network of Basin Organizations (INBO): Existing transboundary governance systems rarely consider the maintenance of fisheries as a prime target and often favour other sectors using the water resource that are perceived to be more profitable or more important. This system has in some instances resulted in negative impacts for inland fishers and communities dependent on inland fisheries.

The two key global international conventions addressing transboundary basins, the UN Convention on the Law of the Non-navigational Uses of International Watercourses and the UNECE Water Convention, are covered above. But in addition, there is a plethora of local or regional instruments and/or river basin management organizations. FAO maintains a global register of these showing that more than 3 600 treaties related to international water resources have been drawn up since 805 CE (FAO, n.d.). Individual transboundary systems vary greatly in terms of their practical and political management and opportunities for awareness-raising will vary from one basin to another. Clearly this document cannot assess each and every one.

The objective of INBO (www.inbo-news.org/en) is to promote IWRM at the level of river basins as an essential tool for sustainable development. INBO endeavours to: develop lasting relations between the organizations interested in such comprehensive management and favour exchanges of experiences and expertise among them; facilitate the implementation of tools; develop information and training programmes; encourage education of the population regarding the issues; promote these principles in international cooperation programmes; and evaluate ongoing actions initiated by the member organizations and disseminate their results.

The main transboundary topic of relevance to inland fisheries is water resources management and other environment-related impacts on fisheries. Migratory fish can also be important and often dominate landings. The implications for transboundary management and governance are highly challenging (Valbo-Jørgensen, Marmulla and Welcomme, 2008).

INBO has paid attention to inland fisheries in the past; for example, co-organizing with the Mekong River Commission an International Forum on Integrated Water Resources Management of the Mekong River Basin (November 2005, Thailand) that paid attention to fisheries as well as serving as a partner of the African Great Lakes Conference (May 2017, Uganda) with a subtheme on sustainable fisheries and aquaculture management. There is an opportunity for a more systematic approach to better integration of inland fisheries into basin management in partnership with INBO. This would include tailoring existing guidance for inland fisheries to a basin organization audience and general capacity development support. Given FAO's role in fostering international cooperation, its involvement in water resources and expertise in fisheries, it has an obvious potential role to play in promoting relevant policies and strategies in partnership with INBO.

Assessment of relevance to inland fisheries and opportunities:	<p>High</p> <p>This is rated high because of the potential for reaching multiple basin organizations, institutions and stakeholders through a single point of entry.</p>
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5.2.2. Lower priority areas

The Economics of Ecosystems and Biodiversity (TEEB): This global initiative is focused on drawing attention to the economic benefits of biodiversity including the growing cost of biodiversity loss and ecosystem degradation. TEEB presents an approach that can help decision-makers recognize, demonstrate and capture the values of ecosystem services and biodiversity.

Conceptually there are strong links between the economics of ecosystems and inland fisheries, but the initiative covers a broader agenda. A recent TEEB study on agriculture and food⁵ was supported by a feeder study (Brugere, Lymer and Bartley, 2015).

There is the potential to develop a much more detailed TEEB for inland fisheries. In particular, it might provide more detailed information on the non-monetary values of ecosystem services of inland fisheries, relationships between these services and water and land use, and synergies and conflicts with other ecosystem service categories to identify potentially mutually supporting policy areas. Being developed under an “economic” umbrella it would also be potentially more influential than similar assessments generated within fisheries.

Assessment of relevance to inland fisheries and opportunities:	Moderate
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The United Nations Environment Programme (UNEP): UNEP has a mandate to be the leading global environmental authority that sets the global environmental agenda, that promotes the coherent implementation of the environmental dimensions of sustainable development within the United Nations system and that serves as an authoritative advocate for the global environment.

There is potential for UNEP to further its work and/or involvement in inland fisheries, but it has less established expertise in this area compared to FAO. Further joint FAO–UNEP work is a potential option building on their respective mandates and expertise; for instance with FAO leading on fisheries and UNEP leading on environment. The opportunity is therefore for FAO and UNEP to work at the fisheries–environment nexus. Ecosystem restoration for inland fisheries (as above) would be one obvious area of potential collaboration.

⁵ <http://teebweb.org/our-work/agrifood/reports/>

There is also the possibility of raising awareness about fisheries in the UN Environment Assembly (the governing body for the environment, which has had elevated status since Rio+20, compared to UNEP's previous governing council). The obvious route into that assembly would be via UNEP or FAO representation in it.

Assessment of relevance to inland fisheries and opportunities:	Moderate
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UN–Water: UN–Water was created because of the lack of a lead agency for water both globally and within the United Nations. UN–Water is the United Nations interagency coordination mechanism for all freshwater- and sanitation-related matters. As a cross-cutting platform, this forum largely discusses coordination/cooperation matters, although it is actively involved in forging consensus among UN entities and partners on priority issues. Regarding inland fisheries, the need is to promote awareness of them and to ensure that they are considered in relevant discussions and work. FAO is already represented in UN–Water as a member. So far, its technical scope/interest has been on water data and management, and water for food. Concerning the latter, inputs so far have been limited to agriculture, but inland fisheries is also a pertinent area regarding the relationship between water use and fisheries production.

The FAO representative to UN–Water could be briefed by FAO Fisheries regarding the potential relevance of inland fisheries to the work of UN–Water and as such FAO Fisheries can receive feedback on current and proposed activities in UN–Water. FAO Fisheries can then provide technical backstopping to the representative as opportunities arise.

Assessment of relevance to inland fisheries and opportunities:	Moderate
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The International Collective in Support of Fishworkers (ICSF): The ICSF is an international non-governmental organization that works towards the establishment of equitable, gender-just, self-reliant and sustainable fisheries, particularly in the small-scale, artisanal sector.

The main aims of the ICSF are to: monitor issues that relate to the lives, livelihoods and living conditions of fishworkers around the world; disseminate information on these issues, particularly amongst fishers; prepare guidelines for policymakers that stress fisheries development and management of a just, participatory and sustainable nature; and help to create the space and momentum for the development of alternatives in the small-scale fisheries sector. At present, and historically, most activities have been related to marine fisheries but the inland sector has been included.

The ICSF's vision is a future in which fishing communities and fishworkers lead a life of dignity, realizing their right to life and livelihoods, and organizing to foster democracy, equity, sustainable development and responsible use of natural resources. ICSF's mission is "to support fishing communities and fish-worker organisations and empower them to participate in fisheries from a perspective of decent work, equity, gender-justice, self-reliance and sustainability".

Within a global perspective, ICSF's work is focused on countries of the South.

With its pro-poor focus on small-scale, family fishers the ICSF has considerable interest and involvement in inland fisheries. There is a high level of potential synergy with the ICSF's priorities and the EAIFM.

FAO has been working with the ICSF. The main opportunities relate to exchange of information, ICSF being a portal for grassroots delivery of guidance and policies on inland fisheries, and seeking ICSF inputs into technical work on inland fisheries.

Assessment of relevance to inland fisheries and opportunities:	Moderate
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IUCN Species Survival Commission and Wetlands International Freshwater Fish Specialist Group (IUCN/SSC/WI/FFSG): The IUCN/SSC/WI/FFSG was established in 2004. Its vision is sustaining freshwater fish in their natural environments, and its mission is to achieve conservation and sustainable use of freshwater fish and their habitats through:

- Generating and disseminating sound scientific knowledge about freshwater fish;
- Creating widespread awareness of freshwater fish values; and
- Influencing decision-making processes at all levels.

The FFSG focuses on a number of key areas, including strategy and policy development, provision of technical information and advice, training and education, IUCN Red Listing and biodiversity assessments.

There are four other SSC specialist groups that have some freshwater aspects as part of their remit for salmon, sturgeon, sharks and rays, and anguillid eels.

Obviously, these groups are conservation-focused and engagement with them might include technical information exchange and collaboration regarding synergies between sustainable use (fisheries) and conservation.

Assessment of relevance to inland fisheries and opportunities:	Moderate
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Forestry and related initiatives: There are various examples of where inland fisheries represent a high value co-benefit of forests. Examples include the Cambodian Tonlé Sap fisheries (which are largely forest-dependent), another would be the Amazon system and its fishery. These are largely forested floodplain-dependent fisheries and normally highly productive and biodiverse. In addition, flood forest is, globally, a highly threatened and endangered habitat type.

The relationship is also two-way. Many forest ecosystems depend on fish. This includes the above-mentioned examples (for example, fish disperse seeds of floodplain/riparian tree species and are important in nutrient cycling). There are also examples of interdependence in temperate systems (e.g. salmonids as a source of nutrient inflows into upland forest areas in North America). The key link in terms of awareness-raising is probably regarding fish as non-timber forest products.

There is currently some interest in this topic in the forest community. Although there is attention to food (and other non-timber products) from forests, such as fruits, seeds, nuts and bushmeat, there can be limited attention to fish (which in some cases represent the most important co-benefit). Inland fisheries also provide an important alternative food resource to bushmeat, and sustainable inland fisheries in or near forests can significantly reduce unsustainable harvesting of forest-dependent bushmeat species. Co-benefits are seen as a means to increase attention to forest values and therefore promote conservation and restoration efforts. The forest community can therefore be motivated to take this topic on board.

This topic is also of relevance to current discussions on REDD+ and associated financing. This is an area currently receiving large investment from climate change mitigation funds.

FAO's Forestry Division has an obvious interest in this topic and is actively engaged in the area.

Assessment of relevance to inland fisheries and opportunities:	Moderate
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The water agenda and fora: This is obviously a key potential area for engagement. At the UN level, and mostly at other organizational levels, there is no single identifiable agency dealing solely, or often primarily, with water (except possibly the International Water Management Institute [IWMI]). An agency with significant involvement in water is FAO itself (it holds, for example, key datasets on water in AQUASTAT).

Water fora present key opportunities. The two key global ones are the Stockholm Water Week (SWW) (an annual event) and the World Water Forum (WWF) held tri-annually. The SWW is managed substantially by the Stockholm International Water Institute, although under a broader steering committee/framework. The WWF is largely under the auspices of the World Water Council. Neither of these fora are recognized intergovernmental processes. The extent to which they influence policy directly is largely unassessed. Indirect influence would be expected. Nevertheless, they are significant stakeholder fora and consequently provide an opportunity for awareness-raising.

The topic of these fora (water) is obviously highly relevant, and they present significant potential opportunities for exposure of inland fisheries. The average participation in SWW is around 2 500 people and the WWF claims around 25 000 attendees.

There is room for caution. First, a large proportion of the potential audience represents the “sharp end” of water (e.g. water supply, treatment and sanitation) with limited incentive to take on board messages about inland fisheries; although food and agriculture interests tend to be well represented. Second, experience has shown that getting issues into these fora (in other words discussed in a meaningful way in plenary and adequately reflected in the outcomes) can be challenging. This has been the experience with “environment/biodiversity/ecosystems” over many years. There are, however, signs of both of these fora adopting a more holistic approach to water in recent events as witnessed by some progress in the ecosystems’ arena.

To some extent successful engagement in SWW will be easier than with the WWF because it is a smaller meeting, considered by many to be less political and with strong support from Sweden-based agencies. On the other hand the WWF has by far the bigger potential audience. It is therefore difficult to judge priority between the two.

In both mechanisms, side events on inland fisheries could be held. Experience for other topics (e.g. “environment/ecosystems/biodiversity”) has, however, shown that this can result in small audiences of the already “converted”; although that option is by no means excluded. That option would also be best pursued through partnerships with other interested organizations. Probably a more effective approach, however, is to attempt to mainstream the topic into other platforms/subdiscussions in these fora. For example, getting inland fisheries into discussions on water and food security is much more influential than stand-alone discussions on inland fisheries. For this to happen, those promoting the water–food linkages need to think way beyond the “crop per drop” mindset and better recognize that “food” is a lot more than just a commodity provided through agriculture. Essentially, a more holistic approach is required to water and food. Examples would include the integration of inland fisheries into agricultural systems, such as in irrigated agriculture where great benefits are on offer, and reservoir fisheries development and management. Another area with considerable linkages concerns the impacts of agricultural water use on inland fisheries; for example, opportunities to integrate irrigation with dam operation and to optimize inland (and coastal) fisheries in reservoirs and downstream. Also, the “food” discussion would benefit from a much broader consideration of nutrition, and in terms of nutrition security, inland fisheries score highly.

Other promising subthemes would be water and ecosystems, climate change adaptation (co-benefits with ecosystems), poverty reduction and so forth. This has been the approach of both the Ramsar Convention and the CBD in recent fora. Again, working in partnership is vital. Key allies are innovative food security stakeholders and in particular ecosystems’ stakeholders (who are gaining increasing attention) and

“poverty reduction” interests, especially the poverty focus aid-related NGOs (such as Oxfam, Catholic Relief).

FAO is usually represented at both these fora. A starting point therefore might be to liaise with relevant staff already engaged in these areas.

Assessment of relevance to inland fisheries and opportunities:	Moderate
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Food and Agriculture Organization of the United Nations: An analysis of the internal attention to inland fisheries among FAO divisions is beyond the scope of this study. It is however noted that in many relevant fora where FAO is represented there is often limited, if any, attention to inland fisheries in them. It is therefore obvious that a priority for integrating inland fisheries into international instruments and processes might be to explore possibilities across FAO’s own work areas.

Success in this context would potentially deliver significant gains by leveraging attention to inland fisheries across FAO’s broader activities. Thus, FAO capacity for inland fisheries could be expanded by mainstreaming inland fisheries into other FAO divisions and activities.

6. PRIORITIZATION AND STRATEGIES

6.1 Some general observations

Too often the key values and attributes of inland fisheries – for instance the role they play in food and nutrition security, poverty alleviation, livelihoods and overall human well-being – have been overlooked, or at best, given cursory consideration across many of the international instruments and processes. It is reasonable to assume that lack of awareness regarding the status and value of inland fisheries is part of the problem. In order to help raise awareness there is not only a need to develop improved information, but also a need to ensure that information products that underpin awareness-building are in the appropriate form and targeted at the relevant fora or audiences at the right time. This report assesses opportunities in one subgroup of audience – the various global international instruments, processes or fora that do not have inland fisheries as their primary mandate but nevertheless are directly relevant to them. In particular, consideration needs to be given to non-specialist audiences and language needs to be concise and straightforward. Key messages should include, but not be limited to:

- Positive links between inland fisheries and biodiversity (e.g. maintaining diversity of catches, conserving fishery-dependent habitats);
- General values of inland food fisheries beyond total catches and monetary value (food and nutrition security, participation/livelihoods, linkages with poverty reduction);
- Inland fisheries as an ecosystem service, delivered alongside many other valuable ecosystem services from aquatic systems; in particular the synergies among inland fisheries and other important ecosystem service categories to highlight the synergies;
- Differences between inland and marine fisheries;
- Information that dispels the following widespread myths about inland fisheries:
 - that they are in decline;
 - lack of information means they are not important;

- official catch figures and statistics reflect reality and “importance”;
- the problem is overexploitation;
- they cannot be managed properly; and
- there is no room to increase catches and therefore they do not justify investment.

Part of the mainstreaming needs will require repackaging of existing information and generation of new information so that it is accessible and context specific. There is also a requirement for guidance on how to value inland fisheries under situations of limited inland fisheries data, which is a widespread issue, in order to embed information within broader policy frameworks; for example, by transferring knowledge on fisheries from data-rich to data-poor areas, while accounting for sociocultural and environmental variables.

As part of this process, consideration should be given wherever possible to the promotion of inland fisheries as a co-benefit of improved ecosystem management, ecosystem-based adaptation or ecosystem restoration. Depending upon the case in question, even though values of inland food fisheries can be high, in many cases they can be minuscule compared to other ecosystem values such as water supply or disaster risk mitigation. But there are, invariably, synergies to be found (Coates, forthcoming). Any intervention that improves the status of inland water ecosystems, for whatever reason, is most likely to also deliver improvements in inland fisheries as a co-benefit. The highest levels of progress, therefore, are likely to arise through partnership with other, often more persuasive, interests.

As many of the issues surrounding inland fisheries are currently only peripherally considered by and in some cases are invisible to the MEAs there is an opportunity to pursue the non-biodiversity-centric, human development agenda as a matter of priority. Consideration should be given to more proactive engagement with these stakeholders, for instance through NGOs, where inland fisheries are seen through the lens of providing enhanced food security, livelihoods, human health and other aspects of human well-being.

A key point regarding ecosystem approaches is that the most appropriate point of entry is at the broader ecosystem level. They should not be contained within individual sectors. The point of an ecosystem approach is that it should be cross-sectoral. Key stakeholders beyond fisheries have limited incentives to pay much attention to an EAF, or to inland fisheries, even if each of these does encapsulate broader system-wide management. Stakeholders beyond fisheries also most often have their own version of an “ecosystem approach”, such as integrated water resources (or natural resources) management, sustainable land management, integrated land-use planning, integrated coastal zone management and so forth. The EAF remains a solid guidance for fisheries specialists and managers, but it is not necessarily the most appropriate medium through which to mainstream inland fisheries into other areas. A key need for mainstreaming is to adopt the language, terminology and tools of the audience, where feasible.

6.2 Prioritizing potential interventions

The priorities for targeting the various instruments and processes listed in Section 5 will depend greatly on the stakeholder in question, its mandate and resources. The various international instruments, frameworks and mechanisms reviewed in Section 5 are categorized below based on the opportunities available to an international organization that has general expertise, reasonable capacity and a relatively broad mandate. FAO itself would be an example, among others. The priority opportunities of other organizations or stakeholders may be quite different.

Priorities were assessed with regard to two key factors:

- (i) Relevance of the mandate to inland fisheries; this does not necessarily mean that inland fisheries is mentioned, but that the mandate has influence on them and/or presents an opportunity for mainstreaming; and

- (ii) Potential opportunity to achieve the desired outcome of raising awareness of inland fisheries and delivering the principles embedded in the EAIFM across the widest audience. This was estimated based on the combined experience of the authors regarding challenges that might be faced and likelihood of significant impact within that area.

This categorization enables identification of the higher priority areas where there is high relevance of the mandate and high potential to achieve the desired outcome through an action. There is an assumption of resource limitations. For example, a comprehensive TEEB report on inland fisheries may have a high potential impact, but it will require significant funding. Therefore, while all the areas shaded green or yellow (Figure 1) present opportunities, the green ones represent the best opportunities for raising awareness of the importance of inland fisheries in the context of the current review and within current (assumed) resources. Those marked red may still be a priority for those stakeholders with a particular interest and ability to engage with them. Should opportunities arise to engage in the other areas they should not be discounted.

For each of the various prioritized instruments and mechanisms there will be differences in the ease of engagement and the degree of impact achievable. For instance, it may be possible to engage with an MEA and even promote inland fisheries through its decision or resolution. However, the actual impact within countries and other fora may still be low. Stakeholders need to take this issue into account when targeting actions for the “high-high” instruments and mechanisms.

Figure 1. Prioritization of instruments, mechanisms, fora or processes for potential interventions based on relevance of the mandate or work area and potential for action to lead to progress

		Priority or opportunity for action	
		High	Low
Relevance of mandate/work area	High	<ul style="list-style-type: none"> • CBD • Ramsar Convention • UN Decade on Ecosystem Restoration • Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests • Water–food–energy nexus • IPBES • INBO 	<ul style="list-style-type: none"> • Helsinki Convention • UN Convention on Non-Navigable Use of International Watercourses • Freshwater Fish SG • ICSF • SDGs • UNEP • CMS • CITES • GEF • UN Water • Wider water fora • TEEB
	Low	<ul style="list-style-type: none"> • Forestry 	<ul style="list-style-type: none"> • UNCCD • UNFCCC • UNCLOS • Antarctic Treaty • Basel Convention • Rotterdam Convention • Stockholm Convention • UNEP GPA • UNESCO MAB

Potentially, all the biodiversity-related fora can be addressed collectively by supplying concise information on how inland fisheries relate to the Aichi Biodiversity Targets, specifically Target 6; and the Post-2020 biodiversity framework, currently being negotiated, that will replace them. However, this would probably require information to be repackaged and re-interpreted to ensure that the appropriate message reaches the desired audience.

6.3 Highest priority intergovernmental instruments and processes

The following instruments or mechanisms have been highlighted as having the highest relevance of mandate and highest priority for opportunity or action to raise awareness of inland fisheries. For each instrument, recommendations are made on potential actions.

The UN Decade on Ecosystem Restoration 2021–2030: As noted in Section 5, this is perhaps the most immediate highest priority due to the opportunity to engage at the beginning of the process and influence major forthcoming funding activities. Coates (forthcoming) provides further technical background information.

FAO is the co-lead implementation agency (with UNEP). Therefore, the first step might be to engage with ongoing processes at FAO regarding the Decade and identify opportunities for mainstreaming inland fisheries.

Convention on Biological Diversity (CBD): The main decision-making body is the COP, which meets every two years. Draft decisions are transmitted to the COP through the Subsidiary Bodies on Scientific, Technical and Technological Advice (SBSTTA) and the Working Group on Review of Implementation (WGRI). In addition, the Secretariat is often involved in crafting relevant decisions, or submissions to the SBSTTA/WGRI, largely based on work areas assigned to it by the COP or SBSTTA/WGRI, but with some flexibility within the Secretariat to present information for pre-session documents (those actually discussed) although usually within the limits of the scope of the agreed agendas of meetings. FAO is always represented at the COPs and, according to the agendas, in most SBSTTA and WGRI meetings. FAO regularly provides information on its activities and/or technical information on specific topics. Information documents on subjects can be accepted for any meetings provided they relate (even if not exclusively) to subjects on the agenda. For international organizations, information documents are usually welcome (and commonly supplied) and often attention is paid to them.

Although consideration of Aichi Biodiversity Target 6 (fisheries) tends to focus on marine fisheries, inland fisheries are not excluded, but so far they have received very limited attention. They are also relevant to several other targets (see Section 5). While information has recently improved (Funge-Smith, 2018; Funge-Smith and Bennett, 2019) this remains mainly a backstopping resource and it is unrealistic to expect relevant processes to automatically take these and other findings on board.

Key opportunities and actions: A priority is to engage with the Post-2020 biodiversity framework. A cautionary note is that the post2020 framework is likely to be general and unlikely to address specific sectors or subsectors (such as inland fisheries). But inland fisheries considerations should be included at the appropriate level; for example, if “fisheries” are mentioned, inland fisheries and their particular characteristics should be included.

A major need is to provide relevant information on inland fisheries. Existing information needs to be supplied directly to, or specifically written for, CBD audiences. It is believed that such information would be well received. The “inland fisheries gap” is recognized by Parties and is also recognized in the fourth edition of *The global biodiversity outlook* (and previous editions); this can be used as a basis to present a document to fill this gap.

Ramsar Convention on wetlands: The Ramsar Convention is the lead agency for the CBD on wetlands-related matters and operates along similar lines to the CBD with some minor differences: for example, Draft Resolutions (“decisions” in CBD parlance) are transmitted to COP through the Convention’s intersessional governance body, the Standing Committee; it has an intersessional Scientific and Technical Review Panel (STRP, instead of SBSTTA). Observer organizations to COP, such as FAO, can make interventions in plenary proposing text for inclusion in resolutions, and these may be included if supported by a Contracting Party and not opposed by a Contracting Party or Parties. However, FAO has traditionally had a lower profile at Ramsar than at the CBD and such texts are better introduced by the Parties themselves, so working with a Party or Parties on such matters is advised.

Key opportunities and actions: These are similar, in terms of topic, to those listed for the CBD. Discussions might be held with the Ramsar Secretariat on opportunities for enhancing cooperation on inland fishery matters. There are also other areas: for example, Ramsar classifies rice fields as “wetlands”

and has paid much attention to them; there is much interest in agriculture–wetlands interactions.

The water–energy–food nexus: As explained in Section 5, there are various activities or fora that use the WEF nexus umbrella. There are needs to mainstream inland fisheries into them. Again, a key need is relevant information on inland fisheries packaged and delivered for adoption in the fora.

Some initiatives have their well-established stakeholders and processes that can be difficult to engage with. One obvious route into these fora is through FAO's own activities in this area.

FAO and Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests: The need to raise the profile and importance of inland fisheries within FAO is self-evident and the potential for impact is high. Internal considerations also extend to application of these guidelines and the raising of the importance of inland fisheries within them.

The Inter-Governmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES): The main opportunity is to ensure that relevant inland fisheries considerations and data are incorporated into relevant assessments – particularly for the forthcoming nexus assessment. FAO is already involved as a partner and one obvious task is to engage with FAO's broader involvement in the IPBES processes.

The International Network of Basin Organizations (INBO): As noted in Section 5. INBO presents opportunities as an entry point to mainstream inland fisheries into the many organizations and processes working worldwide at the basin scale.

A review of current inclusion of inland fisheries across basin organizations would be a useful starting point. This could be followed by a gap analysis and, where identified, the development of targeted guidance and information materials. Capacity development support would be the obvious overall intervention.

Notes on other intergovernmental instruments and mechanisms: The 2030 Agenda for Sustainable Development and the SDGs remains the umbrella process and forum for most matters related to sustainable development, including for inland fisheries. It can be a key focus of governments and relevant agencies. It is high profile and a priority in the global policy arena, but it is not listed here as a priority because it can be challenging to engage with directly. There are some current opportunities with regard to the development of indicators for assessing progress. It remains a key target for mainstreaming inland fisheries, but this is perhaps best achieved through working through the other mechanisms, as listed above, all of which directly or indirectly contribute to the SDGs.

In addition to the opportunities outlined in Figure 1, this review has noted opportunities for improved engagement or mainstreaming on inland fisheries with FAO itself. There are various FAO initiatives or information products, where inland fisheries should be more visible. Some are mentioned above. There are more. In addition, FAO is already well represented in many, if not most, of the fora considered and can contribute much more in them to increase the visibility of inland fisheries. Therefore, one way of leveraging improved outcomes is to increase awareness of inland fisheries in other divisions of FAO and among its key representatives in the various fora.

7. REFERENCES

- Adams, J.** 2012. *Determination and implementation of environmental water requirements for estuaries*. Ramsar Technical Report No. 9 / CBD Technical Series No. 69. www.cbd.int/doc/publications/cbd-ts-69-en.pdf
- Allan, J., Abell, R., Hogan, Z., Revenga, C., Taylor, B., Welcomme, R. & Winemiller, K.** 2005. Overfishing of inland waters. *Bioscience*, 55: 1041–1051. [doi.org/10.1641/0006-3568\(2005\)055\[1041:OOIW\]2.0.CO;2](https://doi.org/10.1641/0006-3568(2005)055[1041:OOIW]2.0.CO;2)
- Arthington, A.H., Bhaduri, A., Bunn, S.E., Jackson, S.E., Tharme, R.E., Tickner, D., Young, B., Acreman, M., Baker, N., Capon, S., Horne, A. C., Kendy, E., McClain, M.E., Poff, N. L., Richter, B.D., & Ward, S.** 2018. The Brisbane Declaration and global action agenda on environmental flows. *Frontiers in Environmental Science*, 6(45). doi.org/10.3389/fenvs.2018.00045.
- Bartley, D., De Graaf, G., Valbo-Jørgensen, J. & Marmulla, G.** 2015. Inland capture fisheries: Status and data issues. *Fisheries Management and Ecology*, 22: 71–77. doi.org/10.1111/fme.12104
- Béné, C., Arthur, R., Norbury, H., Allison, E.H., Beveridge, M., Bush, S., Campling, L., Leschen, W., Little, D., Squires, D., Thilsted, S.H., Troell, M., & Williams, M.** 2016. Contribution of fisheries and aquaculture to food security and poverty reduction: Assessing the current evidence. *World Development*, 79: 177–196. doi.org/10.1016/j.worlddev.2015.11.007
- Bennett, A., Patil, P., Kleisner, K., Rader, D., Viridin, J. & Basurto, X.** 2018. *Contribution of fisheries to food and nutrition security: Current knowledge, policy, and research*. NI Report 18–02. Durham, NC, Duke University. https://nicholasinstitute.duke.edu/sites/default/files/publications/contribution_of_fisheries_to_food_and_nutrition_security_0.pdf
- Biodiversity Indicators Partnership.** 2020. *Red List Index (species used for food and medicine)*. www.bipindicators.net/indicators/red-list-index/red-list-index-species-used-for-food-and-medicine
- Brugere, C., Lymer, D. & Bartley, D.M.** 2015. *Ecosystem services in freshwater fish production systems and aquatic ecosystems: Recognizing, demonstrating and capturing their value in food production and water management decisions*. Geneva, TEEB Agriculture & Food, UNEP. www.teebweb.org/wp-content/uploads/2016/04/InlandFisheries_PART2_web-2.pdf
- Coates, D.** 1995. *Inland capture fisheries and enhancement: status, constraints and prospects for food security*. Report of the International Conference on the Sustainable Contribution of Fisheries to Food Security. Kyoto, Japan, 4–9 December 1995. Document # KC/ FI/95/TECH/3. Government of Japan. 85 p. www.fao.org/docrep/018/ap976e/ap976e.pdf
- Coates, D.** 2002. *Inland capture fishery statistics of Southeast Asia: current status and information needs*. RAP Publication No. 11. Pp. 1–114. www.fao.org/3/ac487e/ac487e.pdf
- Coates, D.** (forthcoming). *Ecosystem restoration and inland food fisheries in developing countries – opportunities for the United Nations Decade on Ecosystem Restoration (2021–2030)*. FAO Fisheries Circular no 1231. Rome, FAO. 136 p.
- Coates, D., Ouch Poeu, Suntornratana, U., Nguyen T.T. & Viravong, S.** 2003. *Biodiversity and fisheries in the Lower Mekong Basin*. Mekong Development Series No. 2. Phnom Penh, Mekong River Commission. 30 p. www.mrcmekong.org/assets/Publications/report-management-develop/Mek-Dev-No2-Mek-River-Biodiversityfisheries-in.pdf
- Davidson, N. & Coates, D.** 2011. The Ramsar convention and synergies for operationalizing the convention on biological diversity's ecosystem approach for wetland conservation and wise use. *Journal of International Wildlife Law & Policy*, 14(3–4): 199–205. doi.org/10.1080/13880292.2011.626707

- de Graaf, G. & Garibaldi, L.** 2014. *The value of African fisheries*. FAO Fisheries and Aquaculture Circular No. 1093. Rome. 76 pp. www.fao.org/3/a-i3917e.pdf
- FAO (Food and Agriculture Organization of the United Nations).** n.d. *FAO Treaties Database*. FAO. www.fao.org/treaties/en/. Accessed 11 November 2020.
- FAO.** 1995. *Code of conduct for responsible fisheries*. FAO, Rome. 41 p. www.fao.org/3/v9878e/V9878E.pdf
- FAO.** 2003. *The ecosystem approach to fisheries*. FAO Technical Guidelines for Responsible Fisheries. No. 4, Suppl. 2. Rome, FAO Fisheries Department. 112 p. www.fao.org/3/a-y4470e.pdf
- FAO.** 2011. *Review of the state of world fishery resources: inland fisheries*. FAO Fisheries and Aquaculture Circular No. 942, Rev. 2, FIR/C942, Rev. 2 (En). www.fao.org/docrep/015/i2484e/i2484e.pdf
- FAO.** 2014a. *Building a common vision for sustainable food and agriculture: Principles and approaches*. Rome, FAO. www.fao.org/3/i3940e/i3940e.pdf
- FAO.** 2014b. *The state of world fisheries and aquaculture*. Rome, FAO. www.fao.org/3/i3720e/i3720e.pdf
- FAO.** 2015. *Voluntary guidelines for securing sustainable small-scale fisheries in the context of food security and poverty eradication*. Rome, FAO. www.fao.org/3/i4356en/i4356en.pdf
- FAO.** 2019a. *The ecosystem approach to fisheries management training course (inland fisheries)*. Volume 1. Handbook for trainees. Rome, FAO. www.fao.org/3/ca5539en/CA5539EN.pdf
- FAO.** 2019b. *Incorporating environmental flows into “water stress” indicator 6.4.2 – Guidelines for a minimum standard method for global reporting*. Rome, FAO. Licence: CC BY-NC-SA 3.0 IGO. www.fao.org/3/CA3097EN/ca3097en.pdf
- FAO.** 2020. *The state of world fisheries and aquaculture 2020. Sustainability in action*. Rome, FAO. doi.org/10.4060/ca9229en
- Funge-Smith, S.J.** 2018. *Review of the state of world fishery resources: inland fisheries*. FAO Fisheries and Aquaculture Circular No. C942 Rev.3. Rome, FAO. 397 p. www.fao.org/3/ca0388en/CA0388EN.pdf
- Funge-Smith, S. & Bennett, A.** 2019. A fresh look at inland fisheries and their role in food security and livelihoods. *Fish and Fisheries*, 20(6): 1176–1195. doi.org/10.1111/faf.12403
- Garcia, S.M. & Cochrane, K.L.** 2005. Ecosystem approach to fisheries: a review of implementation guidelines. *ICES Journal of Marine Science: Journal du Conseil*, 62(3): 311–318. doi.org/10.1016/j.icesjms.2004.12.003
- Global Water Partnership – TAC (Technical Advisory Committee).** 2000. *Integrated water resources management*. TAC Background Paper 4. Stockholm. 71 p. www.gwp.org/globalassets/global/toolbox/publications/background-papers/04-integrated-water-resources-management-2000-english.pdf
- Gregory, R., Funge-Smith, S.J. & Baumgartner, L.** 2018. *An ecosystem approach to promote the integration and coexistence of fisheries within irrigation systems*. FAO Fisheries and Aquaculture Circular No.1169. FAO, Rome. Licence: CC BY-NC-SA 3.0 IGO. www.fao.org/3/CA2675EN/ca2675en.pdf
- HLPE (High Level Panel of Experts).** 2014. *Sustainable fisheries and aquaculture for food security and nutrition*. A report by the High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security. Rome, FAO. www.fao.org/3/a-i3844e.pdf
- Jackson, S.** 2017. How much Water Does a Culture Need? Environmental Water Management’s Cultural Challenge and Indigenous Responses. A.C. Horne, E. L. O’Donnell, J. A. Webb, M. J. Stewardson, M. Acreman, B. Richter (eds), *Water for the Environment: From Policy and*

- Science to Implementation and Management*, Academic Press, United Kingdom.
doi.org/10.1016/B978-0-12-803907-6.00009-7
- Koehn, J.D., Raymond, S.M., Stuart, I., Todd, C.R., Balcombe, S.R., Zampatti, B.P., Bamford, H., Ingram, B.A., Bice, C.M., Burndred, K. & Butler, G.** 2020. A compendium of ecological knowledge for restoration of freshwater fishes in Australia's Murray–Darling Basin. *Marine and Freshwater Research* 71: 1391–1463. doi.org/10.1071/MF20127
- Kummu, M., Sarkkula, J., Koponen, J. & Nikula, J.** 2006. Ecosystem management of the Tonle Sap Lake: an integrated modelling approach. *Water Resources Development*, 22(3): 497–519. doi.org/10.1080/07900620500482915
- Molden, D. (ed.).** 2007. *Water for food, water for life. A comprehensive assessment of water management in agriculture*. London, Earthscan; Colombo, Sri Lanka, International Water Management Institute.
www.iwmi.cgiar.org/assessment/files_new/synthesis/Summary_SynthesisBook.pdf
- Mousset, E., Rogers, V., Saray, S., Ouch, K., Srey, S., Mith, S. & Baran, E.** 2016. *Roles and values of fish in rural welfare in Cambodia (welfare data analysis)*. Phnom Penh, Inland Fisheries Research and Development Institute (Fisheries Administration) and WorldFish. 102 p.
<https://hdl.handle.net/20.500.12348/260>
- Phang, S.C., Cooperman, M., Lynch, A.J., Steel, E.A., Elliott, V., Murchie, K.J., Cooke, S.J., Dowd, S. & Cowx, I.G.** 2019. Fishing for conservation of freshwater tropical fishes in the Anthropocene. *Aquatic Conservation: Marine and Freshwater Ecosystems*, 29(7): 1039–1051. doi.org/10.1002/aqc.3080
- Poff, N.L., Tharme, R.E. & Arthington, A.H.** 2017. Evolution of environmental flows assessment science, principles, and methodologies. In A.C. Horne, J.A. Webb, M.J. Stewardson, B. Richter & M. Acreman, eds. *Water for the environment: from policy and science to implementation and management*. Academic Press. doi.org/10.1016/B978-0-12-803907-6.00011-5
- Toppe, J., Beveridge, M. & Graham, E.** 2017. A case for fish to lead greater food security and nutrition outcomes. *FAO Aquaculture Newsletter*, 56: 43. Rome, FAO.
- UNEP (United Nations Environment Programme).** 2012. The UN-Water Status Report on the Application of Integrated Approaches to Water Resources Management. United Nations Environment Programme. Nairobi.
www.unwater.org/sites/default/files/app/uploads/2017/05/UNW_status_report_Rio2012.pdf
- United Nations Earth Summit.** 1992. United Nations Conference on Environment & Development Rio de Janeiro, Brazil, 3 to 14 June 1992. Agenda 21.
<https://sustainabledevelopment.un.org/content/documents/Agenda21.pdf>
- Valbo-Jørgensen, J., Marmulla, G. & Welcomme, R.L.** 2008. Migratory fish stocks in transboundary basins – implications for governance, management and research. In *Rescue of sturgeon species in the Ural River basin*, pp. 61–86. Netherlands, Springer. doi.org/10.1007/978-1-4020-8924-4_5
- Vörösmarty, C.J., Vanesa Rodríguez Osuna, V., Cak, A.D., Bhaduri, A., Bunn, S.E., Corsi, F., Gastelumendi, J., Green, P., Harrison, I., Lawford, R., Marcotullio, P.J., McClain, M., McDonald, R., McIntyre, P., Palmer, M., Robarts, R.D., Szöllösi-Nagy, A., Tessler, Z. & Uhlenbrook, S.** 2018. Ecosystem-based water security and the sustainable development goals (SDGs). *Ecohydrology & Hydrobiology*, 18: 317–333. doi.org/10.1016/j.ecohyd.2018.07.004
- Welcomme, R.L., Cowx, I.G., Coates, D., Béné, C., Funge-Smith, S., Halls, A. & Lorenzen, K.** 2010. Inland capture fisheries. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 365(1554): 2881–2896. doi.org/10.1098/rstb.2010.0168
- World Bank.** 2008. *Sustainable land management Sourcebook*. Washington, DC, World Bank.
<http://hdl.handle.net/10986/6478>

World Bank. 2012. *Hidden harvest: The global contribution of capture fisheries*. Report No. 66469-GLB. Washington, DC, World Bank. <http://hdl.handle.net/10986/11873>

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