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# Mainstreaming biodiversity in fisheries

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ABSTRACT

Biodiversity mainstreaming, the consideration of biodiversity across fisheries and the range of actions taken by both fisheries and conservation governance streams is the subject of this paper. Evidence is presented that the global fishery community incrementally adopted sustainable development principles from both before and after the 1992 adoption of the Convention on Biological Diversity, integrating a broader set of ecosystems goals into fisheries. Actions taken by the Food and Agriculture Organization of the United Nations (FAO) and regional and national fishery agencies to fulfil their mandate are discussed, in addition to objectives for more sustainable fisheries that have led to significant expansions in legal frameworks, policies and practices in terms of biodiversity conservation. The paper also highlights the growing importance of cross-sectoral cooperation in the resolution of historical disagreements between fisheries and environmental interests, in spite of the various sectoral interests. In this evolution, despite many target stocks not yet being sustainably managed, fisheries approaches are progressively focusing on a broader range of biodiversity considerations, whereas conservation interests are increasingly adopting more socially inclusive approaches. Looking ahead to the future, biodiversity conservation will continue to be of growing importance in fisheries, and presented here, are examples of how past and on-going developments in fisheries challenge the pessimistic picture promoted by some environment-focused advocacy papers. To continue this successful mainstreaming, greater implementation efforts are needed to deliver outcomes at all scales, requiring greater capacity, particularly in developing countries and strengthening of investment in integrated partnerships between fisheries and environment sectors.

## 1. Introduction

*Mainstreaming biodiversity* considerations in sectoral management has acquired a substantial profile since the adoption of the Convention on Biological Diversity (CBD) in 1992. In the case of fisheries, the consideration of biodiversity through the adoption of more broadly focussed, science-based governance approaches finds its roots in the concept of natural resources management (NRM) or wildlife management [79,80], which has evolved and expanded to include more integrated operational paradigms [31].

"Mainstreaming" of biodiversity has a variety of definitions and interpretations across different sectors. The Global Environmental Facility's (GEF) Scientific and Advisory Panel (STAP) define it well, as:

> "*the process of embedding biodiversity considerations into policies, strategies and practices of key public and private actors that impact or rely on biodiversity, so that it is conserved and sustainably and equitably used both locally and globally* [68,69]".

This definition captures how biodiversity considerations are integrated across sustainable development processes and related activities, requiring a coherent and cross sectoral strategy demonstrating strong technical knowledge of the impacts of each activity in question [and] the involvement of a broad range of stakeholders.[1]

For capture fisheries (referred to as the "fisheries sector"), a suggested definition of mainstreaming is:

> "*the progressive, interactive process of recognizing the values of biodiverse natural systems in the development and management of fisheries, accepting full accountability for, and effectively responding to, the broader impact of fishing and fishery related activities on biodiversity and related structure and function of ecosystems*".

In other words, appreciation for the market and non-market values of biodiversity and the provisioning and regulatory services that

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[1] See another example, http://ncsp.undp.org/topics/mainstreaming-climate-change.

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ecosystems provide, while having accountability for the full footprint of fishing and fishery related activities.

In this paper, it is argued that the consideration of biodiversity in fisheries has been progressing, at both the global and local scales, because i) the fisheries sector and its practitioners are embracing a broader range of ecological considerations across their core work; ii) the "environment sector" (conservation biology, environmental and wildlife-focused initiatives and conventions) is advocating greater biodiversity considerations into fisheries policies and practices effectively, or iii) a combination of both, when the two sectors work collaboratively. What is clear is that a cross-sectoral recognition of its purpose is fundamental to progress in biodiversity mainstreaming. Such recognition benefits from fundamental similarities in the strategic visions of each; two of the three goals of CBD for biodiversity are "conservation" and "sustainable use",[2] whereas in the fisheries sector "resource conservation" and "responsible fisheries" (leading to "sustainable use") are key goals [64]. The overlap is obvious.

The mainstreaming of biodiversity in agriculture, fisheries, forestry and tourism was the overall conference theme at the 2016 United Nations Biodiversity Conference [118]. In many of its events the view of mainstreaming was presented as a new and deliberate process taken by sectoral governance actors, with the intent of integrating biodiversity considerations directly into their operational paradigms. In this paper a contrasting view for fisheries is presented, in that mainstreaming be appropriately viewed as an outcome of long-term shifts in policies and practices. Ultimately, many paradigm shifts in fisheries have occurred over time, delivering long-term convergence towards biodiversity mainstreaming - the environment sector's desired outcome.

In this paper the problems and challenges facing fisheries are not disregarded [40], however the journey of biodiversity consideration across the fisheries sector is the main focus, its successes, on-going deficiencies and gaps. The authors also suggest further work that is needed to deliver full coherent legal frameworks, policies and practices across the fisheries and environment sectors, with relevant examples provided, including suggestions to further strengthen cross-sectoral collaboration in mainstreaming.

## 2. Background

The use of the term "biodiversity" in fisheries broadens the sector's perspective beyond the resources available for harvesting so as to include all parts of nature including components not intentionally harvested, but potentially contributing to ecosystem structure and function [12,94]. Both the concepts of biodiversity and ecosystem structure and function have evolved in the last century of ecology and resource management. Historically, the term "ecosystem" was only introduced in 1935 [133] and the concept of "biodiversity" was not yet in common use in the 1980's [47]. However, the diversity of life has received burgeoning attention across the environment and fisheries sectors, as society has gained a more sophisticated understanding of the scope, value and vulnerability of biodiversity and the complex interconnectivity of natural systems [5,6,26,88,98].

In all resource management this broadening of focus received growing consideration after the Second World War, and was again strengthened in the 1980s through the adoption of the World Conservation Strategy (WCS, [74]). The outcomes of the 1992 United Nations Conference on Environment and Development (UNCED), and its Agenda 21 further increased demand for conservation of biodiversity and resulted in the opening for signature in mid-1992 of the Convention on Biodiversity (CBD) that came into force at the end of 1993. The CBD which now has 196 Members (Parties) strengthened the policy framework and implementation capacity for i) the conservation of biological diversity (or biodiversity); ii) the sustainable use of its components; and iii) the fair and equitable sharing of benefits arising from genetic resources.

The concept of "sustainable development" moved quickly after the WCS, to be enshrined in the report of the World Commission on Environment and Development (Brundtland Commission 1983–1987), that re-defined the societal view of development, accounting for the need to maintain "*the ability of future generations to meet their own needs*" when considering a development agenda [127,130]. The provisions of the World Summit on Sustainable Development in 2002[3] presented a more integrated approach to development and sustainable natural resource management, recognizing the need to i) maintain essential ecological processes and life support systems, ii) preserve genetic diversity and iii) ensure the sustainable utilization of species and ecosystems.

This broadening of focus was occurring in the marine realm as well as terrestrially [51,52,90,92,113]. Growing interest in sustainable development, and the need for greater guidance in the exploitation of resources in contrast to the "freedom of-the-seas doctrine", resulted in the adoption of a binding UN treaty, the 1982 Law of the Sea Convention (LOSC). This treaty held instructions on "the exploitation regime"[4] and, to a lesser extent, "protection of the marine environment",[5] including provisions that showed due regard for both target species in fisheries and *associated and dependent species* that together are key parts of marine biodiversity.

The impetus from UNCED and CBD for greater consideration of biodiversity was felt in the management of all sectors depending or impacting living resources, directly or indirectly [78]. The environment sector's objective of mainstreaming biodiversity across economic development sectors was embodied in hundreds of projects supported from the late 1990s onwards by the Global Environment Facility (GEF). These projects were most numerous in agriculture and forestry [68], although all use sectors received some attention across scores of countries.

Biodiversity impacts were already a focus for fisheries prior to the 1980s [64], as reports on the effects of differing gears, bycatch, habitat impacts and the perturbations of trophic relationships on the ecosystem accumulated in sector literature [71,113]. Although they did not refer to the mainstreaming of biodiversity considerations initially, FAO, the UN agency with competence for fisheries, together with many leading States, increased their focus on the environmental goals for sustainable fishery development: this is evident in the seminal Code of Conduct for Responsible Fisheries (CCRF, [27]) that provides guidance on principles and standards on management and conservation of marine life and the aquatic environment.

The CCRF highlights the need for protection (and/or rehabilitation) of not only target species (Articles 6.3. 7.1.8, 7.2) but also non-target, associated or dependent species and habitats (Articles 6.2, 6.8, 8.7, 8.8, 8.11) including on the monitoring, use and sharing of scientific information (Articles 6.4, 7.1, 7.4, 8.1, 12.4). The CCRF sets fisheries in a broader context in respect to management and conservation frameworks (Articles 6.9, 7.1, 7.3, 9.3, 10, 11), urges application of the precautionary principle (Article 6.5, 7.5), the use of selective fishing gears (Article 6.6, 7.6, 8.5) and the minimizing of waste, discards, ghost-fishing and bycatch (Articles 6.7, 7.2, 7.5, 7.6 and 8.5). Illustrative of the broad focus of the CCRF, Article 7.2.3 examines fisheries activity in the context of ecosystems:

> "……*and species belonging to the same ecosystem or associated with or dependent upon the target stocks, and assess the relationship among the populations in the ecosystem*".

[2] https://www.cbd.int/2011–2020/about/goals.

[3] World Summit on Sustainable Development (WSSD). https://sustainabledevelopment.un.org/milesstones/wssd.

[4] conservation and management of living marine resources.

[5] http://www.un.org/depts/los/convention_agreements/convention_historical_perspective.htm.