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# Pathway to sustainability: the Marine Stewardship Council certification standard as an improvement framework for African fisheries

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Fishery certification is increasingly employed as a multi-stakeholder, market-based mechanism to promote sustainability of fisheries. Preparing for, and achieving certification continues to deliver tangible improvements and benefits to fisheries, but the number of certified fisheries from Africa remains low. Some of the factors that constrain certification of fisheries in the region include limited data to assess and manage fisheries, the open access nature of many fisheries, overfishing, poor management, inadequate enforcement, and low demand for certified seafood. To overcome these constraints, several fisheries employ a “pathway to sustainability” approach that involves using the MSC fisheries standard as a framework for gap analysis, action planning, progress tracking and improvement. Certification may not always be the goal. This allows fisheries to make ongoing improvements over prior performance, regardless of whether they immediately achieve certification or not. Progress towards the desired goal, sustainable management, can be tracked over time. Some of the reported benefits include clarity of objectives, consolidation and focus of stakeholder efforts, participatory engagement, ability to attract resources for improvements, benchmarking of performance and, ultimately, improved environmental performance through better fisheries management. This paper discusses the uptake of this approach in Africa, by presenting case study fisheries from the continent. It outlines mechanisms through which these fisheries embarked on a pathway to sustainability using the MSC fisheries standard, and the outcomes from these initiatives. It highlights the successes and challenges associated with implementation. The paper concludes that the MSC standard and the improvements that it incentivizes can make a positive contribution to regional efforts to improve environmental sustainability, fisheries governance and consequently the socio-economic viability and resilience of fisheries in Africa.

## KEYWORDS

Africa, certification, Marine Stewardship Council, fisheries standard, sustainability, stewardship, fisheries improvement

## 1 Introduction

The fisheries sector plays an important economic role in many African countries. It provides direct employment for an estimated five million fishers and supplies up to 50% of total animal protein consumed in several African states (Food and Agriculture Organization, 2020a).

The sector however faces a range of challenges that compromise its continued ability to sustain livelihoods and food security into the future. These include Illegal, Unregulated and Unreported (IUU) fishing, overfishing, weak or ineffective institutional and legal frameworks, insufficient monitoring, control and surveillance, inadequate scientific research, and a paucity of relevant and timely information to inform management decisions (African Union Commission/New Partnership for Africa's Development, 2014; World Bank, 2017).

These challenges are not limited to African fisheries. Globally, 34.2% of assessed stocks are fished at biologically unsustainable levels (Food and Agriculture Organization, 2020a). In response, many developed countries, such as those of the non-Mediterranean European Union, Canada or USA, have successfully introduced a range of management approaches, and recent trends in stock status indicate that assessed fish stocks of these countries are improving (Hilborn et al., 2020). In contrast, stocks in developing countries are reportedly on the decline (Ye and Gutierrez, 2017; Food and Agriculture Organization, 2020a).

A range of initiatives have been introduced to the continent in a bid to reverse the decline in health of fish stocks and associated ecosystems. A key milestone effort was the adoption of the first ever continental Policy Framework and Reform Strategy for Fisheries and Aquaculture in Africa. Amongst the various mechanisms identified, certification and ecolabelling were recognized for their ability to link fishers to valuable markets and, together, provide a framework for assessing good management and responsible fishing practices (African Union Commission/New Partnership for Africa's Development, 2014).

A number of assessment tools have been used to provide a diagnostic framework for fishery sustainability status including RAPFISH (Pitcher and Preikshot, 2001), the Ocean Health Index (Halpern et al., 2012) and the Fishery Performance Indicators (Anderson et al., 2015). They have however rarely been used as a basis for developing and implementing action plans for fishery improvements to meet pre-determined sustainability targets. Fishery certifications and ecolabelling schemes emerged in the late 1990s as one possible approach to help improve fisheries management. The Marine Stewardship Council (MSC), formed in 1997, is widely viewed as the leading fishery certification standard (Gutiérrez et al., 2012). The program's approach is based on the premise of rewarding sustainably managed fisheries. This, in turn, acts as a mechanism to incentivize fisheries to embark on a journey towards continued improvement of management practices (Agnew et al., 2014; Arton et al., 2020; Van Putten et al., 2020).

African fisheries make a comparatively low contribution to the growing uptake of certification across all fishery certification

schemes, amounting to only 2% of certified seafood globally, inclusive of aquaculture and wild capture (Potts et al., 2016), and only 271,994 tons of the over 15 million tons of MSC certified seafood in 2022 (Marine Stewardship Council, 2022). This may be partly due to lower consumer demand and limited domestic markets for ecolabelled seafood, compared to more developed markets, though this has not prevented the growth of awareness about sustainable seafood in some regions such as southern Africa (Barendse et al., 2018). Other factors that may be limiting uptake of certification in Africa include limited availability of data and information to demonstrate sustainability, limited technical and institutional capacity, low performance of fisheries with respect to certification requirements on governance, ecosystem impacts and stock status, lack of support for certification from key stakeholders, and limited availability of economic resources. This may be especially true for small-scale fisheries (Nyirawung and Erasmus, 2022). A further possible factor is the increasing sustainability divide, wherein a combination of economic interdependencies and limited management and governance capacity in developing countries is leading to a lag in rebuilding and management of fish stocks in developing countries compared to developed countries (Food and Agriculture Organization, 2018). The implication is that many African fisheries would need to implement or demonstrate significant improvements in their performance before they can meet the passing grade of certification standards that are benchmarked on the Food and Agriculture Organization (FAO) Code of Conduct for Responsible Fishing (Food and Agriculture Organization, 1995).

While certified seafood volumes from Africa may be low, there is growing interest in the possible conservation and market prospects that certification offers (Glass et al., 2022). Potential for increased market access and price premiums are key drivers for fishery certification (Lallemand et al., 2016; Anderson et al., 2021). However, market benefits are not the only motivation for engaging with certification programmes. There is increasing evidence of fisheries using the MSC's certification framework to achieve non-market and other systemic impacts (Bush and Oosterveer, 2015; Deighan and Jenkins, 2015; Plotnek et al., 2016) including validation of good stewardship (Phillips et al., 2008; Pérez-Ramírez et al., 2012b); improvement in the public perception of fisheries (Roheim et al., 2011); gaining a 'social license to operate' (Robinson et al., 2021); empowerment of small-scale fishing communities (Pérez-Ramírez et al., 2012b); improvements to governance and consultation processes (Bellchambers et al., 2016a); and improved management (Marine Stewardship Council, 2017; Wakamatsu and Wakamatsu, 2017).

Changes and systemic impact can occur in fisheries and their enabling environment even before certification is achieved. Such systemic impacts are defined by the International Social and Environmental Accreditation and Labelling (ISEAL) Alliance – a network of credible Voluntary Sustainability Standards (VSS) – as any type of change, small or large, occurring along a causal chain (or pathway) that results in outcomes or impacts on the enabling environment to achieve broader effects that support the fulfilment

of VSS missions (ISEAL Alliance, 2018). It further identifies three areas of tangible systemic impacts that may be specifically attributed to certification standards namely: increased stakeholder collaboration, an improved knowledge base and implementation support, and better corporate and public policies and behavior.

The promotion or use of VSSs, specifically certification, to achieve sustainability outcomes is not without contention (Wijen and Chiroleu-Assouline, 2019). As an established program the MSC has received considerable scrutiny. Criticisms include that certification appears less accessible for small-scale fisheries compared to large scale fisheries (Pérez-Ramírez et al., 2012a; Stratoudakis et al., 2015). Other studies highlight concerns with applying a culturally different approach to existing management systems (Lajus et al., 2018); and concerns with VSSs as a form of 'private' transnational governance that potentially adds another layer of complexity to already delicate interactions between fisheries, national governments, and non-governmental organizations (Foley, 2013; Foley, 2017; Long and Jones, 2021) and which can be especially challenging for fisheries in developing countries (Nyirawung et al., 2021).

Nevertheless, more and more fisheries appear to be engaging with VSS with an initial aim to achieve the systemic impacts described earlier, rather than being motivated by achieving certification for gaining immediate market benefits. This approach generally involves three main steps: (1) performing an initial diagnosis of a fishery's sustainability status to identify any sustainability gaps by using a certification standard; (2) developing a focused action plan to address the issues identified in the gap analysis; (3) and, embarking on a pathway to sustainability through implementation of the actions, in collaboration with stakeholders. Several fisheries have taken this route, using the MSC standard to provide the framework for improvement. Following these steps may ultimately result in certification, but some studies suggest that several fisheries have gone on to see governance and ecological gains even without being certified (Bellchambers et al., 2016b; Lejbowicz, 2021).

The MSC standard and certification process provides a mechanism that contributes to efforts towards sustainability in fisheries (Martin et al., 2012; Hønneland, 2020; Schiller and Bailey, 2021). However, while there have been several systematic examinations of the impact of the MSC standard on fisheries that have achieved certification (Arton et al., 2020; Van Putten et al., 2020), the pre-certification space remains an area with very limited information. There are very few examples of reviews on the impacts of the process for non-certified fisheries engaging with the MSC standard as a tool for sustainability, and fewer studies still, of such engagements by African fisheries.

This paper provides a broad overview of how fisheries stakeholders have employed the MSC certification standard around the African continent as a framework to develop and promote sustainable fisheries. It provides a synthesis of African fisheries known to have taken the initial step on a pathway to sustainability using the MSC fisheries standard. Following the ISEAL categorization of systemic impacts, it presents a selection of these fisheries as case studies of how the standard has contributed

to improvements in stakeholder collaboration and partnerships, research and knowledge generation, and policy and management change, and, therefore, an example of marine stewardship in practice – contributions not yet well documented in the African context (Barendse et al., 2016).

## 2 Methodological considerations

### 2.1 The fisheries standard structure and assessment process

Central to the MSC is its fisheries standard which was developed based on the FAO Code of Conduct for Responsible Fisheries (Food and Agriculture Organization, 1995). As prescribed by the FAO ecolabelling guidelines (Food and Agriculture Organization, 2011), the MSC fisheries standard is reviewed every five years to ensure integration of the best available science, leading to newer, improved versions of the standard over time. The current version 2.01 (published in August 2018) consists of three overarching principles that require (1) sustainable stocks of target species; (2) minimizing environmental impacts of the fishery; and (3) effective management systems. A new version 3.0 was finalized during 2022 but has not yet entered into force, and was therefore not yet used to assess any fisheries. Throughout this paper, any reference to 'the standard' refers to one of the earlier versions of the MSC fisheries standard, unless otherwise stated.

The main premise of Principle 1 (P1) is that the target stock should be at a level that maintains high productivity and is consistent with Maximum Sustainable Yield (MSY), with the appropriate harvest strategy and tools to achieve this. Further, there should be adequate information to understand the status of the resource and inform management decisions. Only the species or stocks analyzed under P1 are eligible to carry the MSC ecolabel, once certified. Under Principle 2 (P2) it is required that the fishery's interactions with the marine ecosystem should not endanger its structure, function, productivity, and biodiversity. This includes the assessment of all non-target species, habitats, and other ecosystem's elements. Principle 3 (P3) requires that the fishery respects local, national, and international laws within a management framework that clearly articulates objectives in support of long-term resource sustainability, fosters cooperation in the management of shared stocks, ensures effective monitoring, control and surveillance systems, and allows opportunity for effective stakeholder consultation and input into its management (Marine Stewardship Council, 2018).

These principle-level objectives are operationalized by 28 Performance Indicators (PIs) covering a range of requirements across all three principles, with each PI derived from the FAO Code of Conduct for Responsible Fisheries (see Figure 1). Each PI is made up of one or more Scoring Issues (SIs) – sub-requirements that allow the assessment of a fishery at a more granular level. Scoring Issues contribute to the overall PI scoring, ultimately determining whether a fishery passes or fails the assessment. To become certified to the MSC standard a fishery must first be

PRINCIPLE 1	PI 1.1.1 Target stock status 		PI 1.2.1 Harvest strategy 		
	*PI 1.1.2 Stock rebuilding 		PI 1.2.2 Harvest control rules and tools 		
			PI 1.2.3 Information and monitoring 		
			PI 1.2.4 Assessment of stocks 		
PRINCIPLE 2	PI 2.1.1 Primary species status 	PI 2.2.1 Secondary species status 	PI 2.3.1 Endangered, Threatened and Protected (ETP) species status 	PI 2.4.1 Habitat status 	PI 2.5.1 Ecosystem status 
	PI 2.1.2 Primary species management 	PI 2.2.2 Secondary species management 	PI 2.3.2 ETP management 	PI 2.4.2 Habitat management 	PI 2.5.2 Ecosystem management 
	PI 2.1.3 Primary species information 	PI 2.2.3 Secondary species information 	PI 2.3.3 ETP Information 	PI 2.4.3 Habitat information 	PI 2.5.3 Ecosystem information 
	PI 3.1.1 Legal and customary framework 		PI 3.2.1 Fishery specific objectives 		
	PI 3.1.2 Consultation, roles, and responsibilities 		PI 3.2.2 Decision making process 		
	PI 3.1.3 Long term objectives 		PI 3.2.4 Monitoring & Management performance evaluation 		
<b>KEY:</b>  Status/Outcome PI's  Management PI's  Information PI's					

**FIGURE 1**  
Structural outline of the MSC fisheries standard (the default assessment tree, V2.01) showing the three overarching principles, their components and the 28 Performance Indicators (PIs). The colors of the different components correspond to those used in Figures 2A–C. \*Note that PI 1.1.2 is only scored when PI 1.1.1 scores between 60 and 80.

assessed by a group of independent auditors integrated within accredited third-party evaluation entities, known as a Conformity Assessment Body (CAB), against all the requirements shown in Figure 1. The CAB needs to follow a set of assessment process requirements that accompany the standard. The correct application of these requirements are monitored by an independent accreditation body.

## 2.2 What is assessed? Defining a fishery

Key to understanding how the fisheries standard is applied is to know what is meant by a ‘fishery’ for the purposes of an MSC assessment. The entity that is assessed is referred to as the Unit of Assessment (UoA) and is defined by the combination of the biological unit of the target species, the gear type, types of vessels, and a geographic area or management jurisdiction. Specifically, the delineation of the target biological unit, usually referred to as a stock or population, should have a scientific basis and is usually informed

by one or more characteristics, e.g., population genetics, demographics, and/or management aspects.

The rationale for defining a fishery in this way is that the three MSC principles are assessed at different scales: while P1 looks at the status of the entire exploited biological unit, P2 will assess the environmental impacts of the gear or gears in question. In practice this could mean that two UoAs targeting the same stock using two different gears might get the same assessment result under P1, but their P2 results might differ.

The implication is that a fishery being assessed might consist of multiple UoAs. For example, a longline fishery with vessels targeting two species of tuna in the same area would likely consist of two UoAs, as it is targeting two different stocks subject to different stock status, stock assessments and management rules.

## 2.3 Performance levels for certification

For each SI and PI, a fishery’s performance is determined using a scoring system that sets sustainability benchmarks across an

ordinal scale, with the 60, 80 and 100 levels defining key thresholds of performance against an indicator. The 60 score is the minimum acceptable limit for sustainability practice against any given indicator. The 80 level is aligned with global best practice, while a score of 100 represents the performance expected from a ‘state of the art’ fisheries management system. For a fishery to pass an MSC assessment, it must meet two key scoring criteria: first, it must meet the performance required for at least a 60 score for all SIs and PIs, in other words, any score of less than 60 will cause the fishery to fail the assessment; second, the average score for each of the three principles should be 80 or higher (Marine Stewardship Council, 2011). In cases where a PI scores less than 80 but over 60, and the average Principle score is at least 80, the fishery will achieve a conditional pass. The implication of this is that the fishery must develop and implement improvement actions to increase the performance against that PI to the best practice (80) level, within a specified timeframe. Assessment and certification to meet the MSC fisheries standard is a multi-stakeholder process that involves contribution and input from a diversity of stakeholders including fishery managers, seafood processors, government representatives, community members, NGOs, and other stakeholders with an interest in the outcome of an assessment.

Maintaining its certified status requires a fishery to undergo mandatory annual surveillance audits for the duration of the certificate’s validity period of five years. Further, to remain certified, the fishery must undergo a re-assessment in the fifth year to ensure that its performance remains aligned with best practice. It is also expected that conditions set during the previous certification cycle be resolved when entering recertification.

## 2.4 Identifying performance gaps and tracking progress and improvements

Before attempting certification, a fishery may first opt for a voluntary pre-assessment: a preliminary gap analysis against the full fisheries standard which provides an indication of its likely performance during a full assessment. Unlike a full assessment (as described in 3.1), PIs are not given an exact score during a pre-assessment. Rather, they are assigned one of three draft scoring ranges: <60 means that the PI is unlikely to meet the 60 minimum requirement for full assessment; 60-79 suggests that the 60 level will be met, while >80 suggests a potential score above 80. Where a result suggests a high likelihood of passing a full assessment, it may help a fishery make the decision to pursue certification. In contrast, a more pessimistic result might convince a fishery to first try and address the performance gaps in a structured way before attempting full assessment. In this way, the fisheries standard acts as both a diagnostic tool and a potential road map to achieving a higher level of sustainability in the future (Longo et al., 2021).

Addressing the performance gaps identified in a pre-assessment involves developing an improvement action plan based on the initial pre-assessment results. In most cases, a fishery will need to work with a variety of partners to implement these improvements, sometimes formalized by setting up a fisheries improvement project

(FIP) (Conservation Alliance for Seafood Solutions, 2021). A simplified way to track progress against the initial pre-assessment results and subsequent implementation of improvements, or compare performance of several fisheries, is by using the MSC’s Benchmarking and Tracking tool (or BMT), which expresses the pre-assessment PI scoring categories (<60, 60-79, ≥80) as corresponding BMT scores (0, 0.5, 1). It also calculates an overall BMT index – the average of all BMT scores across all PIs (Marine Stewardship Council, 2014a). The value of the BMT index ranges between 0 and 1, where the closer the value is to 1, the closer the fishery is to a position where its PIs would score at the 80 level (Marine Stewardship Council, 2014a). This study uses the BMT scores for fisheries with available pre-assessments to create heatmaps that allow cross comparison of performance of fisheries in the region in relation to the MSC standard.

## 2.5 Identifying African fisheries

For the purposes of this paper, African fisheries were defined as those occurring within the Exclusive Economic Zones (EEZ) of any African coastal and island state by vessels flagged under any nation, or, for fishing occurring outside any EEZ or territorial waters where the vessels involved were flagged to an African state. Furthermore, fisheries in inland waters of African countries (major lakes or rivers) were also included. The area of interest therefore included the following FAO Major Fishing Areas, sub-areas or divisions: 01 Africa Inland waters, 47 (Southeastern Atlantic Ocean), 51 (Western Indian Ocean sub-areas 1, 3, 5, 6, 8), 34 (Eastern Central Atlantic Ocean), 37 (The Mediterranean Sea and Black Sea), sub-areas 1, 2, 3, Divisions 1.1, 2.2, 3.2 (Balearic, Ionian, Levant).

All fisheries meeting the above criteria and known to have had different stages or forms of engagement with the MSC fisheries standard up to the end of 2021, and with information about their engagement with MSC in the public domain, were identified and included in the study (see Supplementary Table 1 for full details). This was based on the authors’ personal experience, expert knowledge, and direct historical involvement with the implementation of the MSC fisheries standard and program. In addition, publicly available documents were gathered *via* internet searches, including Google Scholar, or from online repositories, notably the MSC’s ‘Track a Fishery’ website<sup>1</sup> for certification documents and FisheryProgress.org<sup>2</sup> for FIP documents. Some documents were not publicly available (pre-assessment results can often be confidential and only available on request of the fishery or funders) but could be inspected to extract specific information with permission from partners (see Supplementary Table 2 for a list of the source documents).

All documents found were reviewed with attention given to the type of fisheries and their UoAs, the timing and nature of

1 <https://fisheries.msc.org/en/fisheries/>

2 <https://fisheryprogress.org/>

interactions with the standard, particularly those that had undergone pre-assessments, had a BMT index and scores available, had used pre-assessment results to develop improvement action plans, or had otherwise engaged in MSC pathway projects. Pathway projects are regional multi-fishery assessments that combine a range of tools such as technical capacity building to help fisheries stakeholders better understand assessment results and guide them to develop and implement improvement action plans.

## 2.6 Analysis of pre-assessments

For fisheries with pre-assessment results available, or with a BMT tracker with the results, their scores were analyzed to examine overall performance against the standard. Only pre-assessments based on version 1.2 or later of the fisheries standard were included, and where more than one version existed (e.g., an update to an earlier pre-assessment), the most recent was used. Any fisheries that were subsequently certified, including those with only some UoAs, were not included in this analysis; nor those with pre-assessment results not publicly available and therefore confidential (Supplementary Table 1). The analysis did not include the single inland fishery that had a pre-assessment, as the fisheries' pre-assessment did not include a BMT score. This left 49 fisheries made up of 196 UoAs.

For the sake of analysis and presentation, fisheries and their UoAs were divided into three groups: (A) non-tuna coastal fisheries (i.e., operating only within EEZ's) that targeted species other than tunas or large pelagic species (34 fisheries with 43 UoAs); and fisheries targeting tuna and large pelagic species in the (B) Atlantic Ocean (11 fisheries with 101 UoAs) and (C) Indian Ocean (six fisheries with 52 UoAs). It should be noted that two tuna fisheries, the South African tuna longline and Atlantic and Indian Ocean operations of the OPAGAC/AGAC tropical tuna purse seine fishery straddle both oceans and therefore have UoAs present in both tuna groups.

Performance Indicator level BMT scores of the three fisheries groupings were converted to numerical matrices and plotted as heatmaps using the `heatmap` package<sup>3</sup> {`heatmap`} version 1.0.12 in R, with BMT scores of 0 displayed as red, 0.5 as amber, and 1 as green. Hierarchical clustering was applied to rows only, based on Euclidian distance, while the columns remained in the order of the MSC PIs as presented in Figure 1. Each UoA was assigned a unique labeling code. The row clustering trees were cut based on what was judged meaningful in terms of the nature and type of UoAs (see Figures 2A–C). Row color keys were added to highlight the gear type, and for the non-tuna fisheries (Figure 2A), the ocean/sea where the fishery occurs. Column color keys were added to show the components under each principle and the type of PI (outcome, information, or management – see Figure 1).

## 2.7 Case study analysis of systemic impacts of a voluntary fisheries standard

Six fisheries from those identified in section 2.5 were selected as case studies to provide a more detailed illustration of the range of interactions with the MSC fisheries standard over time. The case study fisheries were Gambia sole, Morocco sardine, Mauritania octopus, Southwest Indian Ocean octopus, Namibia hake and South Africa hake fisheries. For each case study fishery, available information was collated and reviewed to identify key activities and developments that had taken place in relation to its engagement with the MSC standard. This was not intended to represent a systematic or exhaustive analysis. Rather, the case studies were selected to demonstrate the different possible types of systemic impacts in individual fisheries in terms of recognizing performance gaps, and to examine the resulting stakeholder partnerships, research, and knowledge generation applicable to sustainable management and policy change. Where possible, they were chosen to provide a variety of fishery characteristics e.g., small-scale (Gambia sole, Southwest Indian Ocean Octopus); large scale (Morocco sardine, South Africa hake); pelagic (Morocco sardine); demersal (Gambia sole); finfish fishery (Gambia sole, Morocco sardine, South Africa hake); and cephalopod fisheries (South West Indian Ocean octopus, Mauritania octopus).

## 3 Results

### 3.1 Engagement of African fisheries with the MSC standard

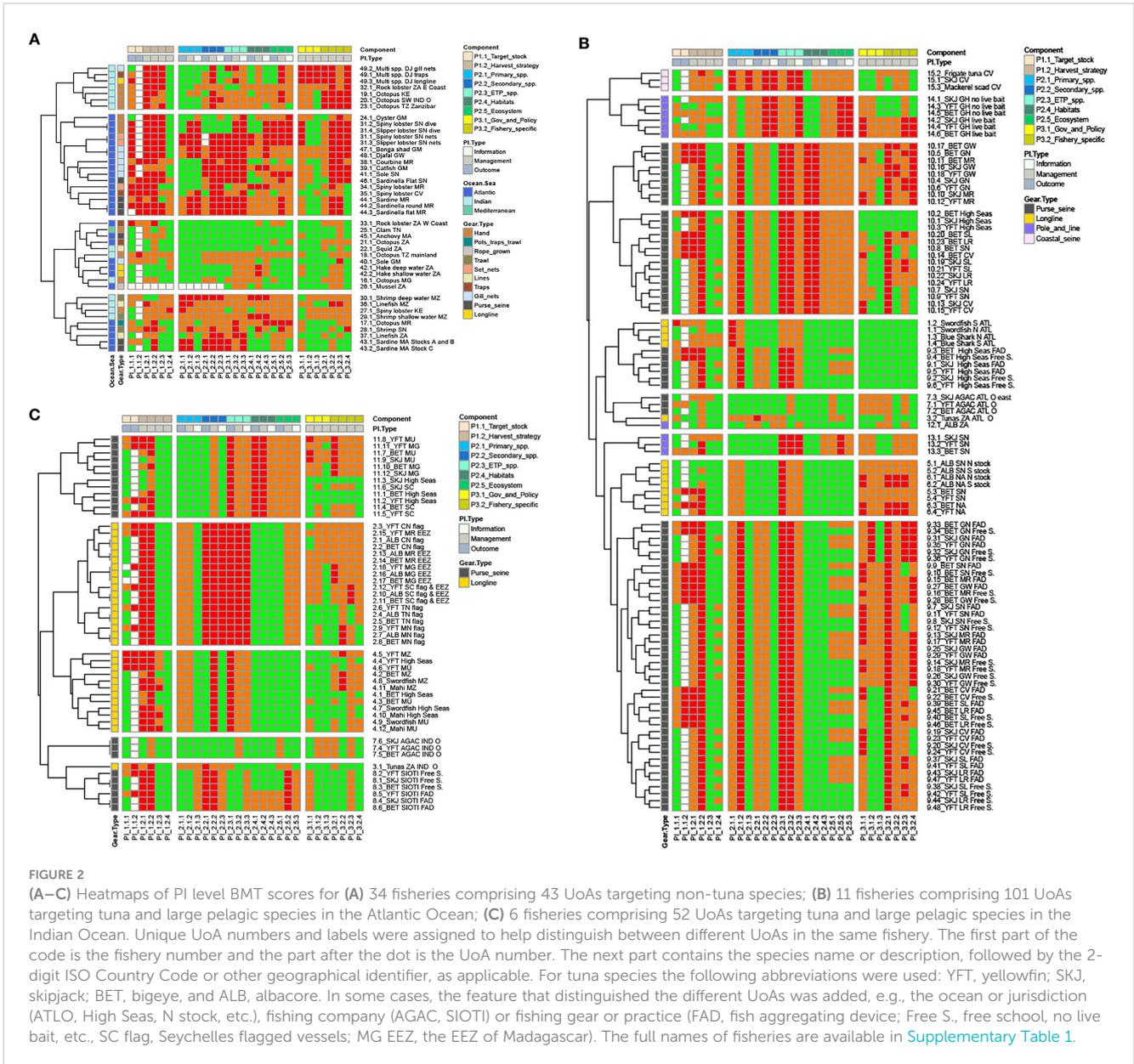
In total, 59 fisheries were identified as meeting the criteria described in 3.5 (Supplementary Table 1). These include one inland fishery (for Nile perch) in Lake Victoria bordering Uganda, Kenya, and Tanzania. The remainder occur in the Atlantic and Indian Oceans, except for one in the Mediterranean and two in the Red Sea, with representation in seven Large Marine Ecosystems (LME's) surrounding the African continent: Canary Current, Guinea Current, Benguela Current, Agulhas Current, Somali Coastal Current, the Red Sea, and the Mediterranean Sea (see Supplementary Table 1). These fisheries operate in the EEZ's of 28 African nation states and one European state – France – due to its Indian Ocean territories of Mayotte and La Reunion. In terms of the management of highly migratory species and stocks (mainly tuna), fishing for these occurs in international waters under jurisdiction of two Regional Fisheries Management Organizations (RFMO's): the Indian Ocean Tuna Commission (IOTC)<sup>4</sup> and the International Commission for the Conservation of Atlantic Tunas (ICCAT)<sup>5</sup>.

Combined, the fisheries target at least 61 different species or species groups as P1 stocks. These include about 19 species or

<sup>3</sup> <https://cran.r-project.org/web/packages/heatmap/heatmap.pdf>

<sup>4</sup> <https://www.iotc.org/>

<sup>5</sup> <https://www.iccat.int/en/>



genera of demersal or reef fish; four small pelagic species; 10 tuna and other large pelagic species, including one shark; four bivalve species; 10 species of shrimp; nine (mainly spiny) lobsters; one squid and two octopus species; and one species of marine algae ([Supplementary Table 1](#)).

A variety of gear types are employed, including bottom and midwater trawls (8); longlines (10); gill or set nets (11); gleaning or hand collection, including the use of hand spears, harpoons, rakes, etc. while on foot or snorkeling (10); hand lines (6); pole and lines (4); traps and pots (4); purse-seine nets (11); and a coastal seine net (1).

Several fisheries may target more than one species or several members of a genus or family (e.g., reef dwelling species belonging to the families Lutjanidae, Scombridae, Serranidae, and Lethrinidae), use more than one gear, and operate in the waters

of multiple countries or jurisdictions. Conversely, different fisheries might target the same species or stock - this is especially true for highly migratory species such as tunas.

### 3.1.1 A timeline of engagement of African fisheries with the MSC standard

A total of 57 MSC pre-assessments for African fisheries are known to have occurred between 2001 and 2021, of which only three were prior to 2007. The first known one was the pre-assessment in 2001 of an Eritrean multi-species longline and handline fishery, followed by the 2002 pre-assessment of South African hake trawl, and then Madagascar shrimp trawl in 2003 ([Figure 3](#); [Supplementary Table 1](#)). In 2004 the South Africa hake trawl fishery became the first African, and one of the first fisheries globally, to achieve its initial certification. Since then, it has been

recertified three times and remained the only fishery in African waters certified up to 2018, when the Echebatar Indian Ocean purse seine skipjack tuna achieved certification<sup>6</sup>. The next year the Sant Yago TF unassociated purse seine Atlantic yellowfin tuna fishery<sup>7</sup> became the third fishery in African waters to be certified.

In the years 2008 to 2010 there was a total of 10 known new pre-assessments. Many of these were crustacean fisheries (shrimp and rock lobster) in East African countries bordering the Indian Ocean, except for the only freshwater fishery to be assessed (Lake Victoria Nile perch), the Namibian hake trawl and longline, South African pole and line tuna, and Mauritanian octopus (see case studies Section 3.2). Between 2010 and 2014 only one other pre-assessment is known to have occurred, in 2012, for Senegalese lobster.

In 2014 and 2015 there was a notable increase in the number of pre-assessments, including four regional tuna and other large pelagic fisheries using purse-seine or longline gear operating in both the ICCAT and IOTC managed high seas and across the EEZ's of more than 10 countries. Some of these fisheries went on to achieve certification (see below). The other three fisheries pre-assessed during this time included – the Gambian sole (Nyiawung and Erasmus, 2022; and case study in Section 3.2.1.1); and a multispecies fishery in the Red Sea. In 2015, the Namibia hake fishery had an update to its 2010 pre-assessment and, in 2020, became the fourth fishery in Africa waters to be certified. The South African and Namibian hake fisheries (see case studies in Sections 3.2.1.5 and 3.2.1.6) remain the only coastal African fisheries to be certified to the MSC standard, contributing 271,994 tons of the over 15 million tons of MSC certified seafood in 2022. Two other coastal fisheries, South Africa hake longline and South Africa albacore tuna pole and line are verified in Transition to MSC fisheries<sup>8</sup>.

The years 2016 and 2017 saw four new pre-assessments, including a first pole and line tuna fishery in Senegal and a multispecies line fishery in Mozambique: the assessment of the latter was promoted by a fish importer and processor in South Africa due to growing retail awareness about sustainable seafood in that country (Barendse et al., 2018).

In 2018 and especially 2019, the sharp increase in number of known pre-assessments completed is attributable to the implementation of two MSC pathway projects initiated in 2017 – the Southwest Indian Ocean Octopus (SWIOceph)<sup>9</sup> Project focusing on octopus fisheries in the Southwest Indian Ocean (SWIO) region, and the Fish for Good project in South Africa.

Together these projects accounted for 14 of the 18 new or updated pre-assessments.

While 2020 had relatively few pre-assessments, 2021 showed a rise, the main driver being the implementation of another pathway project, this time in West Africa<sup>10</sup>, accounting for 12 of the pre-assessments. Another notable contributor was the high number of new tuna fisheries being pre-assessed with the intention of forming FIPs. Two more tuna fisheries operating in African waters achieved certification in 2021: the CFTO Indian Ocean Purse Seine Skipjack fishery<sup>11</sup> and the ANABAC Atlantic unassociated purse seine yellowfin tuna<sup>12</sup>. Both these fisheries formed part of much wider pre-assessments containing several UoAs undertaken in 2015 and 2017 respectively, before a subset went through a full assessment.

The number of fisheries certified, compared to the number of fisheries that have had a pre-assessment in the region is low. This highlights that many fisheries face obstacles to demonstrate their sustainability, but it also suggests that achieving certification might not be the only goal for many fisheries in the short-term. Conducting a pre-assessment is very much the first step of engagement with the MSC fisheries standard. What follows, namely the development and implementation of an improvement action plan, provides the framework for stakeholder partnerships, research, policy and management improvements, and tangible progress towards sustainability, and this can take time.

Sections 3.1.2 – 3.1.4 provide a summary of the gap analysis derived from the pre-assessments results discussed above, while section 3.2 provides a more in-depth look at the selected fishery case studies on outcomes from the development and implementation of their improvement action plans.

### 3.1.2 Fishery performance at principle level

An examination of the draft scoring categories for each MSC principle for these UoAs reveals a large proportion of the scores in each fishery grouping were <80 (Figures 4A–C). However, there were also differences between the three fishery groupings. The UoAs in the non-tuna group (Figure 4A) had the highest proportion of <60 scores for each principle and the lowest proportion of >80 scores (except for Principle 3 for the Atlantic Ocean tuna and large pelagic UoAs which had slightly smaller percentage of >80 scores (Figure 4B).

In comparing the two tuna groupings, Indian Ocean UoAs appeared to perform better for Principle 3 with the lowest proportion of <60 scores (Figure 4C). For Principle 1, UoAs from the Atlantic Ocean tuna and large pelagic fisheries grouping had the lowest proportion of <60 scores (Figure 4B), although scores of >80

6 <https://fisheries.msc.org/en/fisheries/echebatar-indian-ocean-purse-seine-skipjack-tuna/>

7 <https://fisheries.msc.org/en/fisheries/sant-yago-tf-unassociated-purse-seine-atlantic-yellowfin-tuna-fishery/>

8 [https://www.msc.org/docs/default-source/default-document-library/for-business/fishery-improvement-tools/itm-fisheries-list.pdf?sfvrsn=db92ff28\\_7](https://www.msc.org/docs/default-source/default-document-library/for-business/fishery-improvement-tools/itm-fisheries-list.pdf?sfvrsn=db92ff28_7)

9 <https://www.msc.org/what-we-are-doing/pathway-to-sustainability/southwest-indian-ocean-octopus-project>

10 <https://www.msc.org/what-we-are-doing/pathway-to-sustainability/west-africa>

11 <https://fisheries.msc.org/en/fisheries/cfto-indian-ocean-purse-seine-skipjack-fishery/>

12 <https://fisheries.msc.org/en/fisheries/anabac-atlantic-unassociated-purse-seine-yellowfin-tuna/>

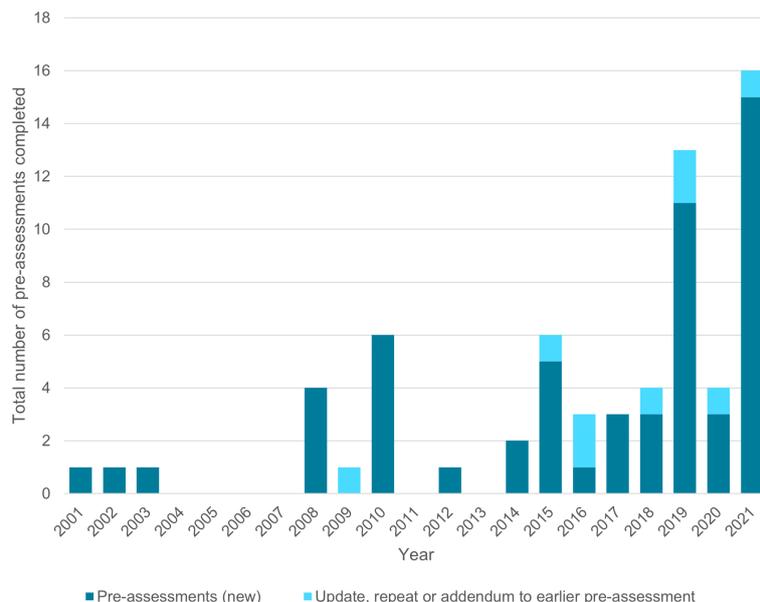


FIGURE 3

Number of known MSC pre-assessments by year for African fisheries. Note that some fisheries may have undergone more than one pre-assessment in different years against an updated version of the standard, or a pre-assessment was updated with new information.

were roughly the same proportion. These results do not necessarily reflect the general state of tuna fisheries in these oceans, but rather the situation of the specific tuna UoAs that undertook MSC pre-assessment.

### 3.1.3 Heatmaps of BMT scores

The heatmap for non-tuna fisheries produced four clusters (Figure 2A). The uppermost cluster contained only fisheries from the Indian Ocean, the second cluster only fisheries from the Atlantic Ocean, while the lower two clusters contained fisheries from both oceans. Gear type did not appear to be an important factor in the clustering. The upper two clusters had notably poorer BMT scores (displayed as red and orange), particularly in terms of P1 and P3 components, while the third cluster represented the higher scoring fisheries.

The heatmap for Atlantic tuna and large pelagic species (Figure 2B) showed nine clusters. One of the fisheries, the Capsen S.A. Atlantic tuna purse seine fishery contained 48 UoAs (represented by UoA codes 9.1 – 9.48) based on all possible combinations of three tuna species, nine jurisdictions, and whether fish aggregating devices (FAD's) are used or not. This fishery alone was responsible for one cluster, with only six of its UoAs falling in another cluster. Gear type did appear to be an important factor in the clustering of UoAs with seven of the nine clusters represented by a single gear type. As fisheries tend to use one gear type these seven clusters also represent distinct fisheries. The fifth cluster represented two gear types with high P3 BMT scores appearing to have driven the formation of this cluster. The sixth cluster was composed of three gear types and appears to represent the higher scoring UoAs.

The Indian Ocean tuna and large pelagic heatmap (Figure 2C) showed five clusters. Like the heatmap for Atlantic tuna and large pelagic species, gear type also appeared to be an important factor in

clustering with four of the five clusters represented by a single gear type (and distinct fishery). Poorer BMT scores for component P2.1 (primary species) and high BMT scores for the component P2.4 (habitats) appears to have been broad driver differentiating longline UoAs from purse seine UoAs. The fourth cluster represents the higher scoring UoAs, all from one fishery.

Two tuna fisheries, South African tuna longline and AGAC tropical tuna purse seine fishery (represented by UoA codes 3 and 7 respectively) had UoAs in each ocean and therefore appear in both Figures 2B, C.

### 3.1.4 BMT indices

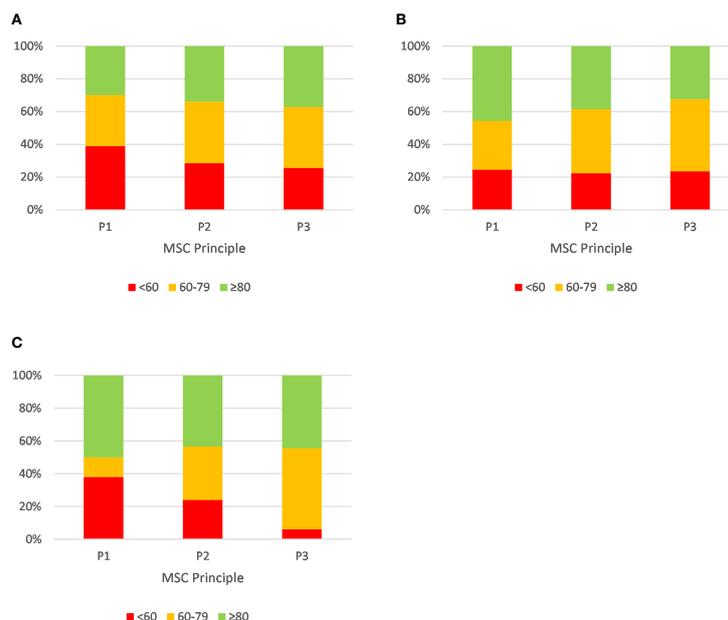
The distribution of BMT index scores (Supplementary Table 3) varied between the three groupings (Figures 5A–C). Distributions for UoAs occurring in RFMOs (Figures 5B, C) were more skewed toward higher BMT scores compared to the distribution for UoAs managed only by coastal states (Figure 5A). The distribution for Indian Ocean tuna and large pelagic UoAs (Figure 5C) was skewed toward higher BMT scores compared to Atlantic tuna and large pelagic UoAs (Figure 5B), and this seems to be due to better BMT scores for P3 in the Indian Ocean UoAs (Figure 4C), and despite the better BMT scores for P1 for Atlantic Ocean UoAs (Figure 4B).

## 3.2 Systemic impacts of a voluntary fisheries standard

### 3.2.1 Fishery case studies

#### 3.2.1.1 Gambia sole

The Gambia sole fishery is one of the most important high-value commercial species in the small-scale fisheries sector in the country. Two species are key to the fishery, red sole (*Cynoglossus*



**FIGURE 4**  
(A–C). Breakdown of PI draft scoring ranges (<60 = Red; 60–79 = Orange; ≥80 = Green) per MSC Principle for (A) non-tuna fishery UoAs; (B) Atlantic Ocean tuna and large pelagic fishery UoAs; (C) Indian Ocean tuna and large pelagic fishery UoAs.

*senegalensis*) and black sole (*Synaptura cadenati*). The fishery supports the livelihoods of about 500 fishers that harvest sole using bottom-set gill nets along the coast and the river Gambia (Tindall, 2012). Landings total 1500 MT (De Alteris et al., 2012). Fish traders often purchase sole from fishers and aggregate this into bulk supplies for processors who then fillet before packaging and exporting primarily to Europe, with small volumes sold locally. The fishery unit within scope of engagement with the MSC is the seine-caught sole from the Gambia river to the Atlantic coast.

### 3.2.1.2 Morocco sardine

The fishery for *Sardina pilchardus* (European pilchard) is the most important fishery in Morocco in terms of landing volume. The fishery comprises three types of fleets: coastal seines, refrigerated sea water trawlers and freezer trawlers. Other target species in the fishery include sardinella, anchovy, chub mackerel, and horse mackerel. There are two management zones for the fishery in Morocco's Atlantic coast, zones A and B from Cap Cantin to Cap Bojador, and zone C from Cap Bojador to Cap Blanc. The interest from this fishery in pursuing certification was driven by the extensive market interest in supplying certified sardine within Europe. Morocco is the biggest supplier of sardine into Europe.

### 3.2.1.3 Mauritania octopus

Common octopus (*Octopus vulgaris*) is one of the most important fishing resources in Mauritania. Although it represents only approximately 20% of the national catch volume, it provides more than 60% of fishery exports' value (Société Mauritanienne de Commercialisation de Poissons, 2021). Over the last 20 years the fishery has transitioned from a structure composed of two very different fleets, the foreign (mainly European) bottom trawling

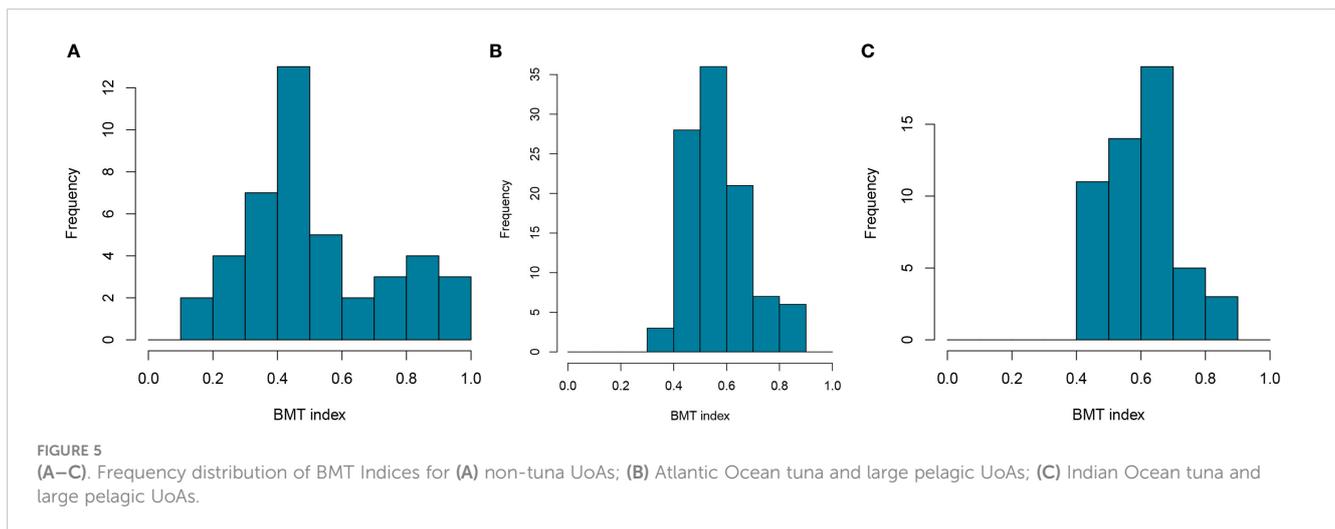
vessels and the national artisanal boats using pots, traps, and jigging, to a three fleets scheme with bottom trawlers (now only national, including Mauritania-China joint venture), artisanal boats and a new coastal trap fleet (Ministère des Pêches et de l'Économie Maritime République Islamique de Mauritanie, 2018).

The annual catch volume of octopus increased from 2,600 tons in 1994 to around 30,000 tons most recently, with a peak of 39,000 tons in 2017 (Food and Agriculture Organization 2020c; Bouzouma and Baye, 2020). In 2018, octopus landings amounted to 31,500 tonnes, 11,400 of which came from bottom trawling and coastal fleets, the rest came from the artisanal fleet. In 2018, the fishery was operated by around 2,400 artisanal boats, and 154 vessels including 18 coastal trap vessels, and 136 trawlers (Khallahi et al., 2020).

Environmental certification and ecolabelling were seen as providing an opportunity to communicate a combination of improvements in Mauritanian fisheries management alongside product quality *via* a transparent approach that is recognized by international markets and also as an incentive to reinforce Mauritanian Fisheries Administration practices in terms of management and governance (Ministère des Pêches et de l'Économie Maritime République Islamique de Mauritanie, 2018).

### 3.2.1.4 Southwest Indian Ocean octopus

Octopus has always been an important resource for coastal communities of the Southwest Indian Ocean (SWIO) region. Traditionally it was a subsistence fishery providing sustenance or material for barter, however increasing global demand for octopus product has turned it into an important economic activity for coastal communities (Guard and Magaya, 2002; Rocliffe and Harris, 2016; Sauer et al., 2019).



Throughout the region octopus are captured using pointed or hooked sticks, either by women and children gleaning along the reef flats at low tide, or by men snorkeling along the reef edge (Guard and Magaya, 2002; Rocliffe and Harris, 2016). The catch is dominated by *Octopus cyanea* with small numbers of *O. vulgaris* sometimes also caught (Sauer et al., 2019). Sauer et al. (2019) estimated the octopus catch data in 2015 for the SWIO to be between 3000–3500 tons. A more recent estimate suggests catch (excluding Mozambique) could be as high as 6,232 tons (Norman et al., 2019). Tanzania, Madagascar, and Kenya are the largest exporters of octopus from the SWIO region, with the bulk of product exported to southern Europe (Comtrade, 2019). The dispersed nature of octopus fisheries in this region resulted in the geographic extent of fishery UoAs engaged in the MSC programme being at country level, with capture method and fishing gear being gleaning and snorkeling with pointed or hooked sticks.

### 3.2.1.5 South Africa hake trawl

The hake trawl fishery in South Africa is the country's most valuable commercial fishery, supporting more than 12,000 fishing and processing jobs (Lallemand et al., 2016). Hake is a popular fish in the local South African market, though more than 60% is exported – mainly to southern and northern Europe, and more recently to Australia and North America<sup>13</sup>.

Trawlers operate in both the deep-sea and inshore environments, targeting two species of hake, *Merluccius paradoxus* and *M. capensis*. The deep-sea and inshore fleets together account for 90% of South Africa's hake catch<sup>13</sup> and in 2004 became the first hake fishery, and the second groundfish fishery in the world to be MSC certified.

### 3.2.1.6 Namibia hake

The same two species of hake in the South Africa hake fishery, *M. paradoxus* and *M. capensis*, are targeted in Namibia, by trawl and longline vessels, with most of the catch destined for foreign

markets (Chiripanhura and Teweldemedhin, 2016). The fishery operates throughout the Namibian EEZ at depths of greater than 200m. South of Walvis Bay, wetfish vessels must fish deeper than 300m and freezer vessels deeper than 350m (Food and Agriculture Organization, 2019a).

Prior to independence in 1990, the country exercised limited control of fishing effort in its waters and hake was heavily fished by an international fleet, with catch at its peak exceeding a million tonnes (Chiripanhura and Teweldemedhin, 2016). Since 2008, the hake catch has seen steady recovery, though excess processing capacity and inconsistent rights allocation and quota policies have at times placed political and environmental outcomes at odds with one another (Kirchner and Leiman, 2014). Today, fishing is strictly controlled, with current management measures including spatial restrictions, a closed season and a shared TAC, which is set at around 150,000 MT per season (Control Union, 2020).

With interest in certification from some stakeholders in the fishery a pre-assessment was conducted in 2010. The pre-assessment was updated in 2015. Four UoAs were identified (deep-water vs shallow and longline vs trawl) and the fishery was certified in 2020.

## 3.2.2 Gap analysis and improvement plans

For the Gambia sole fishery an initial gap analysis of the fishery against the MSC standard, in the form of a pre-assessment, was conducted in 2007 (Keus et al., 2015). The fishery scored well on some performance indicators including some of the requirements on information availability and the ecosystem and habitat performance requirements, but several performance indicators had low scores. The pre-assessment allowed the identification of key areas that would require improvements in order for the fishery to meet MSC requirements (Supplementary Table 4). These included management of retained by-catch, endangered, threatened and protected (ETP) species management, data collection, stock assessment, harvest control rules (HCR) and management plan (Medley et al., 2008). Stakeholders involved in the fishery worked together to develop an action plan that would help to address identified gaps.

<sup>13</sup> <https://www.sadstia.co.za/fishery/markets/>

In the Morocco sardine fishery, a pre-assessment against the MSC standard was first conducted in 2010. The BMT index at the start across zone A and B was 0.59 and in Zone C it was 0.61<sup>14</sup>. A formal FIP was introduced in 2014 although the government had started to initiate improvements informed by the initial pre-assessment prior to the formal improvement project. While the gap analysis showed draft range scores of over 60 on several of the performance indicators, several areas were identified as requiring further improvement. Key issues that needed to be addressed towards meeting the standard included further understanding of the status of stocks, the need for a management plan, the need for harvest control rules for the fishery, an understanding of status of primary species, the absence of information on discards and interaction with ETP species, and uncertainty about adequacy of management measures to manage impact on discards and ETP species (Supplementary Table 5)<sup>15</sup>. Later in the process, stakeholders identified the need for more work in relation to the low trophic level status of the target species, including the importance of sardine populations to seabirds diets.

To address these gaps against the fisheries standard several improvement actions were identified and agreed by stakeholders associated with the fishery. This included working to finalize a management plan for management zones A and B, development of harvest control rules for stocks in zone C, development of a data collection program to enable evaluation of discards and interactions of the fishery with ETP species, agreement to enhance transparency of decision making, and improved understanding of stock status<sup>15</sup>. Regarding low trophic level status, stakeholders identified a need to gather information on numbers and species of sardine predators, and to estimate biomass needed to feed predator populations.

The Mauritanian octopus fishery (including the bottom trawling, trap, pot, and jigging fleets) undertook an initial MSC pre-assessment in 2010, which was updated in 2016. The gap analysis showed bycatch associated with the pot fishery was insignificant, but identified several areas of the environmental performance of the fishery requiring improvement. These included overexploitation of the octopus population, low frequency of stock assessments, absence of a well-defined harvest strategy and harvest control rule, lack of data on discards of the trawling fleet, and incomplete information of the artisanal fishery operations and its landings. In addition, weak data on by-catch species, limited knowledge of habitats and ecosystem characterization, and lack of data on lost pots (ghost fishing) and their impact on the ecosystem were identified as key issues that needed to be addressed (Supplementary Table 6). The limitations in responsiveness of the decision-making process, the absence of formal adoption of the Octopus Management Plan, and the

inefficiency of existing measures to control fishing effort were also highlighted as key governance areas requiring improvements (Food and Agriculture Organization, 2016).

In 2019, the Mauritanian octopus sector, supported by the FAO, outlined an improvement action plan to address these gaps (Food and Agriculture Organization, 2019b). Part of these improvement actions were already integrated within the proposed, though not formally adopted, Octopus Management Plan. Consequently, the first overarching improvement action identified, was the adoption of the Octopus Management Plan. Other relevant actions identified included: the definition of authorized fishing gears and technical features; spatial planning based on fishing gears, vulnerable habitats characterization and identification of other species; improvement of bottom trawling selectivity to minimize discards and by-catch; reduction of pots lost in the artisanal fleet; increased research of the fishery's interaction with ETP species; and the creation of a Commission (Commission d'Appui à l'Aménagement de Pêcheries: CAAP) to support the decision-making process.

For the SWIO octopus fishery several different octopus fisheries in the region have been subjected to gap analyses against the MSC's fisheries standard. In 2010 pre-assessments were undertaken for two fisheries against the MSC standard: one in southwest Madagascar (Medley and Gaudian, 2010) and the other for the Tanzania mainland coast (Hough et al., 2010). In 2018, five further pre-assessments were undertaken: updates for southwest Madagascar and Tanzania mainland; new analyses for Kenya and Zanzibar; and a region-level analysis for the smaller fisheries that exist in Mozambique, Mauritius, Comoros, and Seychelles. The gaps identified in the 2010 analyses of southwest Madagascar and mainland Tanzania were similar to those observed for the additional SWIO octopus fisheries: the status of octopus stocks were not known and there was concern that declining catch rates were indicating pressure on the resource; a harvest strategy and harvest controls rules were either not defined or inadequate; there were concerns about the impact of the fishery on bycatch, ETP species, habitats and the ecosystem – with no data collection occurring to assess validity of the concerns; and there was no fishery specific management plan defining the objectives for the fishery and how compliance, enforcement, monitoring and evaluation would occur (Supplementary Table 7). An action plan to address the gaps identified in the Tanzania pre-assessment was developed, and implementation commenced by World Wide Fund (WWF) and the Ministry of Livestock and Fisheries Development of the United Republic of Tanzania through funding from NEPAD (New Partnership for Africa's Development) and the UK's Department for International Development (DFID)<sup>16</sup>. Around the same time Blue Ventures (a non-governmental organization (NGO)

14 <https://thefishsite.com/articles/moroccan-sardine-fishery-makes-sustainability-progress>

15 [https://fisheryprogress.org/system/files/documents\\_workplan/FIP%20Public%20Workplan%202017%20Approved.docx](https://fisheryprogress.org/system/files/documents_workplan/FIP%20Public%20Workplan%202017%20Approved.docx)

16 <https://www.msc.org/media-centre/press-releases/press-release/nepad-funding-for-improvement-projects-based-on-the-msc-framework-will-boost-sustainability-of-fisheries-in-east-africa->

developed and worked to implement the Southwest Madagascar Octopus fishery improvement action plan in collaboration with local stakeholders<sup>17</sup>.

For the South Africa hake fishery, the first certification in 2004 came with seven conditions and required action plans to address the conditions for the fishery to maintain its certification. These related to bycatch management, seabird monitoring, research on habitats, ecosystems and recruitment variability, and external review of management systems (Supplementary Table 8). During the first re-assessment, feedback from stakeholders identified further uncertainties surrounding the recovery of depleted hake stocks, and further actions to undertake further analysis of by-catch, protection of critical habitat and the fishery's impacts on benthic ecosystems were identified. Action plans to address each condition were agreed as part of the conditions to maintain certification.

The fishery, in partnership with NGO stakeholders, implemented several research initiatives and by re-assessment in 2008 had introduced mitigation measures that included ringfencing of existing trawl grounds and mandatory use of bird-scaring lines. Reflecting the work carried out to address the conditions of the first two assessments, the assessment team identified few weaknesses in the fishery during the second re-assessment and noted that "some historical concerns about the fishery (notably impacts of the fishery on bird species) have been successfully addressed by management measures that have been developed through partnership between the fishing industry, government, and environmental NGOs" (Andrews et al., 2015, p 10). The fishery was certified for the 4th time in early 2021, with several new conditions linked primarily to changes in the MSC standard and the need for further understanding of the *M. paradoxus* stock structure.

The 2010 pre-assessment for Namibian hake was updated in 2015 to take account of developments in the fishery and in the MSC standard. The new pre-assessment highlighted some issues which would need to be addressed. Under P1 these included a better understanding of recruitment of the target hake stock, and the need for a clear plan showing how MSY would be achieved (these would require a better understanding of connectivity between the hake stocks caught in Namibia and South Africa). In P2 there was a need for evidence to demonstrate an understanding of the fishery's impact on seabirds (Supplementary Table 9). Sufficient progress was made addressing these issues allowing the Namibia hake fishery to be certified in 2020. Across the four UoAs 14 conditions were raised, including continuing work to address the appropriateness of stock assessments in relation to reference points and harvest control rules, the effectiveness of measures to reduce mortality of seals, reviewing the effectiveness of measures to reduce seabird interactions, collection of information relating to impacts on vulnerable marine ecosystems (VME's), development of a system for organized and effective management cooperation for *M. paradoxus*.

### 3.2.3 Stakeholder collaboration and partnerships

In the Gambia sole fishery, the collective interest in certification led to collaboration across a range of stakeholders. Partners were identified to fulfil various components of the improvement action plan. This included government departments, business, researchers, and NGO's. Specific partners included: United States Agency for International development (USAID), who provided funding for implementation of a range of actions in the improvement action plan (Ragusa et al., 2013); Coastal Resources Centre (CRC) of the University of Rhode Island, who provided project oversight, training and implementation; WWF who supported CRC as project manager and were also directly involved in implementing a suite of activities related to the improvement action plan; the Gambia Department of Fisheries, the Atlantic Seafood company; local fishers who supported the process with provision of data to aid assessments of stock status (De Alteris et al., 2012); and the National Sole Co-Management Committee (NASCOM) which was set up specifically to support the improvement process and longer term sustainability of the fishery. Membership of this committee included fish mongers and processors, landing site co-management committees, the Gambian Artisanal Marine Fisheries Development Association (GAMFIDA), the National Association of Artisanal Fishing Operators (NAAFO), municipalities, the Department of Fisheries, and the industrial sector. A memorandum of understanding was agreed between the USAID funded 'BaNafaa'<sup>18</sup> project, GAMFIDA, Atlantic Seafood and the Gambian Department of Fisheries on how the partners would work together to make the fishery become more sustainable and potentially obtain the ecolabel<sup>19</sup>.

Implementation of components of the action plan benefited from the various skills, expertise and resources brought into the multi-stakeholder partnership. The nature of support provided by different partners ranged from research support, funding, capacity building, policy development, implementation, and surveillance. Further financial contribution to support improvement actions was obtained from Kaufland, a German retailer, which contributed 100,000 Euros raised through a sustainable seafood consumer campaign to support progress towards meeting requirements of the MSC standard (USAID, 2014).

For the Morocco sardine fishery, a steering committee was set up to support the fishery through the process of implementing improvement actions identified in the gap analysis against the MSC standard. The steering committee consisted of fishing industry, government, research organizations and NGOs (CEA Consulting, 2020), with the main NGO participation from the Sustainable Fisheries Partnership (SFP). The fishery was also supported by a significant number of companies including Lovering Foods, Thai Union, Labeyrie Fine Foods, Silver Foods, and Unimer Group, with ALDI South leading the initiative<sup>20</sup>. Government support came

18 [https://www.crc.uri.edu/activities\\_page/usaiddbanafaa-project-wide-reports-and-progress-updates/](https://www.crc.uri.edu/activities_page/usaiddbanafaa-project-wide-reports-and-progress-updates/)

19 <https://solutionsearch.org/contests/entry/847>

17 <https://blueventures.org/pioneering-action-plan-launched-for-the-octopus-fishery-of-southwest-madagascar/>

20 <https://www.intrafish.com/news/aldi-backed-sardine-fip-sees-leap-in-progress/1-1-750435>

from the Department of Fisheries, the National Institute of Fisheries Research, and the National Fisheries Office who supported the process with research, and technical implementation. A range of partners provided funding for the implementation of improvements including Clama GmbH, Silver foods, Unimer Group and Labeyrie Fine Foods<sup>21</sup>.

In terms of specific partnerships around the use of the MSC standard as a tool to improve environmental sustainability of the Mauritania octopus fishery, the key partners included the FAO which has played a major role supporting the fishery, through a Technical Project “Support to the ecolabelling of octopus in Mauritania” (Food and Agriculture Organization, 2019b). The partnership between FAO, the *Ministère des Pêches et de l’Economie Maritime* (MPEM) and the *Société Mauritanienne de Commercialisation de Poissons* (SMCP), together with the collaboration of the *Fédération Nationale de Pêche* (FNP) and the *Institut Mauritanien de Recherche Océanographique et des Pêches* (IMROP), aimed to generate an enabling political and technical context to evolve the octopus management system. These partnership and collaboration efforts were also supported by several non-governmental and private sector initiatives. This included the Sustainable Fisheries Partnership which integrated the Mauritanian octopus fishery improvement project within its Global Octopus Supply Chain Roundtable, which is a network inclusive of processing, importing, and exporting companies from around the world working together to promote the implementation of fishery improvement projects.

Initial stakeholder engagement involving the Western Indian Ocean Marine Science Association (WIOMSA) and Blue Ventures (Rocliffe and Harris, 2015) precipitated the establishment of the SWIOceph Project. Additional stakeholders supporting improvement against the standard in terms of funding, capacity building, research and knowledge sharing included the GIZ (*Deutsche Gesellschaft für Internationale Zusammenarbeit*), WWF Sweden, WWF East Africa, New Partnership for Africa Development and the African Union Interafrican Bureau for Animal Resources. In addition to generating knowledge, Project SWIOceph focused on capacity building and knowledge sharing with key government, NGO, and fishing organizations throughout the SWIO region.

In South Africa, MSC certification has presented a common goal for trawl operators across two industry associations, the South African Deep-Sea Trawling Industry Association (SADSTIA) and the South-East Coast In-Shore Fishing Association (SECIFA). While representatives from the industry associations, as well as academics and government scientists already meet regularly, as part of a working group run by the Department of Forestry, Fisheries and Environment (DFFE), the fishery’s certification is a consistent theme in consideration of recommendations and the fishery’s stock status. The fishery has also initiated and funded projects to better understand ecosystem impacts of its operations, in order to address conditions raised as part of its certification (Norman and Japp, 2019). These projects include: a Fisheries Conservation Project

involving WWF South Africa and SADSTIA, focused on understanding levels of discard and monitoring impact on non-target species; a collaboration (Benthic Trawl Experiment) between DFFE, South African Environmental Observation Network (SAEON), SADSTIA, South African National Biodiversity Institute (SANBI) and the University of Cape Town (UCT) to monitor recovery in previously trawled areas; and cooperation between the fishery, Department of Environmental Affairs (DEA) and SANBI in the development of offshore marine protected areas (MPAs).

In Namibia there was acceptance by an international review panel in 2019 that *M. paradoxus* was most likely a single shared stock between Namibia and South Africa (Die et al., 2019), leading to a requirement that both fishery assessments be harmonized. Information sharing and collaboration between the Ministry of Fisheries and Marine Resources (MFMR) in Namibia and South African scientists from DFFE was therefore necessary for the harmonization of the two fisheries’ MSC assessments. Mechanisms for future collaboration between Namibia exist in part through the Benguela Current Convention (BCC)<sup>22</sup>.

Here, cooperation between Birdlife International’s Albatross Task Force and the fishing industry led to the voluntary adoption and subsequent legislated use of bird scaring lines, which resulted in a 98% reduction in seabird deaths (Da Rocha et al., 2021). The taskforce continues to work with the fishery to address outstanding certification conditions.

### 3.2.4 Research and knowledge generation

In the Gambia sole fishery, the improvement plan led to collation of new knowledge about the fishery, much of which was through local knowledge of fishers and industry (Ministry of Fisheries, Water Resources, 2012). This included analysis of the state of stock health for the two sole species. A Length-Based Catch Curve Analysis carried out for both species suggested that the two species may be over-exploited and experiencing growth and recruitment overfishing reference points. This led to recommendations to reduce fishing mortality and more research to reduce uncertainty of estimates (De Alteris et al., 2012). Other work carried out to support implementation of the action plan included research to understand migration patterns and spawning seasons of the target species, effect of mesh size changes on bycatch, studies on endangered threatened and protected species, and mapping of habitat types (Drammeh et al., 2011; Lamin et al., 2011; Gabis et al., 2013; Coastal Resources Centre, 2014).

To meet MSC requirements, a suite of research activities was also undertaken in the Morocco sardine fishery. This included data collection to address information gaps on seabirds, collation and analysis of observer data to determine the extent of discards and fishery interaction with ETP, with the results concluding minimal discards and low interaction with these species. Research work was also carried out to understand the fishery’s performance with respect to MSC’s key low trophic level requirements.

21 <https://fisheryprogress.org/node/4196/info>

22 <https://www.benguelacc.org/>

Due to the socio-economic importance of octopus fisheries in Mauritania, there has always been a significant level of monitoring of these fisheries. Nevertheless, since the implementation of the National Fisheries Strategy 2015-2019 and the Octopus Management Plan (OMP), where the process towards MSC certification was explicitly established in its annex II as one of the actions to improve the access to new markets (Ministère des Pêches et de l'Economie Maritime République Islamique de Mauritanie, 2018), the investment in research and further knowledge has been reinforced. While there is no direct evidence of the extent to which the gap analysis against the MSC standard informed research in the fishery, the 2019 *Institut Mauritanien de Recherche Océanographique et des Pêches* (IMROP) scientific working group notes the progress in several areas related to this octopus fishery, related to the implementation of the OMP. Among the most relevant are improved data collection and analysis of landings, effort and yield by gear, fleet segment and area; identification of marine zones for specific fleet management; improved information on catch composition within cephalopods species and incidental catches; and development of octopus specific monthly surveys that have resulted in better adjustment of the stock assessment exercises to be able to estimate MSY levels (Food and Agriculture Organization, 2020c; Khallahi et al., 2020).

The United Nations Environment Programme (UNEP) commissioned a study into the biology and fisheries status of octopus in the Western Indian Ocean and the suitability for Marine Stewardship Council certification (Guard, 2009). WWF has been working toward improving the sustainability of octopus fisheries along the Tanzania mainland coast (World Wildlife Fund, 2019) which has precipitated ongoing research by the Tanzania Fisheries Research Institute (TAFIRI) on octopus recruitment (Tanzania Fisheries Research Institute, 2020), exploitation and management (Tanzania Fisheries Research Institute, 2017; Silas et al., 2021). Interest in potential MSC certification meant SWIO octopus fisheries began considering their wider ecosystem impacts (Sauer et al., 2019), with investigations on habitat impacts of octopus fishing (Mahasoa, 2019) and work toward fishery specific management frameworks (Department of Fisheries Development, 2019). The SWIOceph pathway project acted as a knowledge generation vehicle producing five pre-assessment reports for country-level fisheries in SWIO. Blue Ventures utilized the SW Madagascar pre-assessment to develop an action plan for the octopus fishery of SW Madagascar. This action plan is being implemented through a fishery improvement project to address gaps against the MSC standard<sup>23</sup>, with key activities including data collection for and research into the catch profile of the fishery; optimal approaches for assessing octopus stocks; impacts on other organisms encountered while fishing; and measuring potential habitat impacts of fishers. More broadly, there have also been investigations into the octopus supply chain of SWIO (Moreno, 2011; Wharton School of Business, 2013; Zhao, 2018; Kuboja et al., 2021).

In the South Africa hake fishery, as part of conditions to maintain its certification, comprehensive research has been regularly conducted to improve understanding and management of the impact of the fishery on the benthic habitat (Wilkinson and Japp, 2005; Sink et al., 2012). The conditions attached to certification have also provided the basis for undertaking research on bycatch in the fishery<sup>24</sup> and on seabird impact (Watkins et al., 2008; Field et al., 2013; Maree et al., 2014). Butterworth (2016), in a perspective of the South African experience with MSC certification, considered one of the greatest benefits of hake's certification being the enhanced attention given to scientific considerations. MSC certification has also been estimated to account for 35% of the economic value of the hake fishery (Lallemand et al., 2016), due to market diversification and demand for certified products in high value markets.

Regarding the Namibia hake fishery, there has been long term interest in better understanding links between hake stocks in Namibia and South Africa following certification of the South African hake fishery which has resulted in numerous studies focusing on genetics (Henriques et al., 2016; Kapula et al., 2022) and spatial life history (Jansen et al., 2015; Jansen et al., 2017). This research has been utilized to inform the MSC's requirement that the stock management of certified *M. paradoxus* fisheries in each country be harmonized (Die et al., 2019). There has also been a focus on quantifying the reduction in seabird mortality in Namibian fisheries following the introduction of bycatch regulations (Da Rocha et al., 2021).

### 3.2.5 Policy and management change

One immediate management outcome motivated by the improvement process for the Gambia sole fishery in relation to the MSC standard was the decision and implementation of a proposal to close the fishery within a protected area from May to October (Ministry of Fisheries, Water Resources, 2012; Coastal Resources Centre, 2014). In addition to approving the seasonal closure, the National Sole Fishery Co-Management Committee also approved a minimum allowable size for sole. Capacity building of stakeholders including technical staff to ensure short and long-term sustainability was also undertaken. A fishery co-management plan was developed and formally approved bringing the fishery under improved management. The plan included provisions for exclusive use rights to the National Sole Fishery Co-Management Committee (Ministry of Fisheries, Water Resources, 2012).

In the case of the Morocco sardine fishery, the government used the outcome of the pre-assessment to inform its sustainability policy for the fishery and in 2014 formed a formal fishery improvement project. To address requirements for transparency and availability of data, the national fisheries research organization's website was improved to make stock assessments available. A further outcome of the process was an agreement to formal management procedures

23 <https://fisheryprogress.org/fip-profile/southwest-madagascar-octopus-diving-gleaning/>

24 <https://wwfsassi.co.za/south-african-offshore-trawl-bycatch-fishery-conservation-project/>

for other small pelagic stocks setting out the decision-making process. In addition, an initial catch limit per fishing trip was introduced and a fishery management plan agreed and put in place by the government<sup>21</sup>.

While there are several objectives informing the development of the OMP for the Mauritania octopus fishery, ecolabelling was identified as a direct incentive for its implementation, and the MSC fisheries standard requirements were considered as a reference to improve knowledge and management towards sustainability within the OMP (Food and Agriculture Organization, 2019b). Although it is unclear whether the actions were directly motivated by the MSC standard, some of the actions taken since the adoption of the OMP in 2018 include the improvement of the control and compliance system, the establishment of a maximum number of pots and traps by boat, a minimum landing weight of 500 g (gutted), a minimum bottom trawling mesh size of 70 mm, and establishing non-fishing periods to reduce the catch of juveniles and spawning females (Ministère des Pêches et de l'Économie Maritime République Islamique de Mauritanie, 2018).

At a regional level, through organizations like the Southwest Indian Ocean Fisheries Commission (SWIOFC), there is increasing recognition of the importance of octopus fisheries for fishing communities of the SW Indian Ocean, and the need for more regional collaboration around the management of this fishery (Food and Agriculture Organization, 2020b). At more local levels of management, the potential role of MSC certification in improving the trading and marketing of the fishery is acknowledged in Zanzibar's Octopus Fisheries Management Plan (Department of Fisheries Development, 2019). In southwest Madagascar, an Octopus Fishing Management Committee<sup>25</sup> has been established, improving representation of a wider range of stakeholders including fisher representatives, NGO's, researcher organizations, government and seafood industry in the management processes of the fishery, and coordinating implementation of the comprehensive Southwest Madagascar Octopus fishery improvement project (Gardner et al., 2017).

Meeting the conditions of certification in the South African hake trawl fishery has led to a >95% reduction in seabird deaths and 99% reduction in albatross deaths through implementation of bird scaring lines on all vessels (Maree et al., 2014). South Africa's hake trawl permit conditions include the use of bird scaring lines on all trawl vessels operating in the offshore zone, and restriction of trawling to an historical trawl footprint. Although not yet legislated, the fishery has also adopted voluntary move-on rules for when vessels encounter vulnerable marine ecosystems.

Certification has been linked to a number of improvements in the fishery's management, including ring-fencing of existing fishing grounds to reduce the amount of habitat affected; introduction of precautionary bycatch management measures for monkfish (catch limits) and kingklip (catch limits and seasonal closures), and implementation of the use of bird scaring lines.

Following years of cooperation between Birdlife International's Albatross Task Force and the Namibian hake fishing industry to

address bird bycatch, MFMR passed regulations in 2015 requiring the deployment of bird scaring lines in the demersal longline and trawl hake fishery (Da Rocha et al., 2021).

Lastly, an international review panel in 2019 concluded that *M. paradoxus* was most likely a single shared stock between Namibia and South Africa (Die et al., 2019), leading to a requirement that there be information sharing and collaborative management of the stock between the MFMR in Namibia and South African scientists from DFFE.

## 4 Discussion and conclusion

A key challenge across the fisheries management spectrum in Africa is a lack of policy coherence and coordination in the management of fisheries resources (African Union Commission/ New Partnership for Africa's Development, 2014). While sustainable fisheries management and responsible aquaculture development have been identified as priorities by the African Union, there is recognition that the intent of the reform strategy to fully realize increased productivity, profitability and sustainability of the fisheries sector, has been impeded by inadequate sector policies, lack of coordination between sector players and institutions, weak monitoring control and surveillance systems, poor small-scale fisheries development, lack of coordination in overlapping jurisdictions, and lack of transparency (African Union, 2015; African Natural Resources Centre, 2022). Furthermore, the lack of information about ecosystem status and health hinders their effective management at the national and regional level (African Natural Resources Centre, 2022).

The sustainable seafood community has over the years applied a suite of initiatives aimed at supporting fisheries and fishery managers to overcome some of these constraints. VSSs have a theory of change in which market recognition based on certification provides the incentive to encourage fisheries' sustainable management and improvements. There are, however, barriers that may impede a fishery's efforts to become certified. These include lack of market demand for sustainable seafood, inadequate environmental policy, overfishing, depleted stocks, data deficiency and weak monitoring and enforcement (Bush et al., 2013; Stratoudakis et al., 2016). Creating the enabling environment required to realize the standard's theory of change can support complementary approaches that help to address constraints and incentivize continuous improvement (Stratoudakis et al., 2016; ISEAL Alliance, 2018; Travaile et al., 2019), and there is growing evidence that improvements have resulted from fishery engagement before, during and after certification (Pérez-Ramírez et al., 2012b; Field et al., 2013; Bellchambers et al., 2016a).

In this context, even where certification is not the primary goal or is not yet achieved, the MSC fishery standard has increasingly been used by stakeholders as a framework for assessing environmental performance of fisheries to support improvements. By providing a standardized and integrated ecological assessment of stock health, ecosystem impacts and governance, this approach presents an objective means of characterizing sustainability challenges, prioritizing issues to work on and working with stakeholders to propose and implement solutions (Marine

<sup>25</sup> <https://cgp.mg/>

Stewardship Council, 2014b; Stratoudakis et al., 2015). In addition, it provides a mechanism that allows comparison of ecological performance across different fisheries – within a country, a region, or across countries or regions, and allows for an understanding of progress within a fishery over time, through the use of the BMT index (Marine Stewardship Council, 2014a; Stratoudakis et al., 2015).

Almost all fisheries reviewed for this paper would need to implement improvements in order to qualify for certification. This is typical for fisheries engaging with the MSC (Bush et al., 2013; Wakamatsu and Sakai, 2021). Martin et al. (2012) looked at 442 pre-assessments undertaken globally and found that auditors recommended that 83% of fisheries would need to undertake improvements before embarking on an MSC certification. A study by Asche et al. (2021) using the Fisheries Performance Indicator tool, which functions as a data collection tool to assess environmental, economic and community pillars, found that the scores for Africa fisheries were lower than global average scores across all dimensions including environmental. The MSC standard is based on the FAO Code of Conduct for responsible fishing, and the outcomes can be seen as indicative of the level of improvements needed for fisheries to address the gap between current ecological performance and aspirations represented in the Code.

The pre-assessments reveal the most ubiquitous issues African fisheries have in meeting MSC requirements relate to the PIs for harvest strategy and HCR's (PIs 1.2.1 and 1.2.2 respectively). These indicators are designed to evaluate the combination of monitoring, stock status assessment and management action that are in place in a fishery to ensure that target stocks are managed sustainably and that where stocks are depleted but above a point where recruitment is impaired, they are being managed to ensure stock recovery. The open access nature of some African fisheries may make achieving high scores on these PIs difficult. Globally, however, HCR's are often the most challenging for fisheries to meet anyway (Wakamatsu and Sakai, 2021), with a number of certified fisheries also receiving further conditions on this PI (Agnew et al., 2014; Marine Stewardship Council, 2014b; Bellchambers et al., 2016c). Nevertheless, the higher P1 results in most of tuna internationally managed pre-assessed fisheries reflects the importance of multi-national approaches to management, in particular for highly migratory and widely distributed stocks which allow for a better match between decision-making process, management units and biological units, or stocks. Although these results for tuna fisheries might not be directly replicable for other type of coastal species, they highlight the importance of coordinated management and robust scientific knowledge at the relevant biological scale to progress towards sustainability goals.

In many cases, fisheries also scored poorly on target stock status (PI 1.1.1), reflecting the general state of many African fish stocks, which are in decline following years of foreign fishing, poor governance, lack of data, or the use of inappropriate data, and climate change impacts (Belhabib et al., 2018). Low PI scores in some individual UoAs appeared to be related to the management jurisdiction in which they operate, and the type of gear used. On the other hand, higher P3 scores appear in internationally managed fisheries, notably tuna fisheries, reflecting existence of systems to establish rules and management actions aligned with sustainability

needs. These findings seem to indicate that, at least for shared stocks, fisheries management under regional or international bodies may be more effective, therefore, investing in these multi-national approaches to management might be a key priority for African fisheries.

The case studies show a key outcome of engagement with sustainability standards to be multi-stakeholder partnerships across government, NGO's and the private sector. Across the case studies there are examples of fisheries introducing consultation processes, a requisite of MSC certification. These types of processes and partnerships can support a shift from top down to bottom-up fisheries management. For example there was a high level of engagement of stakeholders in the Gambia sole fishery where the improvement work with the Coastal Resources Centre led to the involvement of fishers who subsequently set up a sole management committee. The Gambia sole and Morocco sardine fisheries appeared to command more stakeholder engagement than the other fisheries. However, overall there did not appear to be a perceptible pattern to correlate the effect of the scale or type of the fisheries, to the extent and nature of stakeholder engagement across the case studies. In an African context, the benefits of stakeholder partnerships is that they can facilitate provision of technical expertise, financial resources and capacity building to support improvement in fishery sustainability performance, thus supporting government efforts to responsibly manage resources (Field et al., 2013).

Effective management of fisheries requires knowledge and information about the resource. The case studies show how the collaboration following from engagement in the process provides a basis for stakeholders to collectively work to identify key research needs and resources, and employ different approaches to undertake research and generate new data that will be useful in supporting sustainable management of resources. While instances of knowledge generation and research occurred across all the case studies, there appeared to be more instances in the Gambia sole and the Moroccan sole fishery compared to the SWIO octopus fisheries. This may be linked to the higher level of stakeholder engagement in the two fisheries compared to the SWIO octopus fisheries. There also appeared to be more examples of documented policy and management improvements attributable to engagement in the MSC standard in the Gambia sole, Morocco sardine and the South Africa hake fisheries compared to the Mauritania octopus fishery, where links of policy improvements to the MSC standard could not be easily established, and compared to SWIO Octopus where engagement with the MSC standard compared to the other case studies is more recent.

Transparency of fishery information is another element that is important to ensuring effective fisheries management (Davis and Hanich, 2020). Insufficient transparency and accountability in the formulation of policies, and management of resources, has been identified as a key factor in inadequate fisheries governance (African Union Commission/New Partnership for Africa's Development, 2014). While pre-assessments are often confidential, the process whereby stakeholders work together to develop and implement action plans requires information to be made available to the stakeholders involved and thus facilitates stakeholder awareness of the status of resources. Many of the fisheries examined here have information about their level of performance with respect to the MSC standard available in the public domain. Stakeholders use platforms

such as the MSC website, FisherProgress.org, and SFP to access this information. This potentially helps address issues around absence of publicly available information on fisheries. Increased availability of information could also be valuable for informing decisions on investments that have the potential to increase fishing capacity on fisheries resources that are not yet being managed optimally.

While utilizing the MSC certification program as a framework for improvement has probably posed a challenge for some stakeholders or management systems, it has undoubtedly led to the development or improvement of fishery management plans for some of the fisheries in this study. This suggests an opportunity that could be extended to other fisheries, thus helping to increase the number of fisheries in the region that are subject to effective fishery management plans.

The findings in this review mirror experiences in fisheries in other regions in Europe, Asia and the Americas. Many fisheries around the world employ the MSC standard as a tool to identify and subsequently address gaps in ecological performance (Plotnek et al., 2016; Wakamatsu and Wakamatsu, 2017; Travaille et al., 2019). Some of these fisheries go on to pursue certification when there is market demand for seafood independently verified as sustainable, while other fisheries employ the standard to achieve other objectives key of which include enhanced stakeholder participation in the management of fisheries and support for policy and management change. This review suggests that many fisheries engaging in the MSC in the region employ the MSC standard initially as an improvement tool. The specific impact in terms of an enabling environment varies from one fishery to another. Further detailed analysis across more fisheries in the region are required, to provide a more comprehensive picture of the scope and impact of engagement of fisheries in the region with a universally recognized standard, and how this relates to any inherent fishery characteristics. However this study highlights the potential opportunities that a certification standard can provide in terms of helping to provide a better understanding of key sustainability issues of fisheries in the region, and as a mechanism to facilitate participatory engagement and investment in the management of fisheries in the region.

## Author contributions

OO, JB, MM, AKG and CM-C contributed equally to conception and writing. OO, MM, AKG, and CM-C researched and developed case studies. JB consolidated datasets and did

quantitative analysis. All authors contributed to the article and approved the submitted version.

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## Conflict of interest

OO, MM, AG, CM-C are employed by the Marine Stewardship Council. JB was previously employed by the Marine Stewardship Council.

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## Supplementary material

The Supplementary Material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/fmars.2023.1042736/full#supplementary-material>

### SUPPLEMENTARY TABLE 1

African fisheries known to have engaged with the MSC standard including description of the target species, gear and timing and nature of the engagement.

### SUPPLEMENTARY TABLE 2

List of source documents for African fisheries.

### SUPPLEMENTARY TABLE 3

BMT scores of African fishery Units of Assessment.

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## Glossary

AGAC	Association of Large Tuna Freezers
ANABAC	Asociación Nacional de Armadores de Buques Atuneros Congeladores
ANRC	African Natural Resources Centre
AUC	African Union Commission
BMT	Benchmarking and Tracking tool
CAB	Conformity Assessment Body
CFTO	Compagnie Française du Thon Océanique
CRC	Coastal Resources Centre
DFFE	Department of Forestry, Fisheries and Environment (of South Africa)
DFID	Department for International Development
EEZ	Exclusive Economic Zone
ETP	Endangered Threatened and Protected
FIP	Fishery Improvement Project
GAMFIDA	Gambian Artisanal Marine Fisheries Development Association
HCR	Harvest Control Rules
ICCAT	International Commission for the Conservation of Atlantic Tunas
IMROP	Institut Mauritanien de Recherche Océanographique et des Pêches
IOTC	Indian Ocean Tuna Commission
ISEAL	International Social and Environmental Accreditation and Labelling
MFMR	Ministry of Fisheries and Marine Resources (of Namibia)
MSY	Maximum Sustainable Yield
NAAFO	National Association of Artisanal Fishing Operators (of the Gambia)
NASCOM	National Sole Co-Management Committee (of the Gambia)
NEPAD	New Partnership for Africa's Development
OMP	Octopus Management Plan
OPAGAC	Organization of Associated Producers of Large Tuna Freezers
P1	1st Principle of the MSC Fisheries Standard
P2	2nd Principle of the MSC Fisheries Standard
P3	3rd Principle of the MSC Fisheries Standard
PI	Performance Indicator
RFMO	Regional Fisheries Management Organisations
SADSTIA	South African Deep-Sea Trawling Industry Association
SAEON	South African Environmental Observation Network
SANBI	South African National Biodiversity Institute
SECIFA	South-East Coast In-Shore Fishing Association

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SFP	Sustainable Fisheries Partnership
SI	Scoring Issue
SIOTI	Sustainable Indian Ocean Tuna Initiative
SWIO	Southwest Indian Ocean
SWIOceph	Southwest Indian Ocean Octopus
SWIOFC	Southwest Indian Ocean Fisheries Commission
UNEP	United Nations Environment Programme
UoA	Unit of Assessment
USAID	United States Agency for International Development
VME	Vulnerable Marine Ecosystems
VSS	Voluntary Sustainability Standards
WIOMSA	Western Indian Ocean Marine Science Association