

The Maldives Tuna Fishery: An Example of Best Practice

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Introduction

The purpose of this article is to consider the development and management of the Maldivian tuna fishery against the backdrop of the development of the global tuna fishing industry. The Maldives tuna fishery is of particular interest as an example of an industry that has evolved from small-scale fishery (SSF) beginnings some half a century ago into a commercial enterprise employing modern technology in terms of boats and gear, as well as contemporary approaches to trading in the global marketplace for tuna products. It is also notable for the predominant use of pole and line gear technology that produces a high quality of catch with minimal environmental impact, and for the retention of key aspects of SSF characteristics in the gender-based division of labor, in which men go to sea and women play a key role in the shore industry.

The discussion that follows begins with an overview of the development of the world's tuna fisheries with particular reference to the Western Indian Ocean in which the Maldives are situated. This is followed by an outline of the methodology employed in the present study. The development of fisheries in the Maldives is then considered, followed by a detailed discussion of the respective roles of fishermen and the fishing communities, including the roles of women. There follows a section dealing respectively with ecosystem impacts and related fisheries management measures. Finally, there is a section on development, management and governance, including considerations of the fishermen, women and fishing community, the structure of management and governance, and current issues.

The Global Tuna Fisheries

The global tuna fishing industry is based on a range of fishing gears, including pole and line, longline, purse seine, fish aggregating devices (FADs), and to a limited extent other gears such as gillnets. The dominant element of the fishing fleets are large distant-water fishing vessels operated by large companies

based in a relatively limited number of distant-water fishing nations (DWFNs). A significant number of these employ crews from yet other countries. Many of these vessels are registered under flags of convenience and may be harvesting fish to unsustainable levels and discarding unwanted catch with consequent destruction of the marine ecosystem. These may also be involved in exploitation of labor, including trafficking, non-payment of wages, long working hours and extended periods at sea, unsafe working environments, abuse, violence and even murders. DWFN fisheries frequently come into conflict with SSF fisheries along continental coasts and off oceanic islands both within and immediately beyond the seaward limits of exclusive economic zones (EEZs).¹

The development of the contemporary industry at the global level can be understood first in terms of its economic development and geographical extent, and second in the nature and evolution of fishing technology. The interplay between economic development and technological change has resulted in the current geographical patterns of fishing, international trade and markets.

Tuna fishing can be traced back to its traditional roots in many parts of the world, including the Maldives. Industrialization of the fisheries commenced in the 1940s and 1950s, first with Japan and the United States in the Pacific Ocean. Japanese activity spread rapidly, reaching the Atlantic Ocean by the late 1950s. Until the advent of purse seining in the 1960s, pole and line fishing was a major means of catching tuna swimming relatively close to the surface, while longlining, although flexible in depth of operation, was more important in accessing stocks swimming in deeper waters beyond the range of pole and line—and later purse seine—gears. In the 1960s, Spain and France pioneered the use of purse seines in the eastern Central Atlantic Ocean off the coast of West Africa, while US purse seiners operated off Central and South America. Japanese longliners ranged all over the world, with the Republic of Korea and Taiwan also adopting longline technology. In the 1970s, this pattern of fishing activity continued to expand in the eastern tropical Atlantic Ocean and eastern tropical Pacific Ocean respectively, together with the introduction of at-sea freezing capacity.

By the 1980s, tuna fisheries were extensively developed throughout the world's ocean, and a process of intensification gathered pace and continued into the 1990s. Key developments included the expansion of the purse seine

1 A. Couper, H.D. Smith and B. Ciceri, *Fishers and Plunderers: Theft, Slavery and Violence at Sea* (London: Pluto Books, 2015), p. 1 quoting International Labour Organization (ILO), *Conditions of Work in the Fishing Sector* (Geneva: ILO, 2004), p. 6; see also D. Tickler et al., "Modern slavery and the race to fish," *Nature Communications* 9 (2018): 4643, DOI: 10.1038/s41467-018-07118-9.

fisheries from the Atlantic Ocean into the Indian Ocean, with concomitant expansion of purse seining throughout the South, Central and Western Pacific Ocean. Many new countries commenced large-scale, distant-water industrial fishing, as well as small-scale longline fishing by coastal countries. The use of flags of convenience to evade national regulations and cut costs became increasingly widespread, with a parallel increase in illegal, unreported and unregulated (IUU) fishing, with its characteristically deleterious social and economic effects noted above. Meanwhile, a significant proportion of tuna fishing vessels became larger and more powerful, able to operate larger purse seines. There was also widespread adoption of FADs leading to even greater levels of fishing activity for target species with associated deleterious effects on the size and composition of fish caught, including increasing bycatch as FADs are less selective. Globally, it is now likely that the tuna fisheries are fully exploited, with localized overfishing.² Further increases in fishing pressure on the marine ecosystems pose a danger of stock collapses.

While serious overfishing could often be mitigated due to the high productivity of tuna species, the steep increase in tuna fishing capacity led to oversupply of markets and drops in prices in the 1990s. However, the international fishery is very dynamic in response to changes in stock sizes and market conditions. The global industry is highly integrated, with the major markets in Japan, Western Europe and the United States. Skipjack and yellowfin tuna are used primarily for canning, with the major markets in Western Europe and the United States. In Japan, the main market is for sushi and sashimi. Tunas are also sold in fresh fish markets.³

The Indian Ocean and the Maldives

In the context of the Maldives tuna fishery, interest centers on the wider factors of the Western Indian Ocean tuna fisheries. While the Japanese were active throughout the world's ocean from the 1950s onwards, as noted above, the key development in the expansion of fishing in the Western Indian Ocean was the advent in the 1980s of French and Spanish purse seiners that had hitherto been fishing mainly in the East Central Atlantic Ocean off the coast of West

2 A. Coulter et al., "Using harmonized historical catch data to infer the expansion of global tuna fisheries," *Fisheries Research* 221 (2020): 105379, DOI: 10.1016/j.fishres.2019.105379.

3 FAO, "World Global Tuna Fisheries," based on: FAO, *Review of the State of World Marine Fishery Resources*, FAO Fisheries and Aquaculture Technical Paper No. 569 (Rome: FAO, 2011), available online: <<http://firms.fao.org/firms/fishery/459/en>>.

Africa.⁴ While prior to the mid-1980s the Indian Ocean catch was below eight percent of world production of principal market tunas, by 2009 this had risen to around 20 percent, equal to approximately 836,000 metric tons.⁵ This more than compensated for a decline in Japanese longlining activity in the Indian Ocean, and this fishing pressure on tuna stocks has continued to increase until the time of writing (June 2021). The principal species targeted are skipjack and yellowfin tuna, which are mainly exported to the European Union (EU) market for canning. It is against this background that the parallel development of the Maldivian pole and line fishery for skipjack and yellowfin tuna discussed below has developed.

Methodology

The methodology adopted in the discussion that follows is conceptually based on the assumption that the fundamental driving force of tuna fisheries development is simply the demand for fish both at the local level and in the major international markets. At the local level, supplies may derive mainly from artisanal and other SSFs, while the major markets are mainly supplied by DWFNS. At the heart of the global industry is the logistics chain from fishing gear to final consumer—“from net to plate.”⁶ An objective of the management of the logistics chain is to aim for as much value added as possible at each stage, including the efficient management of the logistics chain itself, and the optimum location of fish processing in terms of product quality and employment.⁷ The demand for fish focuses in turn on the catching side of the industry, including the major elements of gear, boats and fishermen and the communities in which they are based. The ultimate underpinning of the demand for fish is the marine environment itself: the commercial and bait fish stocks that are the immediate target of fishing, which in turn depend on the marine ecosystem. Finally, are governance and management of the whole integrated system.

4 L. Campling, “The tuna ‘commodity frontier’: Business strategies and environment in the industrial tuna fisheries of the Western Indian Ocean,” *Journal of Agrarian Change* 12, no. 2–3 (2012): 252–278.

5 FAO, n. 3 above.

6 C. Carter, “The transformation of Scottish fisheries: Sustainable interdependence from ‘net to plate,’” *Marine Policy* 44 (2014): 131–138.

7 N. Hamilton-Hart and C. Stringer, “Upgrading and exploitation in the fishing industry: Contributions of value chain analysis,” *Marine Policy* 63 (2016): 166–171.

Within this framework this article concentrates on the themes of development, fishing communities and management of the current Maldivian tuna fishery.

The first element in the methodology concerns the context of the global tuna fishery economic development and the place of the Maldives within it. This is based on a review of key elements in both grey and academic literature, as well as web-based research. The main thrust in the methodology is then aimed at the contemporary development of the Maldivian tuna fishery to provide an up-to-date view of the state of the fishery in 2021. This is based on a field study consisting of 50 semi-structured interviews of fishermen, skippers and boat owners, ensuring at least one respondent comes from each atoll in the archipelago. The questions were organized under four main themes as follows:

- Fishermen: Their incomes and how they are paid, including regularity of payment and any problems associated with payment. Also addressed is employment of foreign workers and their treatment; how long fishermen spent at sea and thus away from family and friends; and the nature of life on board fishing vessels, including food and recreation while at sea. Crew and vessel safety is also considered.
- Community involvement and the role of women: The complement of crew of fishing vessels is analyzed, including how they are recruited. The role of the community in buying and processing fish not sold to commercial cold storage is investigated. The role of women in the shore industry is also covered.
- Management: This includes issues related to the ecosystem, including coral and sand mining and use of destructive fishing methods, and the awareness of fishermen of the nature of illegal fishing practices and the extent to which these practices are engaged in.
- A final dimension of the interviews is to understand the state of the fisheries and related problems from the fishermen's point of view, including what they want from government and the community for the improvement of the industry.

A further element in the methodology is completion of a questionnaire by the Ministry of Fisheries, Marine Resources and Agriculture covering the management and governance issues involved in the Maldives fisheries. An important advantage in these two fields was the prior experience of the first author, who is native to the Maldives, and has prior experience of related research in DWFNS including Taiwan, Thailand, Singapore, Malaysia, Indonesia, and Myanmar, as well as in the Maldives.

Overall, fishermen, boat owners and other stakeholders were contacted, including those in governments, private sector organizations and

nongovernmental organization representatives. Related data was also gathered from the academic literature, grey literature and web-based research.

The Development of Fisheries in the Maldives

Prior to the mid-1970s, fishing, the primary source of protein for the island communities “not done on a commercial scale”, has always been central to the way of life in every inhabited island.⁸ Fishermen would go to sea in the morning in the traditional *mas dhoni* fishing boats⁹ and return with the catch in the evening. If the fishing was good and the schools relatively near to the islands, the *mas dhoni* would return as early as mid-day. If not, they might return late in the evening with very little. As the boats were generally smaller and dependent on sail only and there was no ice to preserve the catch, it was not possible to stay at sea for longer than a day. When landed, the fresh fish was shared among the crew of each vessel, gutted and cooked by the womenfolk the same evening.¹⁰ This would then be smoked or dried during the following days. Some fish would be sold within each island community and some bartered for other products or services. Beyond the immediate subsistence needs, catches were sent to Malé and sold in bulk to be retailed in the capital. A few bulk buyers also exported dried fish to Sri Lanka. Some dried fish products were exported around the region to markets such as Yemen and Sumatra as well.¹¹

The transition from the predominant traditional fishery and local trade patterns began in the early 1970s and rapidly gained momentum during the ensuing decade.¹² The key developments included the mechanization of fishing boats associated with increases in vessel size and range of operation, as well as design modifications; the establishment of canneries for processing tuna associated with longlining by Japanese vessels; decline of exports to Sri

8 Corporate Maldives, “The current trend in Maldives fisheries industry” (June 14, 2018), available online: <<https://corporatemaldives.com/the-current-trend-in-maldives-fisheries-industry/>>; A. Jaleel, “Maritime Transport Policy in the Republic of Maldives” (Ph.D. dissertation, Cardiff University, 2008).

9 H. Maniku, “Evolution of the maritime craft in the Maldives,” *Australasian Institute for Maritime Archaeology* 22 (1998): 9–19.

10 Corporate Maldives, n. 8 above.

11 T. Hohne-Sparborth, M.S. Adam and A. Ziyad, *A Socio-economic Assessment of the Tuna Fisheries in the Maldives*, IPNLF Technical Report No. 5 (London: International Pole and Line Foundation, 2013), p. 10.

12 R. Sathlendraakuma and C. Tisdell, “Fishery resources and policies in Maldives: Trends and issues for an island developing country,” *Marine Policy* 10, no. 4 (1986): 279–283.

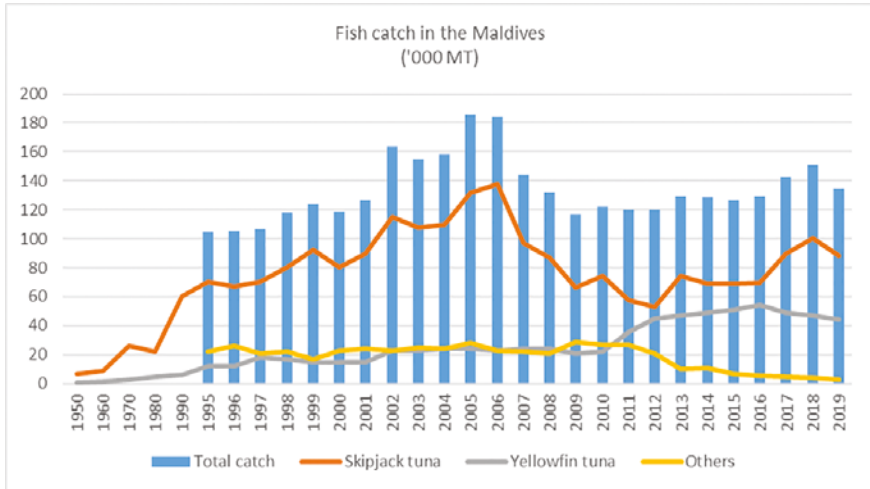


FIGURE 1 Tuna catch (1950 to 2019)

SOURCES: MINISTRY OF FISHERIES AND AGRICULTURE, N. 43 ABOVE; NATIONAL BUREAU OF STATISTICS, "TABLE 9.1: FISH PRODUCTION BY TYPE AND UTILIZATION, 2011–2019," *STATISTICAL YEARBOOK OF MALDIVES 2019*, AVAILABLE ONLINE: <[HTTP://STATISTICSMALDIVES.GOV.MV/YEARBOOK/2019/WPCONTENT/UPLOADS/SITES/6/2019/09/9.1.PDF](http://statisticsmaldives.gov.mv/yearbook/2019/wpcontent/uploads/sites/6/2019/09/9.1.pdf)>; MIYAKE, MIYABE AND NAKANO, N. 14 ABOVE

Lanka; and the expansion of the catch and exports of tuna (See Figures 1 and 2, and Table 1).

The *mas dhoni* used for fishing prior to the 1970s ranged in length from 20 to 60 feet (6–16 m). Many of these sailing craft (Figure 2) were built using coconut timber. The first major development was the fitting of existing vessels with Yanmar inboard diesel engines. The mechanization of the fishing fleet was facilitated by a loan from the World Bank that enabled fishermen to obtain funds for purchasing boats and equipment. Coconut timber is very heavy and is associated with less efficient fuel consumption, so new vessels were built using imported Malaysian timber. From the mid-1990s, the small fishing platforms at the aft of the traditional vessels, adjacent to the tillers, which could accommodate up to half a dozen fishermen were replaced by transom sterns with room to accommodate 18 or more fishermen,¹³ while vessel lengths increased. Currently, some vessels are up to 120 feet (37 m) in length and often built of fiberglass. The range of the mechanized vessels also increased, with vessels spending much longer time at sea, now as much as two weeks, which in turn has meant that vessels are now fitted with crew accommodation. Whereas

13 Jaleel, n. 8 above.



FIGURE 2 Types of fishing vessels
 a. Traditional *mas dhoni*
 b. Second generation *mas dhoni* with transom aft
 c. Third generation *mas dhoni* with accommodation
 SOURCE: A, B—MOOSA ISMAIL, MALDIVES,
 C—COURTESY 'ZUVAAN MASVERIYA'

TABLE 1 Development of fisheries in the Maldives

| | |
|-----------|---|
| Pre-1971 | Primarily for domestic consumption, and export of some dried fish products to countries such as Sri Lanka, Yemen and Sumatra. |
| 1971 | The Sri Lankan market deteriorated and the government looked for alternate means to fill the gap in lost foreign revenue from fish. Thus foreign investments were sought and Thailand, Japan and Spain signed agreements to send freezer collector vessels to buy fish from Maldivian fishermen. This was a turning point from a fisheries primarily geared for domestic consumption to an industry that was export oriented as well. |
| 1972 | An agreement was signed with the Japanese to build the first canning factory in the country. |
| Mid-1970s | Under a loan from the World Bank, fishermen were provided loans for purchasing fishing boats and equipment. This saw the changeover from wind powered sail fishing boats to mechanized ones. |
| 1977 | Felivaru fish cannery was established. |
| 1982–1983 | Collapse of tuna prices globally put the international fisheries agreements with foreign parties in jeopardy. The government bought the Japanese collectors' vessels operating in the Maldives at the time and an additional six vessels. It also bought the Felivaru cannery. |
| 1994–1996 | Additional fish storage and processing facilities established in Maandhoo and Kooddoo by the Maldives Industrial Fisheries Company Limited (MIFCO). |
| Mid-1990 | Exports as well as re-exports through Thailand increased significantly. The second generation fishing boat (<i>mas dhoani</i>) was introduced. These had transom hulls and thus the fishing platform was larger than the traditional vessels and longer as well. |
| 1999 | Kanduoiygiri factory was established by MIFCO. |
| 2000 | As a result of these changes, catch increased from 21,452 Mt in 1966 to 124,109 Mt in 1999. A number of private companies have entered the market since 2000, assigned to operate in specific zones of the Maldives. |
| 2002 | Ensis Fisheries, a private enterprise, was established and has become one of the leading exporters of fresh tuna and other seafood from the Maldives. |
| 2003 | Horizon Fisheries, a private enterprise, took over the Maandhoo factory (storage and processing including canning) from the government. It processes mainly skipjack tuna for the European market. |

TABLE 1 Development of fisheries in the Maldives (*cont.*)

| | |
|------|---|
| 2005 | Cyprea Marine Foods Pvt. Ltd, another private company, was established. It has a fish processing factory and operates 18 fishing vessels. The company targets European markets. |
| 2006 | The partial privatization of the fish buying and processing (for export) industry since the early 2000s saw a dip in catches, but reached 184,158 Mt in 2006. |
| 2012 | Maldives pole and line skipjack tuna was Marine Stewardship Council certified. |
| 2010 | Under a joint venture program, Japanese long liners operated in the Maldives till 2010 when foreign fishing licenses were suspended. |
| 2018 | Addu Fisheries Complex was established by MIFCO. |

SOURCE: HOHNE-SPARBORTH ET AL., N. 11 ABOVE

traditional fishermen used the naked eye, sometimes aided by binoculars and local knowledge, for detecting schools of fish, many modern boats employ sonar. The home ports of the vessels together with levels of activity are indicated in Figure 3.

By far the most important fishery is pole and line gear, targeting skipjack tuna. Fish are attracted using live bait supplemented by water spray that reduces the quantity of bait fish needed. Some of the most common bait fish used for pole and line are silver sprat, shorthead anchovy, various species of fusiliers, blue sprat, various species of cardinalfishes, and blue-green chromis. Big-eye scad and mackerel scad are also frequently used in other forms of fishing (Figure 4). Some 76 percent is caught by pole and line and 22 percent by handline.¹⁴ Skipjack tuna account for two-thirds of the catch, and yellowfin tuna for nearly all the remainder. Japanese longliners operated in the Maldives under a joint venture program until 2010, when foreign fishing licenses were suspended.

The modernization of the fishing operation was associated with the build-up of the export trade from around 30,000 tons in the mid-1970s to a six-fold increase by 2005, followed by a substantial decline and then upturn to 2018

14 M.P. Miyake, N. Miyabe and H. Nakano, "Development of the Indian Ocean Tuna Fisheries," *Historical Trends of Tuna Catches in the World* (Rome: FAO, 2004), chapter 3, available online: <<https://www.fao.org/3/y5428e/y5428e05.htm#bm5>>; National Bureau of Statistics, *Statistical Yearbook 2019* (Ministry of National Planning, Housing and Infrastructure Maldives, 2019), available online: <<http://statisticsmaldives.gov.mv/yearbook/2019/>>.

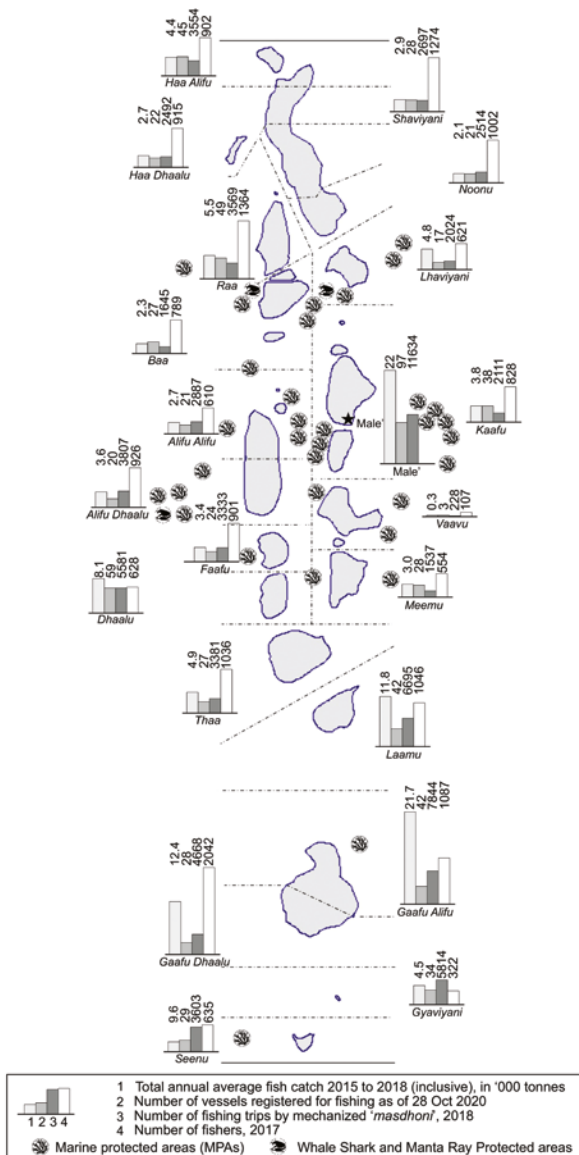


FIGURE 3 Map of Maldives with annual fish catch, licensed fishing vessels, fishing effort and fishermen and marine protected areas
 SOURCE: COMPILED FROM DATA ON MINISTRY OF FISHERIES AND AGRICULTURE MALDIVES WEB PORTAL, AVAILABLE ONLINE: <HTTPS://WWW.GOV.MV/EN/ORGANISATIONS/MINISTRY-OF-FISHERIES-MARINE-RESOURCES-AND-AGRICULTURE>; NATIONAL BUREAU OF STATISTICS, "TABLE 9.11: NUMBER OF FISHERMEN BY ATOLL, 2014–2017," STATISTICAL YEARBOOK OF MALDIVES 2019, AVAILABLE ONLINE: <HTTP://STATISTICSMALDIVES.GOV.MV/YEARBOOK/2019/WP-CONTENT/UPLOADS/SITES/6/2019/09/9.11.PDF>

| | | | | | | | | | | | | | | |
|---|------------------------|---|---|---|---|---|---|---|---|---|--------------------------------|--------------------------------|------------------|---|
| Vessel Name | | Registration number | | | | License number | | | | F | Number of crew | | | |
| Departure date | | Departure harbor | | Arrival date | | Arrival harbor | | Total fuel used for voyage | | | | | | |
| voyage information | | | | | | | | | | | | | | |
| Information on bait | | Day 1 | Day 2 | Day 3 | Day 4 | Day 5 | Day 6 | Day 7 | Day 8 | Day 9 | | | | |
| Type of bait caught (insert code) | | | | | | | | | | | | | | |
| Amount of bait caught (scoops) | | | | | | | | | | | | | | |
| Times not used | | | | | | | | | | | | | | |
| Where caught (insert code) | | | | | | | | | | | | | | |
| Hours spent bait fishing | | | | | | | | | | | | | | |
| When (time) fishing started (Time started out to sea for fishing) | | <input type="checkbox"/> a.m. <input type="checkbox"/> p.m. | <input type="checkbox"/> a.m. <input type="checkbox"/> p.m. | <input type="checkbox"/> a.m. <input type="checkbox"/> p.m. | <input type="checkbox"/> a.m. <input type="checkbox"/> p.m. | <input type="checkbox"/> a.m. <input type="checkbox"/> p.m. | <input type="checkbox"/> a.m. <input type="checkbox"/> p.m. | <input type="checkbox"/> a.m. <input type="checkbox"/> p.m. | <input type="checkbox"/> a.m. <input type="checkbox"/> p.m. | <input type="checkbox"/> a.m. <input type="checkbox"/> p.m. | | | | |
| When (time) fishing stopped (Time left school of fish) | | <input type="checkbox"/> a.m. <input type="checkbox"/> p.m. | <input type="checkbox"/> a.m. <input type="checkbox"/> p.m. | <input type="checkbox"/> a.m. <input type="checkbox"/> p.m. | <input type="checkbox"/> a.m. <input type="checkbox"/> p.m. | <input type="checkbox"/> a.m. <input type="checkbox"/> p.m. | <input type="checkbox"/> a.m. <input type="checkbox"/> p.m. | <input type="checkbox"/> a.m. <input type="checkbox"/> p.m. | <input type="checkbox"/> a.m. <input type="checkbox"/> p.m. | <input type="checkbox"/> a.m. <input type="checkbox"/> p.m. | | | | |
| Location at 12 noon | | | | | | | | | | | | | | |
| School fished from (circle-as-app) | | 1 2 3 4 | 1 2 3 4 | 1 2 3 4 | 1 2 3 4 | 1 2 3 4 | 1 2 3 4 | 1 2 3 4 | 1 2 3 4 | 1 2 3 4 | | | | |
| Other information | | No. of fishing rods | | | | | | | | | | | | |
| | | No. of hand lines | | | | | | | | | | | | |
| | | No. of trolling lines | | | | | | | | | | | | |
| Details of catch | | Pole and line catch | | | Troll line and hand line catch | | | Pole and line catch | | | Troll line and hand line catch | | | |
| | | Amt. | weight | Discarded amt. | Amt. | weight | Discarded amt. | Number | weight | discarded amount | Number | weight | discarded amount | |
| Pelagic | Skipjack tuna | | Kg | | | Kg | | Wahoo | Marlin | | Kg | | Kg | |
| | Yellowfin tuna (small) | | Kg | | | Kg | | | Squidfish | | Kg | | Kg | |
| | Yellowfin tuna (large) | | Kg | | | Kg | | | Other types of wahoo | | Kg | | Kg | |
| | Bigeye tuna | | Kg | | | Kg | | | Details of bycatch | | | Amount (and action code below) | | |
| | Kiwakawa | | Kg | | | Kg | | | 1 | 2 | 3 | 4 | 1 | 2 |
| Raagondi | | Kg | | | Kg | | Species that are banned from being fished | | | | | | | |
| Rainbow runner | | Kg | | | Kg | | Hammerhead shark | | | | | | | |
| Wahoo | | Kg | | | Kg | | Thresher shark | | | | | | | |
| Dolphin fish | | Kg | | | Kg | | Sharkfin mako shark | | | | | | | |
| Dogtooth tuna | | Kg | | | Kg | | Oceanic white tip shark | | | | | | | |
| Reef fish | | Kg | | | Kg | | Sharks, other | | | | | | | |
| | | | | | | | Hawksbill & Green turtle | | | | | | | |
| | | | | | | | Birds near fish school | | | | | | | |
| Codes | Bait type | ① | ② | ③ | ④ | ⑤ | ⑥ | ⑦ | ⑧ | ⑨ | ⑩ | ⑪ | | |
| | Where fished | FAD | ① School moving in ocean | ② School with dolphins | ③ School around drift | ④ | Name of person providing information | | | | | | | |
| | Action taken | Released unharmed | ① Released injured (minor) | ② Released injured (major) | ③ Discarded dead | ④ | Phone number | | | | | | | |
| | | | | | | | | | | | | Sign | | |

FIGURE 4 Fishing Logbook Form, translated from Dhivehi to English

(Figure 1). The first cannery was established in 1977 (Table 1). The collapse of global tuna prices in the early 1980s led to the Maldivian government purchasing the cannery as well as the Japanese vessels used to collect tuna catches and investing in an additional six vessels. From the mid-1990s, exports and re-exports through Thailand increased significantly. From 2000, a number of private companies entered the market, assigned to specific zones within the Maldives. The pole and line skipjack tuna fishery was certified by the Marine Stewardship Council (MSC) in 2012. Fish and fish products now contribute 97 percent of total exports by value from the Maldives, equivalent to US\$160 million per annum (Figure 5).

Fishing vessels are almost all privately owned, being individually owned and operated. In many cases the vessel owner is also the skipper and other crew members may also have shares. While regulated for safety of crews and vessels as well as protection of marine resources and the environment, the vessels operate commercially with a large degree of freedom. There are no restrictions on how they use the catch, and there are no quota or effort limitations on individual vessels, apart from regional quotas on some species. They may sell the catch to whoever they wish and there are no restrictions on whom they employ. Although State-owned companies provide fuel and ice, many private companies and individuals are also involved in this shore-based industry. According to the Fisheries Ministry of the Maldives, ice is provided from some 67 locations, although nine of these plants are not currently in operation. The

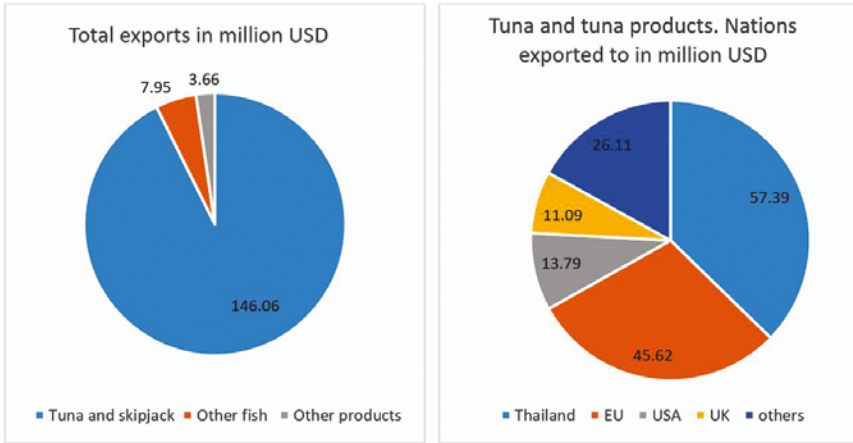


FIGURE 5 Exports from the Maldives 2019
SOURCE: MALDIVES CUSTOMS SERVICES

industrial structure has also provided substantial opportunities for women to be employed in the processing plants and industries related to fishing. However, with the development of the tourist industry and related work in the resorts, many young men and some women have entered the tourist industry rather than opting to enter the fishing industry. The work was perceived to be more comfortable, with better rewards. With the onset of the COVID-19 pandemic many resorts had to be closed and large numbers were laid off. Many interviewed fishermen indicated that there had been an increase of requests from people formerly working in the tourist industry to find berths on fishing vessels. Only a very small number of migrants, mainly from Bangladesh, are employed in the fishing industry.

The Fishermen

The development of fisheries in the Maldives has above all centered on the role of fishermen (Figure 6) and women involved in the fishing industry as discussed in the next section. From Figure 6 it is seen that the number of fishermen had been gradually decreasing till 2016. This could be due to several factors including other employment opportunities, especially in the tourism sector. It is noteworthy that the employment shows a significant increase in 2017. According to the *Statistical Yearbook, 2019*, one of the sources for Figure 6, employment showed an increase in all atolls with most in R and GDh Atolls, with the latter increasing over threefold. However, no reasons or explanation

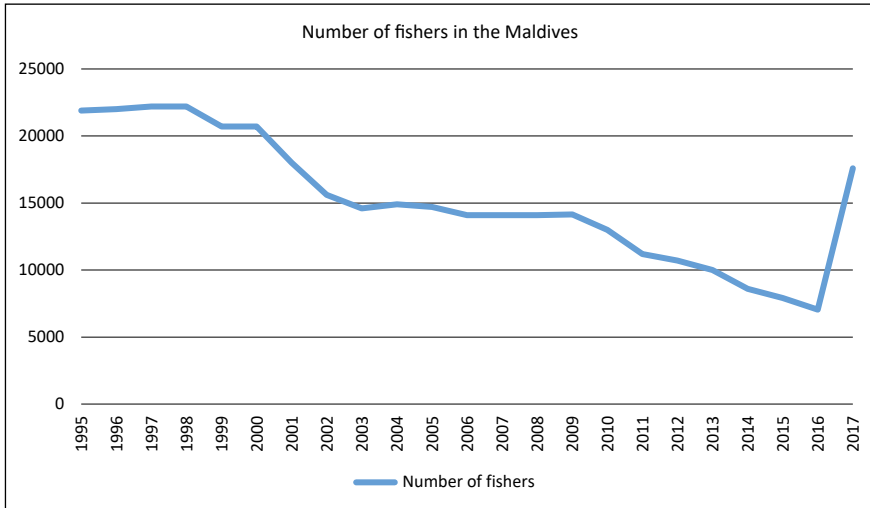


FIGURE 6 Fishermen in the Maldives

SOURCES: MINISTRY OF FISHERIES AND AGRICULTURE, N. 43 ABOVE;
 NATIONAL BUREAU OF STATISTICS, "TABLE 9.11: NUMBER OF FISHERMEN BY
 ATOLL, 2014–2017," *STATISTICAL YEARBOOK OF MALDIVES 2019*, AVAILABLE
 ONLINE: <[HTTP://STATISTICSMALDIVES.GOV.MV/YEARBOOK/2019/](http://statistics.maldives.gov.mv/yearbook/2019/)>

for this increase were provided. Five major themes relating to fishermen emerged in the present study, namely, the economics of dealing with the catch, the payment for work done, the role of migrants, working conditions and routines at sea, and safety at sea.

Maldivian fishermen are not paid wages or salaries. Instead, fishermen are each given a pre-determined share of the catch or equivalent share of money received from selling the catch. The proportion of shares distributed among the crew varies slightly from region to region. For the majority of vessels, costs are deducted first, including diesel fuel, provisions and fishing gear (lines and hooks). Some vessels also include expenses of lubricants, petrol for generators, bait nets, and fishing rods, for example. After deduction of costs, the remainder is divided into two or three equal parts. In the present study, 16 vessels reported dividing into two parts and 27 vessels into three parts. A few additional vessels used variants of these proportions. After this division, one part is taken by the vessel owner and the other(s) are equally divided among all fishermen who fished on that particular trip. It is also very common for additional shares (equal to what each fisherman received) to be given to the skipper and a few other key fishermen (such as divers who catch bait) by the owner from his share. There are also cases where the owner, instead of additional shares, gives a set monthly amount to the skipper.

The fishermen are usually paid at the end of every trip, which may be daily, weekly or fortnightly, or in rare cases, even monthly. The majority are paid weekly every Friday. Occasionally there are some delays in payment to the crew when fishing is good overall. The fishermen complain that during such periods the State-owned fish landing centers sometimes have problems with cash and the vessels are not paid immediately for the catch. There have been delays of up to a month or more before the vessels are paid. A number of owners said that sometimes if a crew is in urgent need they will even pay such a crew in advance, the loan to be deducted when they receive payment for the catch.

None of the fifty respondents said that there were any major issues regarding payment for the fishermen. Fishermen may question infrequently why, when the catch for consecutive trips was the same or more, the amount they received was less than the time before. According to the owners this may be because more time was spent looking for fish, with longer distances travelled thus adding to fuel costs.

According to the respondents, the earnings from fishing are very attractive. On a scale of 0 to 10, 0 being very low and 10 a very good income, the lowest given was 4 from two atolls, while 10 was given by vessels from four atolls. The national average obtained from the survey was 7.3. Respondent 23 from GA Gemanafushi said that, on average, they manage to bring home a monthly amount of 40,000 Maldivian rufiyaa (MVR) (c. US\$2,600), which is equal to the highest pay scales in the civil service sector. According to him, even in the worst times, "we can bring home MVR10,000 per month." Respondent 5 from G Dh Thinadhoo said that on larger vessels of 80 to 100 feet when fishing is good there are instances when a crew member can earn as much as MVR200,000 in a month.

The interviews with Maldivian fishermen indicate that there is a current trend of employing a few foreigners, especially migrants from Bangladesh. The number of migrants range from none in some vessels to up to six in a few others. It was observed that there are none or very few foreign workers in the northern atolls, while in Malé Atoll and in the south, there are relatively more. While one vessel employs six, two respondents said that there are four on each of their vessels, while most have only one, who serves as cook and maintains general cleanliness on board. Foreign crew members are treated the same as Maldivian fishermen. One (respondent 13 from L Maavah) described an incident when one night a foreign crew member had a toothache when the vessel was some 50 miles off the Laccadive Islands, "the next morning we travelled back to H Dh Kulhudhuffushi 150 miles away to attend to his medical needs." There does not appear to be any reported cases of verbal or physical abuse either among migrant or native fishermen.

Fishing vessels do not stay out at sea for long periods before returning to their home ports. A fishing trip can be as short as one day, or may in extreme circumstances last about a month. Most fishermen indicated that they would try to be on an inhabited island every Friday, a day of religious significance for Muslims, even when working on distant fishing grounds. The amount of time vessels stay at sea varies, although most (22 of the interviewed respondents) make weekly trips. Eleven respondents said that their vessels sometimes return the same day: "It all depends on how quickly we are able to catch fish" was the answer of many. "Sometimes we may have to spend a few days without catching any fish, so we have to stay longer," said one. "[W]hen the fishing is good in another part of the country, we may go and fish in that region and not come back to our island for over a month," noted another.

It is also a common practice for individual fishermen to take a day off whenever they feel like it, and on such days the skipper will try to recruit another hand. The workload is comparatively light on the fishing vessels. In the pole and line fishery, after catching the bait, usually before sunrise, often with the help of divers, the crew will be relatively free until they arrive at the fishing grounds when everyone will be engaged. Once the fishing is over the crew again are free. According to many, there is ample time to watch television and movies and play board games. Because the vessels have little gear on deck, there is hardly any maintenance work while at sea. While ashore the crew will generally undertake hull cleaning underwater or beached, while all major maintenance and repair of the hull and machinery are undertaken by contractors. With respect to provisions, the crew collectively decide on the food they would like to have. They share the cost of food equally. The quality of meals aboard is much better than that enjoyed in most homes ashore.

Considering the number of fishing vessels involved, though there are accidents and injuries, major incidents and casualties are few. Though about half the respondents reported accidents on their vessels, the most common accident is fishing hooks hitting and injuring parts of the body. There have also been a few cases of fishermen falling and being injured when hit by fish. The most serious injuries reported included an individual severing two fingers while hauling a tuna with a handline and another fracturing an arm. There have also been about half a dozen fatalities in the past few years. All of these related to diving for bait and were mainly due to inexperience and improper procedures in using SCUBA diving gear. Safety is also improved because the vessels do not have deck gear. Apart from this, all vessels are registered at the Maldives Transport Authority, and annual safety inspections are carried out to ensure seaworthiness. Such inspections include hull and machinery, safety and communication equipment, among others.

Of the fishing vessel incidents that occur, most are related to engine failure and related issues. Thirty-five of the respondents had experienced such incidents, ranging from engine breakdown, propeller damage, freshwater pump faults, leaking shaft seals, and engine coupling failure to exhaust manifold damage. Almost all respondents noted that any vessel in distress would immediately have other vessels come to their aid. Some vessels provide towage free of charge, while others reclaim fuel costs. Even then they do not charge for time or anything else.

The Fishing Community and the Roles of Women

There is a strong community dimension in Maldivian fisheries. This is manifested especially in the crewing of fishing vessels, the disposition of the catch, and the substantial role played by women.

The crews are very often made up of relatives and friends. According to the survey carried out in the preparation of this article, the number of crew on a vessel ranges from nine to 28, with a national average of around 18. While a few of these vessels had three generations of family members, 45 of the 50 boats had relatives and friends and even those who are not usually come from the same island. However, 19 respondents also said that although they have family and friends among the crew, no special preference is given to them. Rather they will employ any able fisherman as well. A few stated that their preference is based on ability, not kinship. Respondent 48 from K Malé and 45 from S Hithadhoo said that they had no preference for family or relatives at all. When asked how the crew are recruited, the survey showed that apart from family members, most others would ask the skipper to go fishing on his vessel. Sometimes the skipper will ask able people they know to go fishing on their boat. Recruitment is never by advertisement, but totally by word of mouth. Before the age of mobile phones, skippers used to go and knock on the doors of each fisherman in the early hours. Now the common practice is to let the crew know the time of departure when they leave the vessel after a trip. If one is missing or late they will be called or messaged on their mobile phone. It is also becoming increasingly common to have phone-based social groups on a messaging app such as Viber for sending collective messages to the crews. Regarding maintenance of fishing boats, on most vessels the crew will undertake hull cleaning at no extra charge. Many owners provide refreshments when such work is undertaken. Apart from minor repairs, all other work is carried out by hired craftsmen such as carpenters.

While most of the catch is sold to cold stores, fish-collecting vessels and processing plants, most fishermen bring some fish to their respective islands to be taken home by the crew or sold to the island communities or to buyers who purchase in bulk for processing. Occasionally they may also sell to other islands where there are more bulk buyers and therefore have the potential to obtain a better price. The catch brought to the islands is usually below the saleable weight for the major buyers. Fish bought by bulk buyers are processed by dedicated employees and sometimes by women of the households. Some of the bulk buyers distribute fish to various households, and the women will boil the fish and give these back to the owner. They then further boil the concentrate till it becomes *rihaakuru* (tuna stock). Fish not sold to the bulk buyers or taken to homes are processed by the women as smoked fish, dried fish and *rihaakuru*. A few fishermen bring most of their catch to their respective islands for processing rather than selling it to the major buyers. Kendhoo in B Atoll is one where almost all the catch is brought home, shared among the crew and then processed. Thulhaadhoo in the same atoll is also associated with a lot of smoking and drying of tuna and making *rihaakuru*. Women play a major role in the processing of fish. Around 70 percent of respondents indicated that in their islands women were involved in the processing of fish. However, the role of women is diminishing to a certain extent because most of the catch is now sold to either major buyers or smaller bulk buyers who employ full-time staff including immigrant labor. Respondent 6 from S Maradhoo said: "In this island women are not involved in the processing as fish are sold to bulk buyers from the island who also undertake the processing. Boiling and smoking are done on a large-scale by foreign labourers." Apart from the processing undertaken by women in the cottage industries, women are also employed in fish processing plants such as the Felivaru Fisheries Complex in Lh Naifaru.

Women have played a key role in the fishing industry throughout history. A unique feature in the Maldives is their enthusiastic engagement in beaching fishing vessels, a tradition of long standing (Figure 7). Women were called upon to take up the rope along with fishermen as a ritualistic activity. In some islands where there are wards, they will participate in beaching vessels from their wards (Respondent 28, B Eydhafushi). Very often they did this in support of the fishermen and for free. Some stated that a small fee was given to each person who participated. In yet other areas women participated on behalf of the women's committee to collect funds for their activities. For example, Respondent 2 from Eydhafushi stated that women participated on behalf of their women's committee. An attendance register was maintained and an annual payment was made accordingly. According to this respondent, about



FIGURE 7 Women engaged in beaching a fishing vessel
SOURCE: COURTESY OF MUHAMMAD MALIK

MVR300 was paid for manually hauling a boat ashore. However, the survey showed that this practice, once widely observed throughout the Maldives is slowly dying. Vessels have become larger and too heavy for manual beaching, while the availability of winches, slipways and towing machinery has reduced the need for manual hauling. Seven respondents said that they still beach smaller vessels manually, and five of them said that women are still taking part in this activity in their respective islands.

Ecosystem Impacts and Fisheries Management

The fishing industry is associated with ecosystem impacts on the reefs, bycatch, certain species impacts, and coral mining. Management measures include data management, use of prohibited gears, the development of management plans, and the provision of marine protected areas (MPAs).

Impacts Related to Fisheries

The Maldives reef system, which is the seventh largest in the world, harbors a diverse array of marine species. Thiladhunmath Atoll (HA and HDh Atolls) with a surface area of 3,788 km² and Huvadhoo Atoll (GA and GDh Atolls) with

a surface area of 3,278 km² are two of the largest in the world.¹⁵ The Maldives has more than a thousand species of demersal and epipelagic fish, including many species of shark and five species of marine turtles, as well as over 20 species of whales and dolphins. The reefs are populated by 180 species of corals, around 150 species of crabs and 400 species of molluscs.¹⁶ This high level of biodiversity plays a key role in the livelihood of the people, providing income and food security notably for both fisheries and tourism.

The predominant pole and line skipjack tuna fishing described above is highly selective and bycatch is minimal. In a study conducted in 2015, over 106 fishing days, it was found that bycatch amounted to 0.65 percent of the total catch and most bycatch was released alive with only 0.02 percent discarded dead.¹⁷ In the handline and trolling fishery (about 25 percent of total annual tuna catch by weight) where fish are also caught individually, there may be a slightly higher chance of bycatch, as is the case with the small-scale longline fishery. In its report to the Indian Ocean Tuna Commission's Scientific Committee, the Maldives noted that ecosystem impacts of both the pole and line and handline fisheries for tuna are virtually non-existent.¹⁸ Shark and turtle bycatch are reported from the longline fishery, which has strict measures to report and release those that are caught, while bird entanglement in longline gear is mitigated by being mandated in law.¹⁹ Logbooks for all the tuna fisheries have provisions to report all endangered, threatened and protected species. The MSC certified the Maldives skipjack tuna fishery in 2012.²⁰

There are a number of specific individual endangered species protection measures, including for whale sharks and green turtles.²¹ Sharks pose a considerable problem for the tuna fisheries, as they tend to break up shoals of tuna, take the catch before the fishermen can land the fish, chase tuna away from

15 Republic of Maldives, *State of the Environment 2016*, (Malé: Ministry of Environment and Energy, 2017), available online: <<https://www.environment.gov.mv/v2/wp-content/files/publications/20170202-pub-soe-2016.pdf>>.

16 Convention on Biological Diversity, "Country Profiles: Maldives, Biodiversity Facts," available online: <<https://www.cbd.int/countries/profile/?country=mv>>.

17 K.I. Miller et al., "Bycatch in the Maldivian pole-and-line tuna fishery," *PLoS ONE* 12, no. 5 (2017): e0177391, DOI: 10.1371/journal.pone.0177391.

18 M. Ahusan et al., *Maldives National Report Submitted to the Indian Ocean Tuna Commission Scientific Committee—2018* (Malé: Ministry of Fisheries and Agriculture, Maldives, 2018).

19 Maldives' Regulation 388-R/2 on longline fishery, 2014; IOTC Resolution No. 10/06 on reducing the incidental bycatch of seabirds in longline fisheries (2010), superseded by Resolution 12/06 (2014).

20 See Hohne-Sparborth et al., n. 11 above, p. 6.

21 Vermillion International, "Maldives—Protected Marine Species," available online: <<http://www.vermillionmaldives.com/maldives-protected-marine-species.htm>>.

fishing vessels, and endanger divers during the catching of bait. In a recent incident near Lh Faadhoo in 2020, a fisherman fell into the sea while fishing and was attacked by a shark, so he had to be taken to hospital by sea ambulance.²² The interviews with fishermen to a great extent show their opposition to the protection of sharks without control. Only two said that sharks help the tuna fishery and a few were neutral on the issue.

Taking coral from reefs also causes damage and hence affects life within the reefs that are crucial for fisheries. The live bait, essential for the pole and line fishery, are dependent on the reefs. Historically, Maldivians used to take corals from the reefs for building houses. In 1990, direct government intervention was introduced with a ban on mining coral for houses.²³ In 1992, selected areas for sand and coral mining were designated. In 1993, the government stipulated the use of cement blocks instead of coral in construction of all government buildings. From 1995, Malé stopped using coral for construction and a similar trend has been observed on other islands. All the respondents in the survey said that coral is no longer used for building purposes.

Fisheries Management

To understand stock levels and trends and make projections, data on fish stocks is crucial. According to the Ministry of Fisheries,²⁴ the practice is for fishing vessels to maintain daily catch data and report this to the Ministry. Those who fish from inhabited islands used to report to the respective Island Office, which in turn reports to the respective Atoll Office and thus to the Ministry. Currently, a logbook form is used (Figure 4), which has to be completed and submitted to the fish buying centers including fish processing plants, cold storage facilities and fish collecting vessels. The buyers will not buy unless the completed logbook is submitted to them. Though a similar reporting system is used for fish brought directly to the islands, this information is not being relayed as effectively to the Ministry. This was confirmed by the fishermen as well as by the Ministry, which stated that return rates from the islands are poor.²⁵

22 “Sharks attacks Maldivian fisher who fell to the sea,” *Mihaaru Daily News* (October 24, 2020), available online: <<https://mihaaru.com/news/84594>>.

23 A. Jaleel, “The status of the coral reefs and the management approaches: The Case of the Maldives,” *Ocean & Coastal Management* 82 (2013): 104–118.

24 Survey questionnaire sent to the Ministry of Fisheries, Marine Resources and Agriculture, Maldives.

25 Id.

With regard to prohibited gears, Article 27 of the *Fisheries Act of the Maldives*²⁶ prohibits the use of the following gears in the maritime zones of the Maldives: purse seine fishing; gillnet fishing; trawl net fishing; fishing using a net with the exception of bait fishing and fishing for personal consumption; and fishing using an explosive, poison or other such chemicals. Net fishing is indiscriminate with respect to size or species and yields much bycatch that is often discarded into the sea. There is much wastage as well as loss of juvenile fish. Discarded and lost fishing nets account for much of the plastic entering the marine environment, as well as ghost fishing that kills many fish and marine mammals.²⁷ Further, explosive blast and poison fishing not only kill fish indiscriminately, but destroys the marine environment and causes extensive damage to reefs and marine life within them. All respondents confirmed that to their knowledge the law on net fishing is fully abided to by fishermen and that no blast or poison fishing occurs anywhere in the Maldives.

For the observation of good management and to ensure stock sustainability, fisheries management plans are required under the *Fisheries Act of the Maldives*. In these plans the types of fishery are specified. They are drawn up with stakeholder consultation and periodically reviewed. In addition, there are many designated MPAs. These help to protect and preserve habitats, protect and rejuvenate individual species, and provide protected spawning grounds. A few sites have also been allocated as whale shark and manta ray sanctuaries (Figure 3).

Development, Management and Governance

Development

Over the last half a century the Maldives has succeeded in developing a modern tuna fishery from a traditional SSF fisheries base. Further, it is a fishery fully integrated into the international trade system, albeit largely built on the narrow foundation of two fish stocks—skipjack and yellowfin tuna. A key feature of the industry is the degree of national independence in its development. These circumstances and level of success are not common in either coastal or oceanic island SSFs. The fishing fleet is by and large modern and well-equipped

26 *Fisheries Act of the Maldives*, No. 14/2019, available online: <<https://www.gov.mv/en/guidance-and-regulations/fisheries-act-of-the-maldives>>.

27 A. Nicolas, "Ghost fishing gear: How discarded fishing gear became the ocean's silent killer and what you can do to help stop it," *WWF* (October 20, 2020), available online: <<https://www.worldwildlife.org/stories/ghost-fishing-gear#:~:text=Fishing%20gear%20accounts%20for%20roughly,a%20name%3A%20ghost%20fishing%20gear>>.

and able to operate widely within the EEZ (declared in 1976), while the fishing port locations and shore side of the industry is widely distributed throughout the country.

It is important to note that almost all the main concerns of both the fishing community and the government relate to development, especially within the archipelago (Table 2). The biggest single issue faced by fishermen concerns delays in selling the catch quickly, either because there are long waiting times to landing or insufficient buying centers near to certain fishing grounds. Longer waiting times during good fishing periods means that valuable fishing time is also lost, as well as increasing the risk of deterioration in catch quality before landing, not least because ice is sometimes not available as widely as needed either geographically or quantitatively.

TABLE 2 Requests from the survey respondents to the government and the community

| Government | Respondents | Community | Respondents |
|--|-------------|--|-------------|
| Ability to sell the fish caught (timely)/reduce queues | 21 | Advocate fishing issues to the government | 3 |
| More buying facilities (cold storages)—increase capacity | 16 | Buying fish (especially smaller ones) | 3 |
| Repair/replace collecting vessels | | | |
| Increase the buying price of fish | 10 | Provide land for slipway and cottage industry | 3 |
| Availability of ice in more regions | 10 | Create awareness and motivate youth about the industry | 3 |
| Control/stabilize price of fish to keep high | 7 | More people (especially young) to join industry | 2 |
| Immediate payments | 5 | Not to use FADS except for intended purpose | 2 |
| Reduce price of fuel | 4 | Provide ice facilities | 2 |
| Fishing boats loans with installment payments | 4 | Start small businesses related to fishing | 2 |

TABLE 2 Requests from the survey respondents to the government (*cont.*)

| Government | Respondents | Community | Respondents |
|--|-------------|--|-------------|
| Broaden international market | 4 | Establish fish market | 1 |
| More anchored FADs | 2 | Safety (carry out inspection and certification) can be done by island councils | 1 |
| More diesel facilities | 2 | To have a common voice to stabilize fish price | 1 |
| Control sharks | 2 | More people to come into processing | 1 |
| Provide free drinking water/bathing facilities at buying facilities | 2 | Councils can help mediate in solving issues | 1 |
| More affordable ice | 1 | Councils can provide water to the quay | 1 |
| Install FADs further from each other | 1 | | |
| Fishing as a subject in school curriculum | 1 | | |
| Finance to help fishing-related small industries | 1 | | |
| Enable foreigners to come and buy fish | 1 | | |
| No space to sell in Malé market so we have to sell at any price buyer asks | 1 | | |
| More focus on yellowfin tuna fishing | 1 | | |
| Provide subsidies during low fishing | 1 | | |
| Online payments availability | 1 | | |
| Encourage more private buyers to enter market | 1 | | |

The point of view expressed by the government is that fishing is seasonal, and increasing the number of landing facilities risks heavy underutilization when fishing is poor. However, the Ministry stated that they are trying to address these issues by facilitating new investments in processing through policy and regulatory framework changes; establishment of new ice plants in strategic locations; promoting the use of onboard fish chilling/ice-making facilities, including refrigerated seawater (RSW) and ice plants by means of specific loans, and facilitating the establishment of small-scale fishing processing plants: "This year (2021) the Ministry is working on the establishment of 3 ice plants with a capacity of 75 metric tons. Next year we also plan to establish 8 more ice plants with a capacity of 225 metric tons in strategic locations. In addition loan facilities will be provided for 50 vessels to be fitted with RSW systems."²⁸ An issue of concern regarding ice plants is that although there are currently 67 plants totaling over 1,700 tons capacity, many are not in service. According to the owner of one of the largest privately owned plants this is because the plants are normally modular and replacing an electric circuit board can be quite expensive as these are not normally kept in stock. Replacement takes time.

Another important request from the fishermen is for the government to increase the buying price and keep it stable. The government publishes international prices of skipjack and other tuna species regularly, and says that often the State-owned company buys skipjack at par or even higher prices than international prices, thus running a loss. In the international tuna trade, prices are heavily influenced by tariff policies of the major markets in the United States and the EU, particularly,²⁹ which in turn exerts a strong influence in the location of processing facilities. In the Maldives, a major challenge in accessing a greater share of the international tuna market is insufficient finance for marketing combined with the seasonal nature of the fishery, which means that the Maldives cannot guarantee a steady supply throughout the year. The Fisheries Ministry also noted that "growth within the sector will be based on international commitments and restrictions." Nonetheless the highest priority for the Maldives as a fishing nation is to ensure that fish caught in the Maldives are value-added locally rather than exported as raw material. Government policy is to prohibit export of raw material (frozen skipjack) from July 2023. It also hopes to diversify through both the development of new fisheries, such as the diamond black squid fishery, and to develop a mariculture sector.

28 See n. 24 above.

29 L. Campling, "Trade politics and the global production of canned tuna," *Marine Policy* 69 (2016): 220–228.

The tuna resources are characteristically dynamic both geographically and seasonally, a reflection of strong environmental fluctuations, including regular seasonal variability such as the influence of the monsoon centered on the Indian sub-continent. It may be that the location of the Maldives relatively close to the Indian subcontinent means that there is less competition with the international tuna fleet operating in the Western Indian Ocean as the Maldives fishery is located relatively close to the islands. It is difficult to assess the impact of DWFNS' fleets operating on a large-scale close by. However, management of tuna fisheries in the wider region is fraught with difficulties. It is difficult to predict tuna distribution using past data,³⁰ while the dynamism of both the tuna stocks and the wide-ranging fleet activities means that spatial management measures are not likely to be particularly effective.³¹ Interestingly, in the present study the implications of climate change were not mentioned. It may be that the sheer dynamism of both the marine environment and tuna resources tends to mask any longer-term change related to climate change.

Fishermen, Women and the Fishing Community

Despite the transition from SSF to a modern commercial fishery, with concomitant decline in the number of fishermen directly employed in the fishing industry, the fishing community remains resilient in both maintaining and developing working practices. There remains a clear gender-based division of labor between men who go to sea and women who work in the post-harvest sector, a situation common not only in many contemporary SSFs worldwide, but also common historically throughout the developed world as well. However, there is concern both at the individual level and within the wider community to encourage more young people to enter the industry; failure to do so would imperil its long-term development.

Perhaps a greater medium-term threat to the fisheries has been the rise of the tourist industry, especially during recent decades. Tourism is now the backbone of the Maldivian economy, contributing some 30 percent of total government revenue, as well as a high level of employment. Its share steadily increased from US\$110.5 million in 2010 to US\$242.2 million in 2015 and

30 N. Dunn and D. Curnick, "Using historical fisheries data to predict tuna distribution within the British Indian Ocean Territory Marine Protected Area, and implications for management," *Aquatic Conservation* 29, no. 12 (2019): 2057–2070; T.K. Davies, C.C. Mees and E.J. Milner-Gulland, "Second-guessing uncertainty: Scenario planning for management of the Indian Ocean tuna purse seine fishery," *Marine Policy* 62 (2015): 169–177.

31 D.M. Kaplan et al., "Spatial management of Indian Ocean tropical tuna Fisheries: Potential and perspectives," *ICES Journal of Marine Science* 71, no. 7 (2014): 1728–1749.

US\$479 million in 2019.³² According to a report published in 2020 by the National Bureau of Statistics,³³ tourism's share of the gross domestic product (GDP) was 21 percent in 2019. Tourism receipts totaled US\$3.2 billion. In 2014, 27,828 were employed in the resorts, 41 percent of which (11,409) were locals. The estimate for 2019 was 44,954, including 21,128 (47 percent) local. Just over 8 percent of the 2014 figure were female.

In comparison, fishing is not a close competitor in terms of its contribution to the economy. Between 1997 and 2007 it contributed between 6.6 and 8.8 percent of GDP.³⁴ However, this contribution has dropped in recent years to between two and three percent. As already noted above, there has been some competition in employment between the two industries. The number employed in the fishing industry declined from around 22,000 in 1995 to around 7,000 in 2016, increasing sharply in 2017 (Figure 6). As the COVID-19 pandemic gained in strength throughout 2020, many resorts were closed and large numbers of staff were laid off. This was reflected in the fishing industry, which experienced many requests from those laid off to join the fishery. In this context it is important to highlight that the tourism industry relies on long-haul jet aircraft combined with stiff competition from other oceanic islands, especially in the Indian Ocean and Caribbean, whereas the fishing industry is securely based on a local resource.

Management and Governance

The management model for fisheries used in the Maldives is illustrated in Figure 8. The industry is managed by the government in such a way that the local fishery can be developed and expanded while maintaining eco-friendly methods and gears that have been in use for a long time, while preserving the community nature of the industry involving people of the islands, especially women who have always played a significant role in fish processing. While the increase in vessel size and commercialization, including selling the catch to buyers instead of bringing it home, have all affected traditional ways, the development of factories and other related industries means that women are able to

32 National Bureau of Statistics (NBS), Ministry of National Planning, Housing and Infrastructure, *Statistical Yearbook 2020* (2020), available online: <<http://statisticsmaldives.gov.mv/yearbook/2020/indicators/>>.

33 NBS, *Employment in Tourist Resorts, 2019* (in collaboration with Ministry of Tourism, Republic of Maldives, 2020), available online: <<http://statisticsmaldives.gov.mv/nbs/wp-content/uploads/2020/06/Resort-Employee-Survey-2019-1.pdf>>.

34 FAO/South West Indian Ocean Fisheries Commission, *Report of the First Working Party on Fisheries Data and Statistics, Mombasa, Kenya, 24–27 April 2007*, FAO Fisheries Report No. 852 (Rome: FAO, 2008), available online: <<http://www.fao.org/3/a151ue/a151ue.pdf>>.

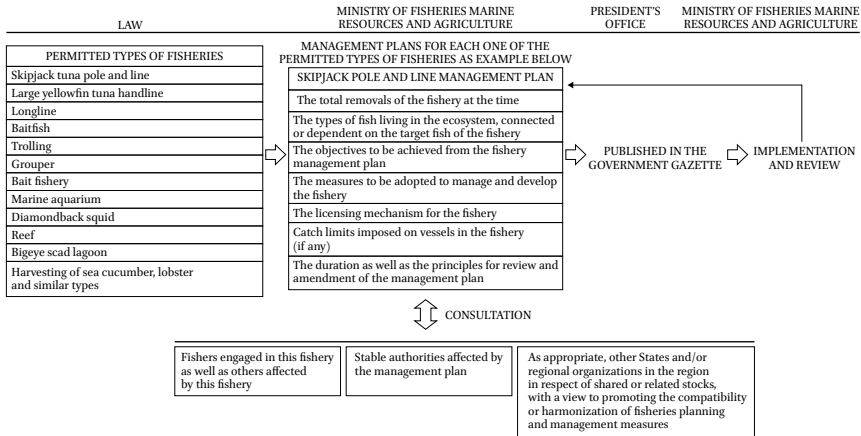


FIGURE 8 Fisheries management model used in the Maldives

shift from their traditional role overseeing the wood burners to the cleaner and arguably better environment of the factory.

It is also worth noting that the expansion of the fishing industry began in the 1970s at the time when the negotiations leading to the United Nations Convention on the Law of the Sea (UNCLOS) were in progress.³⁵ A key aim of UNCLOS was the extension of coastal State jurisdiction to 200 nautical miles from the baseline of the territorial sea. This provided the Maldives with an extensive EEZ, an added level of security for its status as a small island developing State. Since then the international relations and politics of the Indian Ocean have been complicated by the strategic rivalry between India and the People’s Republic of China. In the Maldives this has been evidenced by provision of infrastructure developments by one or the other State, but does not seem to have impacted the fishing or tourism industries and their international links. Further, piracy stemming from the political instability along the coastal regions of the northwest Indian Ocean was of concern for a time to the Maldivian fisheries, but has been too far to the west of the archipelago to pose a serious long-term risk to the fisheries.

Current Issues

Management issues revolve around the interplay of market demand and the logistics that link markets to primary production, the tuna resources, decision-making in the tuna industry, and governance decision-making within the

35 United Nations Convention on the Law of the Sea (Montego Bay, adopted December 10, 1982, in force 16 November 16, 1994) 1833 *United Nations Treaty Series* 397.

several stakeholder groups in industry, government and non-governmental organizations respectively. Individual issues exist both within markets, resources, industry and stakeholder groups, and also may cut across this structural classification.

As already noted above in the methodological section, markets provide the fundamental driving force in the exploitation of tuna resources. For the Maldives, this is predominantly the European canned tuna market, especially the Western European market for certified pole and line-caught skipjack and yellowfin tuna. Overall, fishery performance is sensitive to market influences, including in this case EU and to some extent US tariff barriers.³⁶ A current example are the calls within the market for banning yellowfin-derived imports in response to the alleged overfishing of yellowfin in the Western Indian Ocean, which has caused consternation in the Maldives, albeit that the outcome of this spat is at best uncertain and somewhat problematic.³⁷

As far as resource management is concerned, the impacts of fishing can be readily understood in terms of the contrast between the deep ocean ecosystem and the atolls' reef ecosystem. The Maldives, together with the Lakshadweep Islands to the north and the Chagos Archipelago (British Indian Ocean Territory) to the south, are situated atop the Chagos-Laccadive Ridge or Plateau that rises steeply from the deep ocean floor. It is instructive to note that at least until comparatively recently in the Maldives, there has been a high degree of stability in both ecosystems involving the use of baitfish from the lagoons used to catch tuna in the deep ocean. This can be traced back to at least the 12th century CE in the origins of the pole and line fishery and associated tuna exports that seem to have initially developed in tandem with the cowrie trade.³⁸

In the atoll lagoons the baitfish stocks are now monitored,³⁹ and their populations appear to be relatively stable. However, other pressures arise from the exploitation of large, long-lived fish such as groupers, which appear to have

36 J.K. McCluney, C.M. Anderson and J.L. Anderson, "The fishery performance indicators for global tuna fisheries," *Nature Communications* 10, (2019): 1641, DOI: 10.1038/s41467-019-09466-6; Campling, n. 29 above; see also P. Guillotreau et al., "Local, regional and global markets: What drives the tuna fisheries?," *Reviews in Fish Biology and Fisheries* 27 (2016): 909–929.

37 C. White, "IOTC delays yellowfin decision, WWF declares decision 'lost opportunity'," *SeafoodSource* (March 12, 2021), available online: <<https://www.seafoodsource.com/news/environment-sustainability/iotc-delays-yellowfin-decision-wwf-declares-decision-lost-opportunity>>.

38 S. Yadav et al., "King tuna: Indian Ocean trade, offshore fishing, and coral reef resilience in the Maldives archipelago," *ICES Journal of Marine Science* 77 (2020): 398–407.

39 R. Gillett, A.R. Jauharee and M.S. Adam, *Maldives Livebait Fishery Management Plan* (Malé: Marine Research Centre, 2013).

been in decline for the past two decades or so, probably in part due to the tourism industry. Exploitation of ornamental fish does not seem to be threatening the reef ecosystem.

In the deep ocean, while the skipjack tuna stock appears to be relatively stable, it is likely that the yellowfin tuna stock is seriously overfished. Apart from direct investigations of the yellowfin stock, there is strong evidence of IUU fishing in the wider Western Indian Ocean region, with large numbers of unidentified fishing vessels recently highlighted by the submission from India to the Indian Ocean Tuna Commission (IOTC) meeting in March 2021.⁴⁰ The IOTC has since enacted a series of conservation measures due to come into force in the latter part of 2021 unless an objection is lodged. These include an interim plan for rebuilding the Indian Ocean yellowfin tuna stock in the IOTC area of competence, the establishment of a program for transshipment by large-scale fishing vessels, and harvest control rules for skipjack tuna in the IOTC area of competence.⁴¹ Current MSC certification of the pole and line fishery will come up for renewal in 2023, and its continuation may depend on maintenance of long-term stability between the two stocks presently under threat by over-exploitation of fishery resources.

In the industrial context, IUU fishing in the deep ocean contrasts with the increasingly active role taken by the fishing industry in the Maldives. The expanded role of the private sector since the early 2000s is notable (Table 1), albeit actively promoted by the government of the Maldives, as is the decline of direct Japanese participation, as noted above. Meanwhile, the industry has encouraged targeting of free-swimming schools and avoidance as far as possible of catching juvenile yellowfin tuna. This involves reduction of reliance on FADS; drifting FADS that had broken away from their moorings were researched as early as a decade ago.⁴²

40 IOTC, *Report of the 4th Special Session of the Indian Ocean Tuna Commission*, held by video-conference 8–12 March 2021, Doc. IOTC-2021-SS4-R (2021); see also J. Rattle, *A Case Study on the Management of Yellowfin Tuna by the Indian Ocean Tuna Commission* (London: Blue Marine Foundation, 2019); WWF, T.M. Tracking, *Unregulated Fishing on the High Seas of the Indian Ocean: The Impacts on, Risks to, and Challenges for Sustainable Fishing and Ocean Health* (2020).

41 IOTC, *Conservation and Management Measures adopted by the IOTC at its 25th Session*, IOTC Circular 2021–31 (2021), available online: <<https://www.iotc.org/documents/conservation-and-management-measures-adopted-iotc-its-25th-session>>.

42 M. Shainee and B. Leira, “On the cause of premature FAD loss in the Maldives,” *Fisheries Research* 109, no. 1 (2011): 42–53; see also A.R. Jauharee and M.S. Adam, “The evolving Maldivian tuna fishery and its increasing dependence on the anchored FADS” (Malé: Marine Research Centre/IOTC, 2012), available online: <<https://www.iotc.org/sites/default/files/documents/proceedings/2012/wptt/IOTC-2012-WPTT14-10.pdf>>.

As far as governance is concerned, the government of the Maldives commissioned a report on the overall management and planning of fisheries that was published in 2018.⁴³ This has been followed by the publication of a Master Plan (MASPLAN) in January 2021.⁴⁴ As noted above, the Maldives became a full member of the IOTC in 2011. Meanwhile, the Maldives Seafood Processors and Exporters Association (MSPEA) has signed a memorandum of understanding with the International Pole and Line Foundation to cooperate on all matters pertaining to the management of tuna fisheries.⁴⁵ Further, the Maldives has provided management advice to other pole and line fisheries in the region, including those in Indonesia and South Africa.⁴⁶

Both the significant commitment and concern of the Maldives regarding the management of tuna fisheries has been further underlined by actions taken in the wake of the decision by certifier DNV-GL (Det Norske Veritas-Germanischer Lloyd) because the 2015 IOTC Scientific Committee's report showed stocks in decline "due to increased targeting from other countries and other methods of fishing." It was reported by the IOTC that the maximum sustainable yields of stocks were exceeded due to substantial increases in longline, gillnet, handline and purse seine fishing effort, and associated catches in recent years.⁴⁷ Since then, the Maldives has increased its efforts at reducing yellowfin tuna catch, so that by 2019 it has been reduced by 7,737 metric tons compared to 2015 to

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- 43 Ministry of Fisheries and Agriculture, *Republic of Maldives Project for the Formulation of Master Plan for Sustainable Fisheries (MASPLAN): Final Report* (Japan International Cooperation Agency/ITEM Consulting Inc./Fisheries & Aquaculture International Co. Ltd., 2018), available online: <<https://openjicareport.jica.go.jp/pdf/12301677.pdf>>.
- 44 Ministry of Fisheries, Marine Resources and Agriculture, *Maldives Tuna Fishery Management Plan 2021* (Malé: Ministry of Fisheries, Marine Resources and Agriculture, 2021), available online: <<https://www.gov.mv/en/files/kandumahuge-masverikamuge-plan.pdf>>.
- 45 "Maldives Tuna Agreement," *FishFocus* (2021), available online: <<https://fishfocus.co.uk/Maldives-tuna-agreement>>.
- 46 "The Maldives invites Indonesia to be a principal partner in spearheading the interests of coastal nations at the Indian Ocean Tuna Commission," *International Pole and Line Foundation* (May 27, 2015), available online: <<https://ipnlf.org/news/the-maldives-invites-Indonesia-to-be-a-principal-partner-in-spearheading-the-interests-of-coastal-nations-at-the-indian-ocean-tuna-commission>>; see also "Agreement settled with Maldives to develop tuna fisheries in the Indian Ocean," *Fish Information & Services* (August 25, 2017), available online: <<https://seafood.media/fis/worldnews/worldnews.asp?monthyear=8-2017&day=25&id=93512&1=e&country=&special=&ndb=1&df=1>>.
- 47 C. White, "Maldives loses MSC accreditation for pole and line yellowfin tuna," *Seafood Source* (April 18, 2016), available online: <<https://seafoodsource.com/news/environment-sustainability/maldives-loses-msc-accreditation-for-pole-and-line-yellowfin-tuna>>. The Maldives pole and line fishery was given 90 days from the suspension effective from April 15, 2016 to provide a corrective action plan to address the suspension.

align with IOTC resolutions.⁴⁸ According to the MSPEA, in 2019 local fishermen, processors and the government together campaigned to reduce yellowfin tuna catch, with a special focus on reducing juvenile catches, and managed to reduce yellowfin tuna catch five times below the IOTC requirements, with a significant reduction in the catch of juveniles. The government also revoked the permits of 32 longline vessels targeting yellowfin and bigeye tuna in the Maldives' EEZ, and yellowfin tuna processors increased the difference in buying prices of fish below and above 30 kg. These measures are said to have led to larger fish sizes and a reduction of yellowfin catches by handline. The World Wildlife Fund has congratulated the Maldives' efforts in certification and taking a leadership role in the sustainable management of tuna fisheries in the Indian Ocean.⁴⁹

Conclusion

The Maldives may be one of the best examples of a successful transition from an SSF to a modern commercial fishing industry that is well-connected to international markets. The stability of the fishing community is especially notable in the continuation of elements of the earlier SSF society, including the key role of women. The Maldives is also notably proactive in the management of tuna fisheries, not only in cooperation within the industry itself and the formulation of a comprehensive national fisheries plan, but also in advancing the interests of conservation and good management practices in the IOTC and among its constituent members. Nonetheless, there are considerable ecosystem threats posed by IUU fishing by DWFNs and continuing pressures on the reef ecosystem. Further, the overall management of the Indian Ocean tuna fisheries also poses a considerable threat to these fisheries in both the region and the Maldives.

48 M. Kearns, "Maldivian fishermen, processors band together and reduce yellowfin tuna catch by five times IOTC requirement," *SeafoodSource* (October 15, 2020), available online: <<https://www.seafoodsource.com/news/supply-trade/maldivian-fishermen-processors-band-together-and-reduce-yellowfin-tuna-catch-by-five-times-the-iotc-requirement>>.

49 "WWF applauds Maldives for Indian Ocean's first Marine Stewardship Council Certification," *WWF* (November 26, 2012), available online: <<https://wwf.panda.org/?206835/first-indian-ocean-tuna-fishery-certified>>.