

A SOCIO-ECONOMIC ASSESSMENT OF THE TUNA FISHERIES IN THE MALDIVES

Thomas Hohne-Sparborth

Contributing Authors:

M. Shiham Adam & Adam Ziyad





“ I come from a long line of pole-and-line fishermen; it’s in my blood. For as long as I can remember, I have never wanted to do anything else.”

Abdulla Shaan, Maldivian fisherman

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This report presents an analysis of the role of the pole-and-line fishery of the Maldives as a social and economic policy, as opposed to a purely ecological one. The study explores how government policies have helped shape the fishery and have impacted on the vulnerability, adaptability and livelihood assets of the local population. The sector is heavily exposed to trends on the world market, and the economic potential of the fisheries remains underutilised. However, the pole-and-line fishery has served to create an accessible and equitable form of employment to a large, and otherwise isolated, part of the population, and benefits from the fishery are spread through the economy through consumer spending, saving and re-investment, including in education.

The field work for this Technical Report was conducted in April-May 2013.



ORGANISATIONAL PROFILES

International Pole & Line Foundation (IPNLF)



The International Pole & Line Foundation (IPNLF) works to develop, support and promote socially and environmentally responsible pole-and-line and hand-line tuna fisheries around the world. IPNLF's ambition is to contribute to thriving coastal fisheries, including the people, communities, businesses and seas connected with them.

As a hub for sustainably-minded organisations, we use the influence of the market to forge change through practical fishery projects and stakeholder cooperation. IPNLF membership is open to organisations involved in the pole-and-line tuna supply chain, from fishing associations to suppliers, to retailers. Allied with our members, we demonstrate the value of pole-and-line tuna to consumers, policy-makers and throughout the supply chain.

We work across science, policy and the seafood sector, using an evidence-based, solutions-focused approach with guidance from our Scientific & Technical Advisory Committee and Board of Trustees.

IPNLF was officially registered in the United Kingdom in 2012 (Charity 1145586), with branch offices in London and the Maldives, and a staff presence in Indonesia.

Find out more about pole-and-line tuna, IPNLF and membership:

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TABLE OF CONTENTS

	Profiles	4
	Table of Contents	5
1	Introduction	6
2	Methodology	8
	2.1 Data collection	8
	2.2 Theoretical framework	8
	2.3 Report structure	9
3	Overview of the fishery sector	10
	3.1 History	10
	3.2 Target species	11
	3.3 Value addition	12
	3.4 Contribution to GDP	12
	3.5 Foreign trade	13
	3.6 Supply and use of fish products	16
4	Vulnerability context	17
	4.1 Fish catch	17
	4.2 Prices	19
	4.3 Climate effects	21
5	Policies, institutions and processes	22
6	Livelihood strategies and outcomes	24
7	Socio-economic status of the fisheries	26
	7.1 Natural capital	26
	7.2 Social capita	26
	7.3 Human capital	28
	7.4 Physical capital	29
	7.5 Financial capital	30
8	Discussion and recommendations	34
	8.1 Benefits	34
	8.2 Challenges	34
	8.3 Recommendations	36
9	Conclusion	38
10	References	40
	10.1 Published sources	40
	10.2 Unpublished sources	42

Lead Author:

Thomas Höhne-Sparborth
T.Hohne-Sparborth@lse.ac.uk

Production and Editorial design:

Paul Rackstraw
paul@rackstrawdesign.co.uk

All image credits:

International Pole & Line Foundation
info@ipnlf.org

The report has been compiled by Thomas Höhne-Sparboth, London School of Economics and Political Science, UK, in collaboration with the International Pole & Line Foundation (IPNLF).

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1 INTRODUCTION

1 INTRODUCTION¹

The Maldivian pole-and-line fishery is one of the largest coastal fisheries in the Indian Ocean, and is estimated to account for 18-20% of the total catch of skipjack tuna in this region (Adam, 2013b). The fishery has received considerable attention as a potential model for coastal states, owing to both its commercial success, and its adherence to ecological best-practices. Pole-and-line fishing has been promoted for its environmentally-friendly nature, owing to the low by-catch, which renders alternative methods such as purse-seining unsustainable (Greenpeace, 2009).

In 2012, the Maldivian skipjack tuna fishery achieved recognition of its adherence to sound environmental management by successfully completing the process of certification by the Marine Stewardship Council (MSC). This certificate enables Maldivian skipjack tuna fish products such as canned tuna to carry the eco-label, whereby it has retained access to European markets and extracts a premium compared to other fisheries such as those of Indonesia, where pole-and-line fish catch may amount to as much as 100 kilotonne (kt), but where the lack of an established supply chain means only around 10% is marketed as such (Burton, 2013; Ali, 2013; Adam, 2013).

Certification is merely one step in the improved management of the fisheries, following on the heels of a range of other reforms, such as the 2010 ban on shark fishing, and the country's accession to full membership status of the Indian Ocean Tuna Commission (IOTC). However, in the on-going debate over the suitability of the Maldivian model, particularly in terms of its relevance to other coastal states, the role of the pole-and-line fishery as a social and economic policy bears further examination, and no studies have as yet explicitly focused on this aspect as their main area of focus, although various works have touched on the subject (Linton and Shareef, 2011; Sinan and Rasheed, unpublished, 2012; Greenpeace, 2009).

This report provides an analysis of the pole-and-line fishery of the Maldives from the perspective of the fishermen that the sector employs, the communities of which they form

a part, and the society as a whole, within which the fishery plays a central role. The report seeks to answer the question of how the fisheries affect the vulnerability, adaptability and livelihood assets of the local population, particularly in the remote atolls. The study also identifies the various government policies that have helped to shape the fisheries into their present form, and how these policies have impact on these socio-economic dimensions.

The research builds on the existing literature regarding the fishery in the Maldives, and draws extensively on new material drawn from unpublished data and a series of interviews conducted in May and June 2013. While such a study has not been previously conducted for the Maldivian case, which is distinct in a number of regards, particularly as regards its promotion of pole-and-line fishery, a number of authors have previously explored the socio-economic impact of fisheries in other regions.

An early study of the fisheries in the South Pacific, for instance, explored the contrasts between traditional fishing practices and the competition from modern industrial-scale fishing activities, and explored issues related to the organisation and allocation of fishing grounds, and the distribution of profits (Doumenge, 1966). Several recent studies of the fisheries in Hawaii have also evaluated the economic contribution made by the sector, and have explored the importance of social networks both between fishermen, and other societal groups (Barnes-Mauthe et al., 2012; Arita et al., 2011; Sharma et. al, 1999)². More recently still, an increasing rate of tuna catch has inspired socio-economic studies of tuna fisheries in Tanzania, which, though hampered by data limitations, found that artisanal fishing techniques had the potential to generate a significant income for fishers, was a significant contributor to exports, and generated some government revenue through licensing and registration fees (Igulu, 2013).

In comparing socio-economic studies from other regions, a word of caution is appropriate. Studies such as the one attempted in this assessment are necessarily highly

¹ This research was made possible through financial support by Sainsbury's and the International Pole & Line Foundation (IPNLF). The author would also like to express his appreciation for the assistance provided by the Marine Research Center, the Fisheries Management Agency, Horizon Fisheries, and all interviewees whose views and experiences contributed to the report.

² An extensive summary of earlier case studies of the Hawaiian case is also provided by Glazier (1999), detailing works that have contributed to the development of estimation methods of economic contributions by fisheries, for instance through the use of I-O tables, the evaluation of specific regulations and environmental policies, and the use of cost-earnings surveys.

context-specific. In the case of the Maldives, for instance, the reliance on pole-and-line fishing is distinct from cases reviewed in previous studies. Care should thus be exercised in the application of findings to other cases. The point is illustrated by a citation from the aforementioned report on fisheries in the South Pacific, which noted that “it is certain that the obstacles of language, custom, concepts of social

relationships, and organization of work are very difficult, if not impossible to overcome, at least over a very short period of time” to conclude that imposing a foreign fishing culture on traditional fisheries in places such as Polynesia would likely be a mistake (Doumenge, 1966). As a result, the Maldives may offer many fruitful lessons, but the challenges in transplanting its model ought not to be underestimated.



Maldivian pole-and-line fishermen at work - one man, one hook, one fish.

2 METHODOLOGY

2.1 DATA COLLECTION

The fieldwork related to this report was carried out over a period of three weeks in May and June 2013. Interviewees included government officials in the Ministry of Fisheries and Agriculture (MOFA), the Ministry of Tourism, the Fisheries Management Agency (FMA), and the Marine Research Center (MRC). An extended fieldtrip was conducted to visit Horizon Fisheries, the largest private fishing company, and Kooddoo, the largest government-owned fishing company. Fishermen were interviewed at the fish purchase point at Horizon Fisheries in Maandhoo in Laamu atoll, at the harbour in Malé, and Vilingili island in Gaafu Alif atoll, and a town-hall meeting with

26 fishermen was also organised at Kolamaafushi island in this same atoll. Other interviews included councillors of Gan and Fonadhoo islands near Maandhoo, fish processors in Gan and Vilingili, and market traders in Malé.

Statistics were obtained primarily from the Fisheries Management Agency, supplemented with public data collected and published by the Ministry of Planning and National Development (MPND), and historical purchasing prices provided by Horizon Fisheries. A variety of other published and unpublished sources are cited in this report, as mentioned in the references.

2.2 THEORETICAL FRAMEWORK

This report analyses the status of the fisheries and their socio-economic impact on the population of the Maldives using the Sustainable Livelihoods Framework, a tried-and-tested methodology propagated by the UK Department for International Development (DFID) and the United Nations' Food and Agriculture Organization (FAO). The approach distinguishes between the contexts in which people live, the assets that they have available to them, and the policies and institutions that affect their choices, the strategies that result from these (FAO, 2005). The visual representation of the framework, as shown in the figure below, highlights that each of these elements form part of a broader livelihood system.

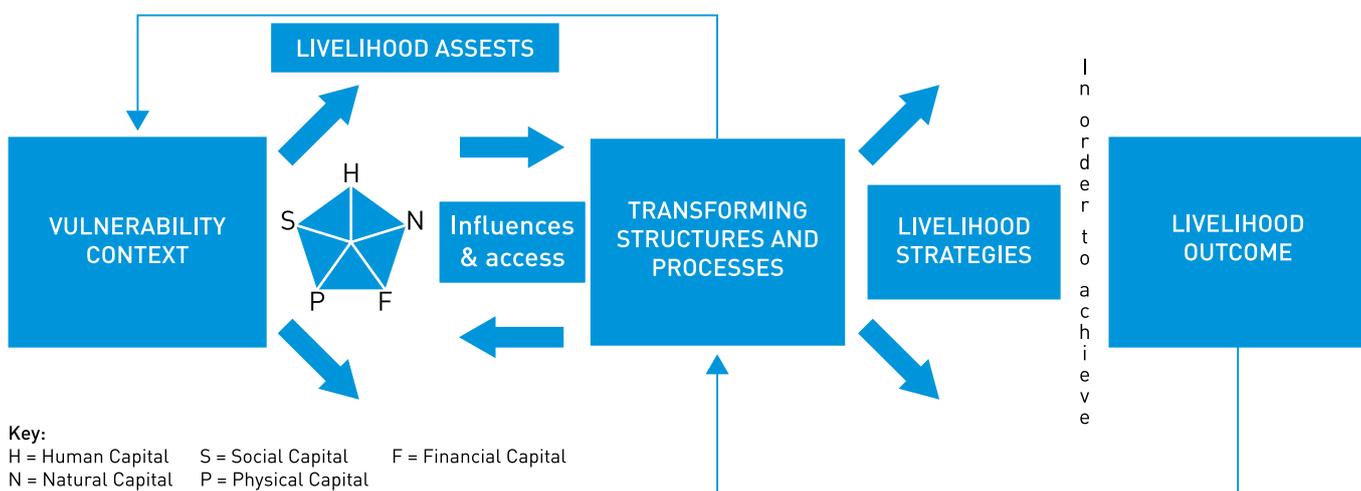
This type of analysis places “a heavy emphasis on understanding the structures and processes that condi-

tion people's access to assets and their choice of livelihood strategies” (DFID, 1999). The approach is applicable both to richer and poorer strata of the population, and recognises that a variety of actors (ranging from the local community, to the private sector and government) interact to shape outcomes, as part of a dynamic and on-going process.

The framework recognises five different types of “assets” that individuals and communities may rely upon to secure their livelihoods:

- **Human capital** relates to the ability of individuals to contribute, add value, and perform labour. Human capital may be increased or decreased as a result of health issues,

Figure 1: Sustainable livelihoods framework



Source: DFID (1999)

nutritional status, education, informal skills and training, experience, migration, and personal attributes such as motivation and work ethics. Whereas traditional economics seeks to measure contributions by sectors such as health and education in terms of the expenditures on schools and medical facilities, human capital instead emphasises *outputs* such as educational achievement and mortality rates (Appleton and Teal, 2002).

- **Natural capital** represents the biological and geographical resources that are available to people and communities in their immediate environment, such as access to agricultural land, biodiversity, and marine life. Natural capital may be either sustainable (such as in the case of a naturally-renewing stock of fish producing a constant flow of new fish), or unsustainable (such as in the case of the extraction of mineral resources). In some contexts, ownership over natural resources may be a contentious issue, and may not be well-defined or cause for strife, for instance in the case of fishermen competing over shared fishing grounds.
- **Physical capital** includes all the accumulated technological and material investments that contribute to the goal of production, and may include infrastructure such as ports and roads, as well as factories and processing plants, or smaller-scale investments such as fishing vessels or fishing gear. Physical capital is often fixed, in the sense that it cannot be easily liquidated, and may carry associated costs such as depreciation, insurance, or risk of damage. Owing to its tangible nature and quantifiable value, physical capital may also be used as collateral to increase access to financial capital.
- **Social capital** represents the economic potential of communities of individuals, as enshrined in institutions, networks, culture and laws. Social capital encapsulates fluid concepts such as knowledge, trust and security that may act as a catalyst for economic activity. Authors such as Putnam have highlighted how such “soft” assets as trust have a direct and measurable impact on economic performance (Putnam, 1993). For instance, the presence of a police force and a low level of corruption may encourage businessmen to engage in business, without fear of theft or harassment, while well-developed connections between communities can create opportunities for trade and commerce. Similarly, in fisheries, social networks may help reduce uncertainties faced by fishermen, and can consist of linkages both between fishermen, and with other individuals, groups or institutions related to the sector (Barnes-Mauthe et al., 2012).
- **Financial capital** includes all monetary resources that an actor has access to, including wages, profits, pensions, savings, remittances, shares, bonds, loans, etc. Financial capital has no inherent value, but is instead measured in terms of the other forms of capital, such as the amount of labour (human capital) it represents, or the amount of goods (physical capital) it can buy. As such, it is an immediate but also incomplete means by which to measure an individual’s economic well-being.

2.3 REPORT STRUCTURE

This report first provides an overview of the fishery sector in terms of its history and present organisation to set the stage for the rest of the analysis. The report then considers factors such as the seasonality inherent in fish catch and trends related to stock status and the export markets to describe the vulnerabilities that the fishery sector, and those that it employs, are exposed to.

In accordance with the sustainable livelihoods framework, section 5 then proceeds to an explicit identification of the various institutions and policies that have helped shape the fisheries and determine the livelihood strategies available. As discussed in section 6, the main outcome of these

policies has been to facilitate an outcome in which the fisheries are organised in the form of small-scale privately-run enterprises that may be deemed economically inefficient, but from a socio-economic perspective provide a sustainable and equitable form of income to a large and vulnerable population. In section 7, these socio-economic effects are explored in greater detail, on the basis of the five forms of capital described above.

The report concludes with a discussion of the findings and makes a number of recommendations to ensure and monitor, evaluate and optimise the socio-economic status of the fishery sector.

3 OVERVIEW OF THE FISHERY SECTOR

3.1 HISTORY

Owing to the unique geography of the Maldives, it is unsurprising that historical evidence suggests that the fishery sector has been an important part of the local economy for much of the documented history of the islands. Tuna fishing is likely to date back at least to pre-Islamic times³. Further accounts by passing travellers and explorers have provided further insights into the nature of the fishery in these times, and suggest that the use of live bait pole-and-line fishing to catch skipjack tuna has been in common use for centuries (Anderson et al, 2012, citing Anderson et al, 1998; Anderson and Hafiz, 1996; Fitzler, 1935). Fish was caught using locally-built vessels using coconut rafts and locally grown timber, and boiled, smoked and sundried to produce a product known as Maldives fish (Ali, 2007).

For most of the history of the fisheries, fish catch was intended primarily for domestic consumption, although some dried fish products were exported around the region to markets such as Sri Lanka, Yemen and Sumatra (Anderson et al, 2012). In 1971 the market in Sri Lanka largely collapsed, which led the government of the Maldives to issue an invitation for foreign investment in the fishery sector, in a bid to ensure continued access to foreign-exchange obtained from the sale of fish products. Spain, Thailand and Japan each signed agreements of varying periods of duration to send collector and freezing vessels to purchase the fish from local fishermen (Ali, 2007). The opportunities presented by the demand for frozen fish represented a change in the character of the fisheries, from being focused primarily on domestic consumption to one increasingly geared towards exports.

In 1972, agreements were also concluded with Japanese partners for the construction of the Felivaru cannery, and the supply of 100 engines of 28 horsepower (Ali, 2007). By providing attractive credit schemes for the purchase and equipment of dhonis, the government, with the assistance of World Bank development programmes, was instrumental in modernising the fishing fleet. While pole-and-line fishery remained the dominant method of fishing, the mechanisation of the fisheries led to larger vessels with higher capacity

(Anderson et al, 2012). Japanese long-liners have also actively fished in Maldivian waters under a joint-venture programme, but the licences of foreign vessels were suspended in 2010 (Adam et al, 2012).

In 1982, the price of tuna in the world markets collapsed, and put the agreements with foreign vessels at risk. The government responded by purchasing the Japanese collector vessels that had been servicing its fishermen, as well as the Felivaru cannery, and with the aid of a loan from Kuwait, expanded its fishing fleet by a further six collector vessels in 1983. In 1994 and 1995, further storage and processing facilities were established at Maandhoo and Kooddoo (Ali, 2007).

Through the State Trading Organisation and, later, a state-owned company (“MIFCO”), the government exercised a monopoly on freezing and canning (Linton and Shareef, 2011).

As a result of these changes, catch increased from 21,452Mt in 1966 to 124,109Mt in 1999. In 2000, the fisheries were partially privatised and the annual catch temporarily declined, but reached 184,158Mt in 2006, representing a compound annual growth rate of 5.5% from 1966 (FMA, 2013; Sinan, 2011). From the mid-1990s, exports as well as re-exports through Thailand also increased rapidly, particularly to end markets such as Japan and Europe, where awareness campaigns on sustainably-sourced fish have led to rapid increase in demand for pole-and-line fish.

From 2006 to 2009, fish catch declined for three consecutive years, and again in 2011. The reasons for this decline have not been determined conclusively, but possible explanations include changes in oceanic conditions, including changes in sea surface temperature, over-fishing of skipjack tuna in the rest of the Indian Ocean, and a decline in fishing effort (Adam, 2013a). A recovery in fish catch was reported in 2013 (Horizon Fisheries, 2013b). Trends in the export of fish products largely matched those of fish catch, experiencing a decline to 2009/2010, before making a partial recovery in 2011, when the value of exports of marine products amounted to US\$120 million (MPND, 1982-2012).



³ The Maldives converted to Islam in AH 548 (AD1153-54)

3.2 TARGET SPECIES

In 2012, skipjack, yellowfin and other tuna species accounted for 44%, 37% and 2% of total fish catch respectively (FMA, 2013). Other fish, especially reef fish, are mostly consumed domestically, particularly in the tourism sector. The tuna fishing fleet is currently split roughly equally between vessels specialising in skipjack or yellowfin fishing (Burton, 2013a). The proportion of skipjack as a percentage of total tuna catch has declined in recent years, from a high of 75% in 2006. Although some vessels will target both species, skipjack fishing is concentrated in the southern part of the Maldives, while yellowfin fishery is primarily located in the centre (Sinan, 2011). The division is largely explained by infrastructural differences, as the southern atolls lack easy access to Male's international airport or deep-freezing facilities, which renders the export of yellowfin tuna from the south impractical.

Skipjack fishing experiences a high season from September until April, after which fish catch drops significantly until August. The concentration of skipjack fisheries has shifted from the central atolls to the southern atolls, as a result of capacity expansions in terms of vessels and processing plants (Sinan, 2011). Skipjack is caught using around 80-150kg of live bait per fishing trip (Anderson, 1994), which are caught at night, these days often using high-voltage light to attract the fish. Skipjack is exported in fresh, frozen, chilled or canned form, or dried in the small-scale cottage industry for sale to Sri Lanka. Skipjack catch declined from 138,458Mt in 2006 to 57,652Mt in 2011, for indeterminate reasons, as discussed in section 4.1.

Yellowfin tuna was previously caught primarily by pole-and-line and using live bait (Sinan, 2011). In recent years, around 15-17% of pole-and-line catch is estimated to be yellowfin tuna, mainly in the form of juveniles of under 40cm in length, while handline fishing of mature and sub-adults

is now estimated to account for around half of total yellowfin catch (Adam, 2013; Burton, 2103). Yellowfin fishing trips are much longer than skipjack trips, and can last up to two weeks. During this time, caught fish is stored in on-board ice boxes, which are refilled when selling the fish to processors. The price of yellowfin has increased in recent years, and – stimulated by declining skipjack catch – may have motivated skipjack vessels to switch to yellowfin fishery. Accordingly, catch has increased from 7,711Mt in 1991 to 15,247Mt in 2001 and 44,977 in 2012 (FMA, 2013).

The tuna fisheries are dependent on a migratory and straddling stock, which exposes the sector to vulnerabilities related to fishing trends and practices elsewhere in the Indian Ocean, as discussed in greater detail in section 4.1.

Reef fish are the primary other species of fish caught commercially. Exploitation of reef fish started in the mid-1980s and by the 1990s groupers, sea-cucumbers and aquarium fish were actively targeted for exports (Adam et al, 1997, as cited by Sinan, 2011; Adam, 2013). Since then, growth in this sector has largely been driven by demand from the expanding tourism sector. As of 2013, the Ministry of Fisheries and Agriculture is pursuing a policy of diversification, and is, for instance, preparing a grouper management plan that could create new commercial opportunities for the exploitation of this fish (Shafeeu, 2013). Currently, exports are beginning to target regular reef fish such as jacks, breams, snappers and job fishes, contributing to growth in the reef fisheries.

Shark fishery was common in the Maldives for centuries, but in recognition of the greater economic benefits of maintaining eco-diversity and a healthy shark population for marine tourism purposes, shark fishers received financial assistance and training to facilitate their transition to other livelihoods, and shark fishing was formally banned in 2010.



Tuna, the day's catch, waiting to be stored on ice.

3 OVERVIEW OF THE FISHERY SECTOR

3.3 VALUE ADDITION

Fishing vessels are largely held privately by enterprising fishermen, or shore-based owners who may own vessels but do not participate in fishing trips and whose ownership is generally limited to one, or at most two, boats. These vessels sell their fish to processing companies, either through shore-based facilities or collector vessels, or to the cottage industry, consisting of small-scale artisanal family businesses that smoke and dry the fish, or produce fish paste. Some of the processing companies own and operate their own vessels (Linton and Shareef, 2011), but the majority of the vessels remain privately operated. The larger processing companies appear reluctant to invest in their own vessels, as such a step is deemed politically sensitive, representing an upset of established practice (Horizon interview).

In 2000, as part of structural reforms, MIFCO was split up into (1) Kooddoo Fisheries company, which exports frozen fish to Thailand; (2) the Felivaru canning facility in the north; and (3) the KOG Fresh Fish plant. Of the three, only Kooddoo, located towards the south of the Maldives, appears to be managing well, and remains the largest exporter of frozen tuna to Thailand. The company is planning an expansion in the southern atolls through a new freezing facility. The Felivaru facility has large surplus capacity, but struggles with a neglected infrastructure, poor cash-flow and access to fish, and may be only marginally profitable, if not running at a loss.

A number of private companies have also entered the market since 2000, assigned to operate in specific zones of the Maldives. Under MSC certification, any private company that is a member of the Maldives Seafood Processors and Exporters Association (MSPEA) is allowed to export MSC-certified skipjack tuna products. The largest private company, Horizon Fisheries, was founded in 2003 and expanded the

storage facilities originally owned by MIFCO into a canning and freezing complex. The company mainly processes skipjack tuna intended for the European market and has large surplus capacity, resulting in high operational costs. It is also developing a cold storage facility in the north, where a third processing plant has been constructed by a separate company that could become a competitor with Felivaru for access to fish, if it in fact becomes operational (Adam, 2013b). Most of the other private companies, such as Ensis and Cyprea Marine Foods are focused on the yellowfin industry, and are an important source of finance for fishermen (Linton and Shareef, 2011).

Both processing companies and the artisanal industry purchase fish directly from fishermen, cash-in-hand, but processing companies also provide fuel and ice, which provides them with an important advantage. Fishermen are mobile, but will generally sell to the one or two companies that operate in their area, mostly based on considerations of convenience, as prices are generally the same between the companies. Fish is then sold fresh to export markets, processed into canned tuna, or frozen for shipment to overseas canners, particularly in Thailand.

A smaller amount of fish is sold to the cottage industry, which in recent years has suffered from the rising costs of the raw fish, and falling demand from markets such as Sri Lanka. Moreover, competition from the large fish processors limits the access to fish by artisanal producers, which is largely restricted to smaller fish that do not meet the weight-limits of the companies. As of 2013, artisanal producers reported to be struggling to make a profit, but with limited skills, local opportunities and credit facilities, alternative livelihoods are not readily available (Höhne-Sparborth, 2013b).

3.4 CONTRIBUTION TO GROSS DOMESTIC PRODUCT (GDP)

In dollar terms, output from the fisheries sector has increased since the 1980s and peaked in 2006, after which the decline in fish catch had a detrimental impact on the primary fishery industry, which was not offset by a rise in prices. During the period from 2006, however, production in fish processing continued to increase, which is believed to have been the result of the privatisation in 2000 and the progressive entry of new private processing and exporting companies, increased demand for export products from Europe, and the increase in the price of fish in the world markets. Output generated in

the secondary fish processing sector peaked in 2008, before falling for three consecutive years, with a partial recovery in 2012. In 2012, the total output from the fishery sector was approximately US\$69 million.

In percentage terms, however, the significance of the fishery industry to Maldivian GDP has declined from 12-18% in the 1980s, to 6.4% in 2003, and to just 3.5% in 2012. The decline is mostly accounted for by rapid growth from the tertiary sector, including tourism, where the compound growth rate over the period from 1984 to 2010 reached 8.1% per year, as

OVERVIEW OF THE FISHERY SECTOR 3

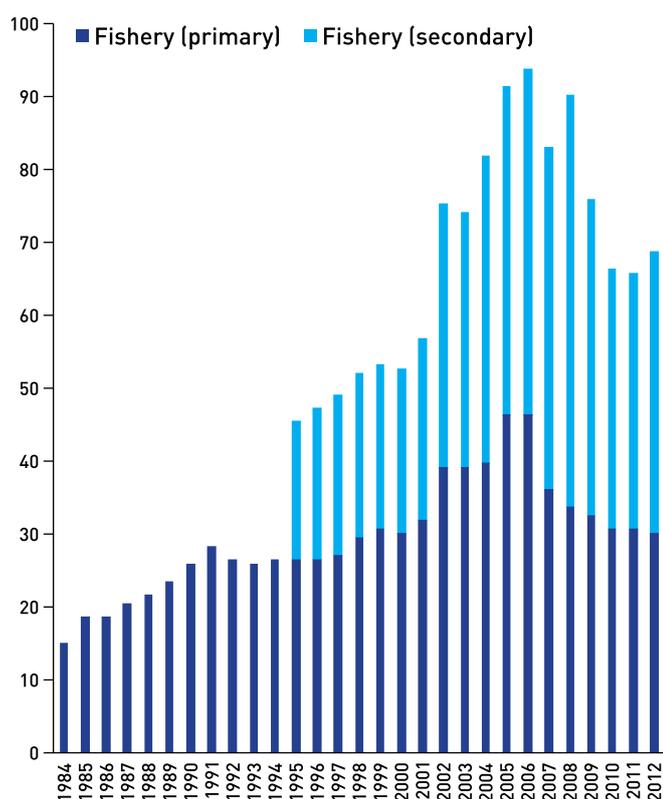
well as sectors complementary to tourism, such as transportation, communication and construction (Mohamed, 2013).

While fish catch partially recovered in 2012 and 2013, fish stocks place a natural limit on the volume of output in the primary sector. In the manufacturing sector, the dependency on imported raw materials results in high costs and adversely affects the growth prospects of the industry⁴. As predicted by the IMF, “the fisheries sector is expected to continue to perform poorly due to exogenous factors affecting the fish population” (IMF, 2011). The Ministry of Planning and National Development (1982-2012) projects a partial recovery in 2012 and 2013, but forecasts medium-term growth in the manufacturing sector as a whole of only 1.6%py and

2.6%py in 2014 and 2015, respectively. It forecasts negative growth in value terms of -1.4% and -0.4% in the primary fisheries industry for these years, compared to growth of 4.6% and 3.8% in the tertiary sector (MPND, 1982-2012).

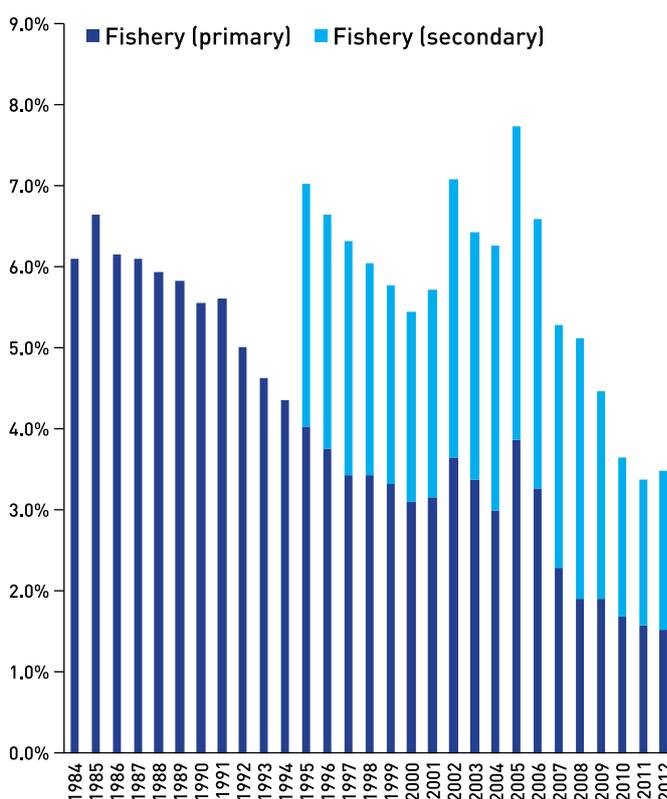
It should also be noted that the indirect contribution of the fisheries to GDP may be significant, by stimulating related industries, such as various manufacturing sectors, boat-building, trading enterprises, transport, and service industries. In the case of Hawaii, for instance, it has been estimated that an increase in demand for longline tuna products of \$1 would result a total economic impact of \$2.59 (Arita et al., 2011). A specific estimate for the Maldives is not available, but is likely to be of a similar order.

Figure 2: Fishery contribution to GDP, 1984-2012 (Constant US\$2012 million)



Source: MPND (1982-2013)

Figure 3: Fishery contribution to GDP, 1984-2012 (percentage of total GDP)



Source: MPND (1982-2013)

Notes: Data from editions of the MPND statistical yearbook from before 2011 provide a higher estimate of the size of the fishery sectors. A data adjustment appears to have occurred when the MPND adopted 2003 as the new base year. Figures from 1984-2002 have been estimated in an attempt to incorporate this adjustment.

⁴ Over 62% of the products traded in the economy have an imported content of at least 50%, contributing to an exchange rate pass-through of 79%, implying that a 10% change in the exchange rate would result in a 7.9% change in consumer prices (IMF, 2011).

3 OVERVIEW OF THE FISHERY SECTOR

3.5 FOREIGN TRADE

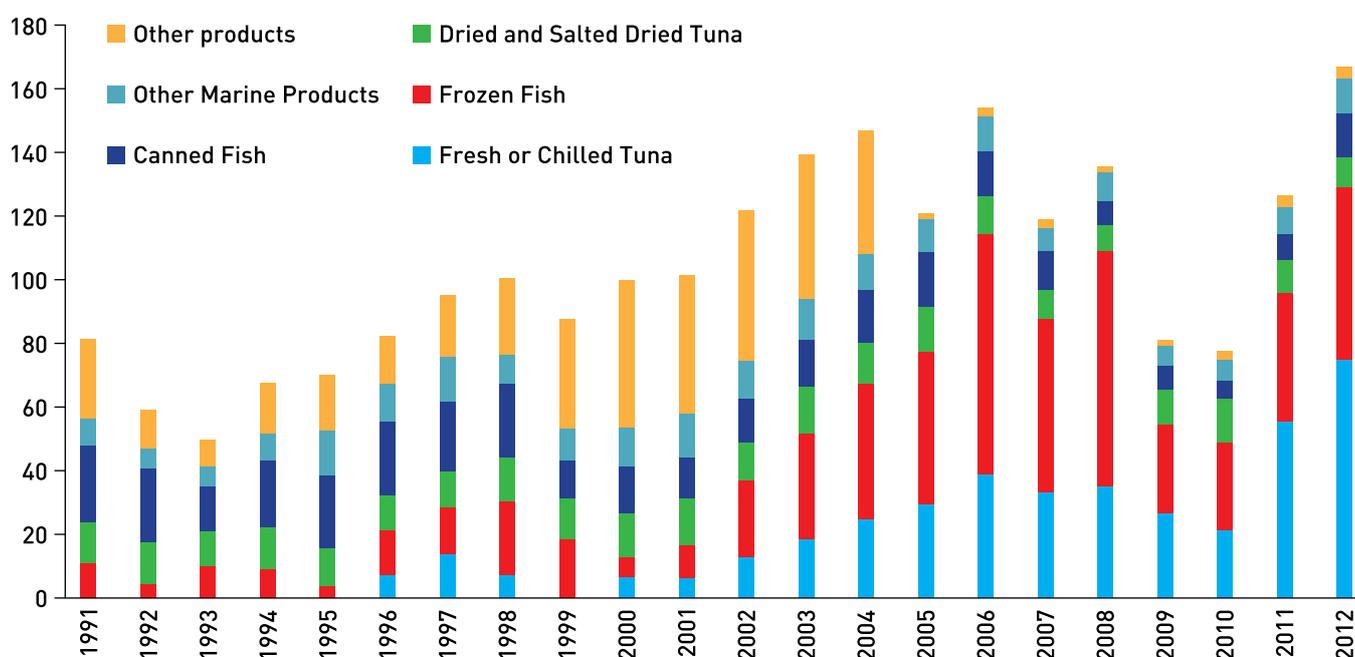
While the fisheries constitute a declining portion of GDP, exports of marine products have accounted for nearly all of the country's exports. In 2011, marine products accounted for 97% of exports, and this percentage has changed little in the last twenty years, if re-exports of imported material are excluded. The remainder of the exports from the Maldives primarily consist of waste material.

Since 1991, the value of exports of dried tuna, produced by the small-scale cottage industry, has remained fairly constant, suggesting that there has been little growth or investment in this sector. Conversely, the volume of fish and fresh or chilled tuna exports increased 129% from 2000 to 2011, while prices of these products increased by 220%, to contribute to a large increase in the total value of the exports of these products. A further increase was recorded in 2012. Canned fish has declined from US\$24 million in 1991, to US\$14 million in 2000 and US\$6 million in 2010, most likely as the result of a decline in fish catch, combined with economic inefficiencies and the poor performance of the Felivaru cannery. In 2012, exports of canned fish are estimated

to have made a partial recovery to US\$14 million. Fishery exports also provide the Maldives with an important means of access to foreign exchange, alongside tourism.

The tourism industry brought in 931,333 tourists in 2011, staying an average of 7 days, and was worth an estimated US\$579 million in 2011. However, out of 101 resorts, 41 were managed by foreign partners, and a further 17 through joint venture arrangements (MPND). Much of the investment is also financed by foreign banks (Jamal, 2013). It is unclear what portion of revenue (much of it paid by credit card rather than cash) remains in the Maldives, so that dollars continue to remain in high demand by local companies that require foreign currency to finance their imports. The imbalance in supply and demand of foreign currency has given birth to a black market exchange, where dollars are traded at a premium of around 10-20%.⁵ This premium creates a further obstacle to value addition, as greater financial gains may be derived from exporting intermediate products to a foreign market, than selling the product domestically to be further processed.

Figure 4: Exports by commodity, 1991-2012 (constant US\$2012 million)



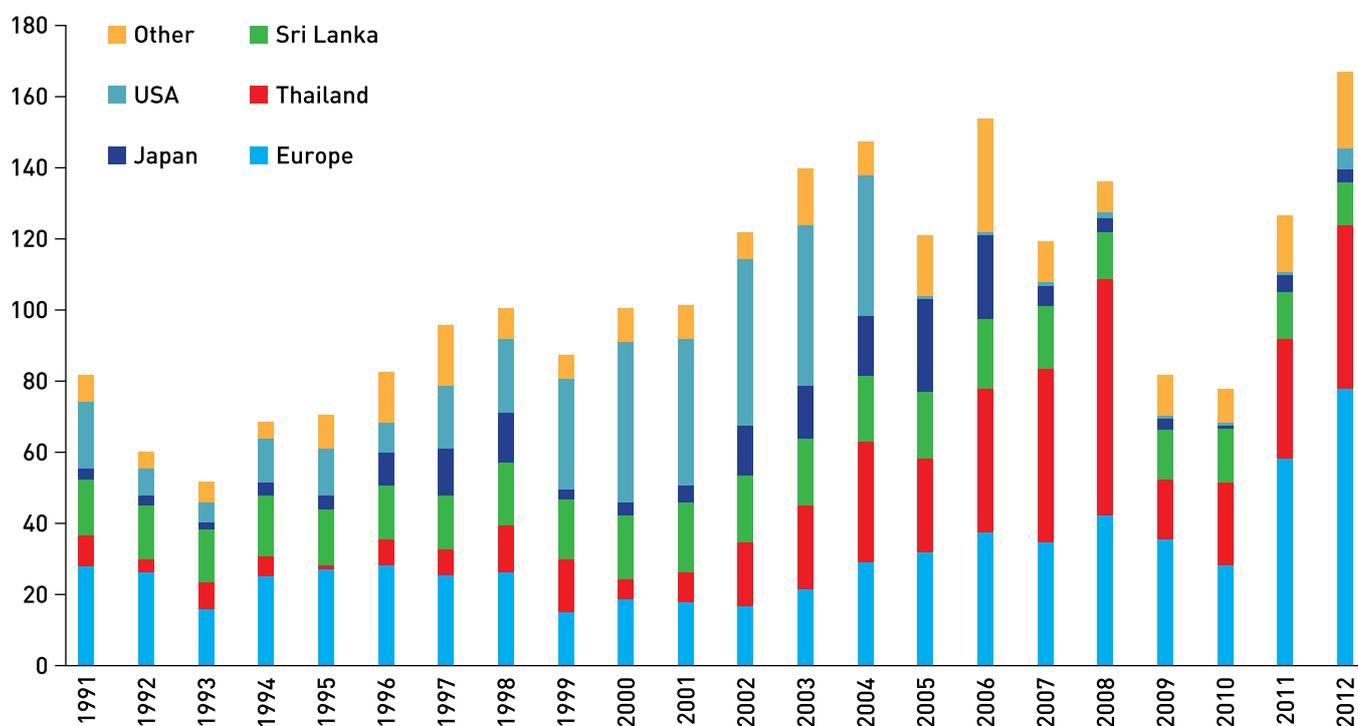
Source: MPND (1982-2012)

Notes: The sudden drop-off in the category of other products relates largely to trans-shipment of apparel and clothing to the USA, which appear to have ceased in 2005.

⁵ In May 2013, the official exchange rate was 15.15MVR per dollar, whereas black market prices were in the range of 17-18MVR per dollar

OVERVIEW OF THE FISHERY SECTOR 3

Figure 5: Exports by destination, 1991-2012 (constant US\$2012 million)



Source: MPND (1982-2012)

Notes: The sudden drop-off in the category of other products relates largely to trans-shipment of apparel and clothing to the USA, which appear to have ceased in 2005.

Thailand and the European Union account for the majority of exports. In 2011, Europe accounted for 46% of exports. When taking into account re-exports of Maldivian fish products processed in Thailand, the percentage is significantly greater. Burton (2013b) estimates that 90% of the fish exports from the Maldives to Thailand are canned and exported to the European Union, while much of the balance is accounted for by Canada and Australia. Trade has been facilitated by the status of the Maldives as a Least Developed Country (LDC), a classification which provides duty-free access to the European market. In January 2011, however, the Maldives graduated from LDC status to become a *developing country*. A two-year transition period is set to end by the end of 2013. Although a one year extension has been applied for (Shafeeu, 2013), a 20.5% import duty will be imposed on all tuna imports from the Maldives into the European Union by 2015 at the latest.⁶



Live bait is scattered onto the sea to attract tuna, exports of which account for nearly all of the Maldives' exports.

⁶ The equivalent rate for imports from Thailand is 24%. The lower rate of 20.5% is the rate applied to countries, including the Maldives that qualify for reduced rate under the Generalised System of Preferences (GSP).

3 OVERVIEW OF THE FISHERY SECTOR

3.6 SUPPLY AND USE OF FISH PRODUCTS

In another case study, specific to the Hawaiian fisheries, it has been noted that another contribution of fishery as a sector is in its provision of inputs to other industries in the economy, mainly in terms of the sale of fish for end-consumption, and as an input for further processing (Sharma et al, 1999).

In 2003, the only year for which supply and use data is available for the Maldives, the total value of unprocessed fish (excluding fish consumed by processing industries) amounted to US\$32 million, while the total value of processed fish amounted to US\$64 million. A total of US\$10 million of products were imported.

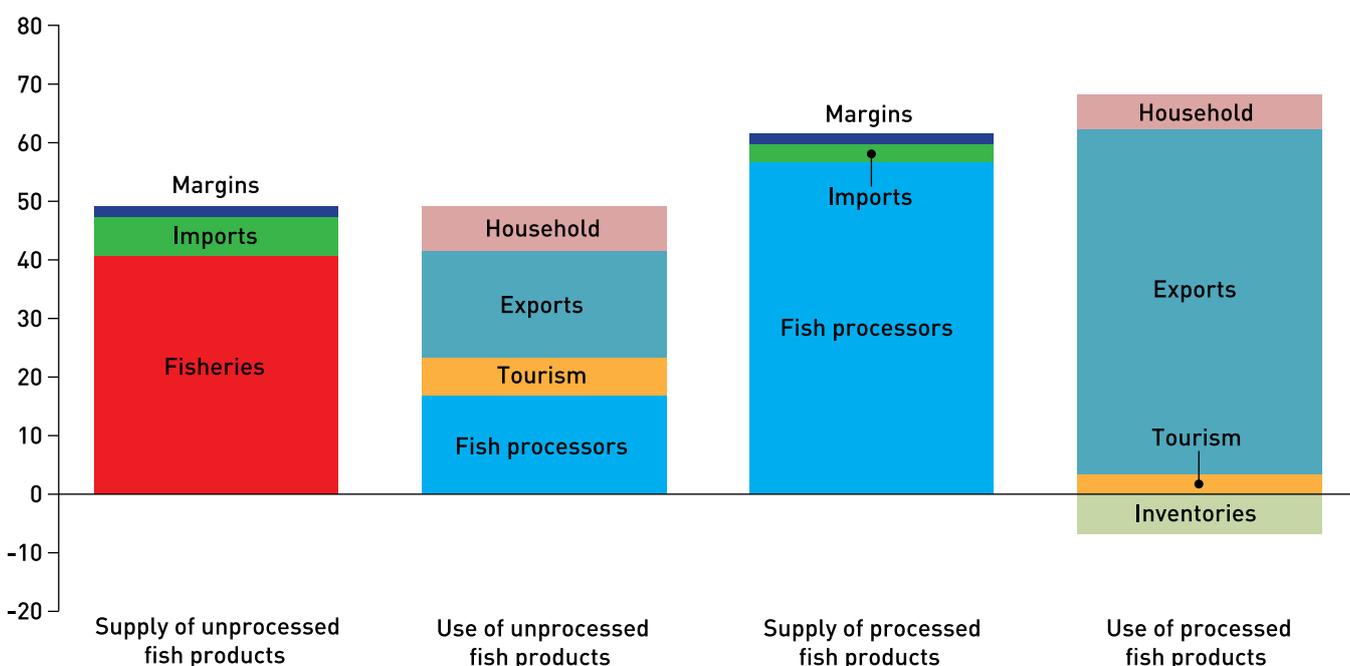
Exports accounted for US\$77 million, consumption by tourism-related industries in restaurants, hotels and resorts accounted for US\$10 million, while domestic household consumption amounted by US\$14 million. The discrepancy between supply and use is accounted for by margins and inventories by retailers, wholesalers and processing companies. Household consumption of US\$14 million corresponds to per capita consumption of around US\$49, which at 2003 prices amounted to approximately 185 kilos of skipjack tuna. Sinan (2011) reports estimated



The fishermen load their catch into the hold, to store it on ice, keeping the tuna fresh until landed.

per capita fish consumption of 181kg.⁷ The FAO estimates that in 2009 fish protein accounted for approximately 44% of animal protein (FAO, 2013), highlighting an important nutritional role of the fisheries within the economy.

Figure 6: Use and supply of processed and unprocessed fish products, 2003 (US\$ million)



Source: MPND (1982-2012)

⁷ Note that these figures relate to total fish consumption, including species other than tuna. Domestic consumption of skipjack tuna is estimated to be around one third of total catch (Burton, 2013b).

4 VULNERABILITY CONTEXT

The vulnerability context relates to the insecurity inherent in an individual’s environment, which may affect a person’s livelihood through seasonality, trends and shocks, and are generally outside of their control, at least in the short to me-

dium term (DFID, 2000). In the Maldives, the fisheries are particularly exposed to such vulnerabilities, owing to their dependence on natural resources, many of which form part of a larger eco-system.

4.1 FISH CATCH

Together with prices, revenue in the fisheries is a function of fish catch, which has shown considerable fluctuation over the last 20 years. Fish catch itself is influenced by a number of factors, including trends in the local fish population, the amount of capacity available within the industry, the effort devoted to fish catch, the catch rate per unit effort, as well as seasonal variations.

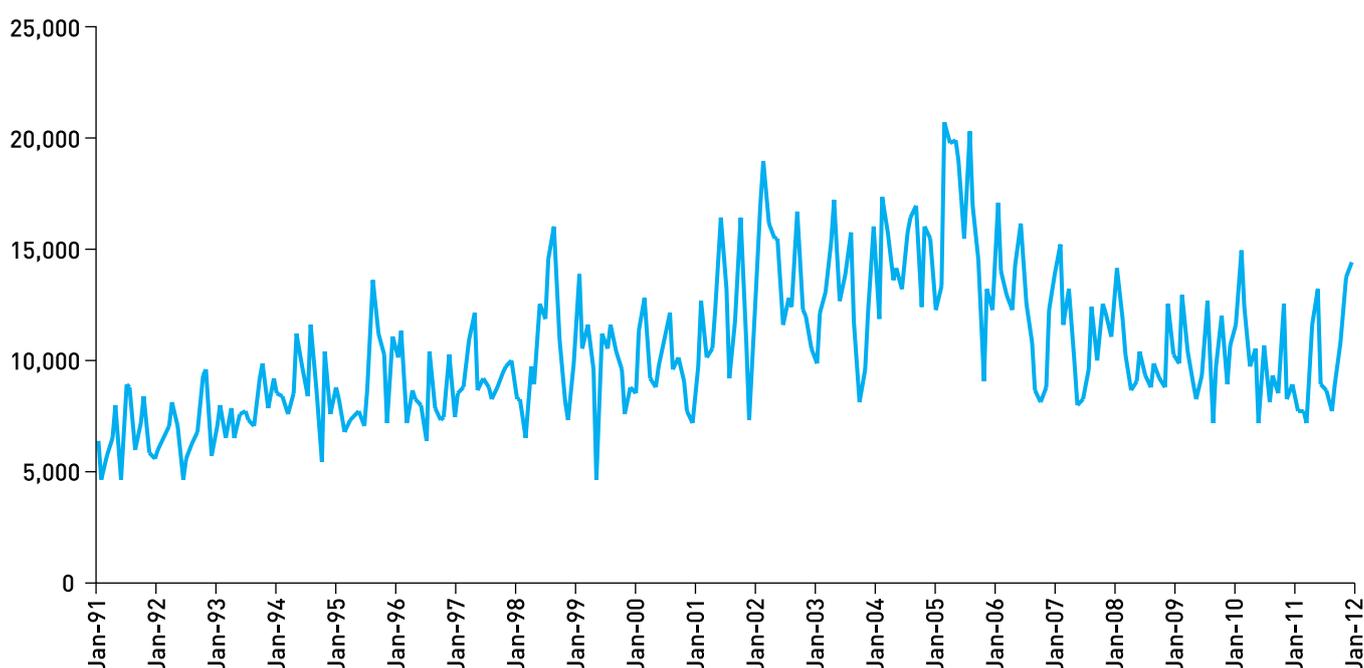
As shown in Figure 7, skipjack, yellowfin, other tuna species as well as other fish catch increased significantly from 1991 to 2006, which can in large part be explained by investments in capacity and efficiency. Adam and Kolody (2011) provide an overview of a number of the changes in the average catchability of fishing vessels since the 1970s, citing an increase in the size and power and storage capacity of the vessels, improved electronics, the introduction of a network of around 45 anchored Fish Aggregating Devices (FADs), im-

provements in bait catching techniques through the use of floodlights, and the use of collector vessels serving to dramatically increase efficiency of the vessels and to increase the operating range of the fishing fleet.

From 2006 onwards, however, total fish catch has declined owing to a decline in skipjack catch (yellowfin catch actually increased 55% since 2006). The cause of this decline has been suggested to be “a combination of the over-exploitation and oceanographic changes in the area”, while there is also evidence that “catch rates of the skipjack [have] also been declining” and that “average sizes of skipjack in the Maldives [have] also decreased in the recent years” (Adam et al, 2012, also citing Adam, 2010 and Adam et al, 2011).

The cause of the decline is difficult to determine conclusively, in part because a rigorous stock assessment was not carried out until 2011, and the species is highly migratory,

Figure 7: Monthly total fish catch, January 1991 - December 2011 (metric tonnes)



Source: FMA (2013)

4 VULNERABILITY CONTEXT

subjecting it to influences elsewhere in the Indian Ocean. It has been noted that skipjack tuna is relatively difficult to overfish, as the species' growth rate, reproductive potential and overall population size allows it to withstand high levels of fishing pressure (Anderson et al, 2012). However, the Maldives is located in a zone with a high affinity for tuna, owing to the productive waters around its atolls and the network of FADs, so that "a decline in the real abundance of tuna may not be observed until stock is seriously depleted" (Adam, 2013b).

Other ecological explanations that have been suggested include a rise in the ocean temperatures affecting the behaviour of the fish, and the damage to local reefs caused by the 2004 tsunami, affecting the population of smaller fish, although surveys have shown that this lack of live bait ranks low as a reason reported by fishermen for not going fishing (Adam, 2013).

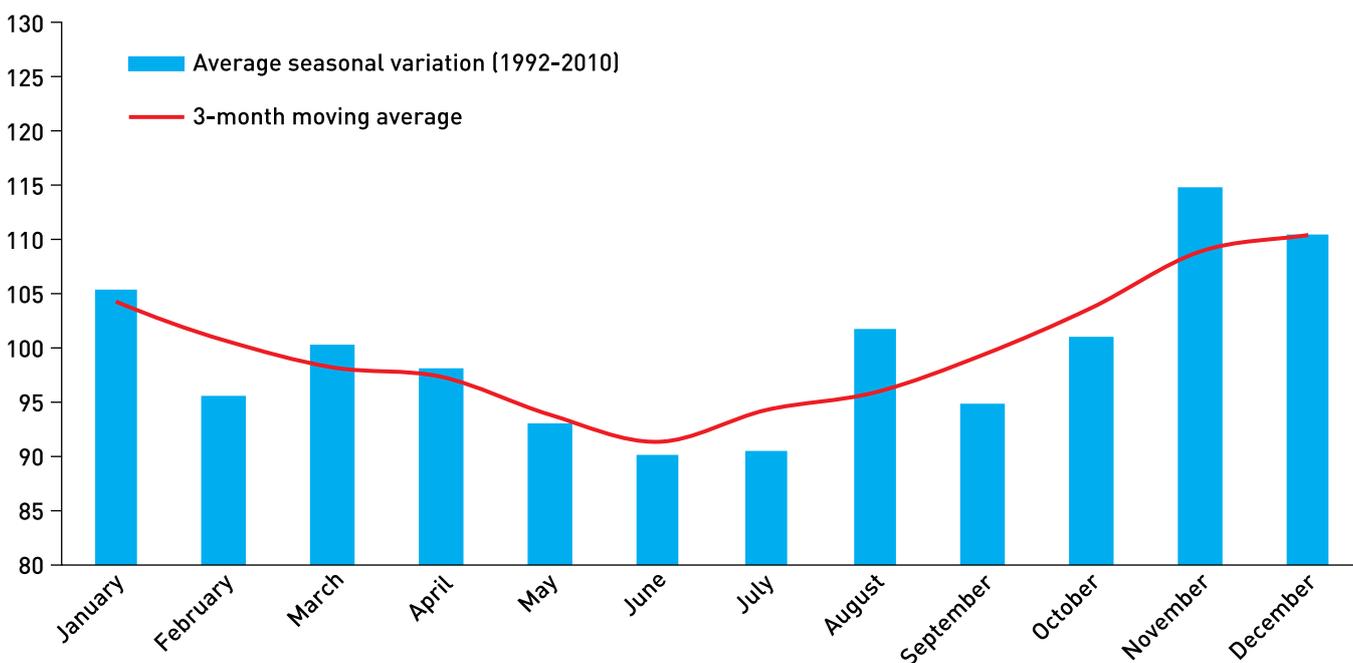
An approximate breakdown of the causes of the decline in fish catch since 2006 is shown in *Table 1*. From 2006 to 2011, fish catch per unit effort (defined as one day of fishing) declined 18.6% from 1,024kg to 834kg for mechanised "masdhonis" (boats). During this same period, the average number of vessels engaged in fishing also declined by

16.6%, and the average number of trips per vessel declined by 5.5%.

Part of the decline in fishing trips per vessel is likely related to the decline in fish catch per unit effort in skipjack fishing, since below a certain expected rate of return, it may not be economically viable for a vessel to go fishing. In addition to a decrease in skipjack catchability, the decrease in catch per unit effort is also attributed to the increase in the proportion of yellowfin fishing, as the amount of the much larger and more valuable yellowfin fish caught on any single fishing trip is usually much less than an average day's skipjack catch, in tonnage terms (Höhne-Sparborth, 2013; Burton, 2013b).

Aside from long-term trends owing to changes in fishing methods, fish catch in the Maldives is also highly seasonal, as shown in *Figure 8*, as a result of the migratory nature of tuna and weather patterns. Fish catch is, on average, lowest in the months from May to July, after which fish catch increases to peak during the months from November to January. Seasonal variations such as these contribute to the vulnerability in the sector, by creating significant fluctuations in revenue and increasing the degree of insecurity as regards expected income.

Figure 8: Seasonal variations in total fish catch, 1992-2010 (annual moving average = 100)



Source: FMA (2013), author's calculations

Notes: Ratio of each month calculated as that month's fish catch over the 12 month moving average. Graph shows average values for each month over the years 1992 to 2010.

Table 1: Fish catch, fishing trips and number of vessels engaged, 2006-2011

	2006					2011				
	Fish catch (kt)	Fishing trips	Catch per unit effort (kg)	Avg. number vessels	Trips per vessel	Fish catch (kt)	Fishing trips	Catch per unit effort (kg)	Avg. number vessels	Trips per vessel
Mech. masdhonis	179.1	174,842	1,024	923	189	114.9	137,784	834	770	179
Sailing masdhonis	0.1	553	127	3	184	2.4	2,880	835	15	189
Mech.vadhu dhonis	0.8	6,820	122	44	155	1.2	3,415	345	21	162
Sailing vadhu dhonis	0.1	1,162	72	11	106	0.1	1,218	71	7	178
Rowing boats	0.4	1,930	208	14	138	2.1	4,482	476	25	178

Source: MPND (1982-2012), author's calculations

4.2 PRICES

As with fish catch, prices for tuna have shown considerable variation over the last ten years, owing both to long-term global and regional trends, and short-term seasonal fluctuations and supply shocks, all of which impact on the livelihoods of those engaged in the fisheries.

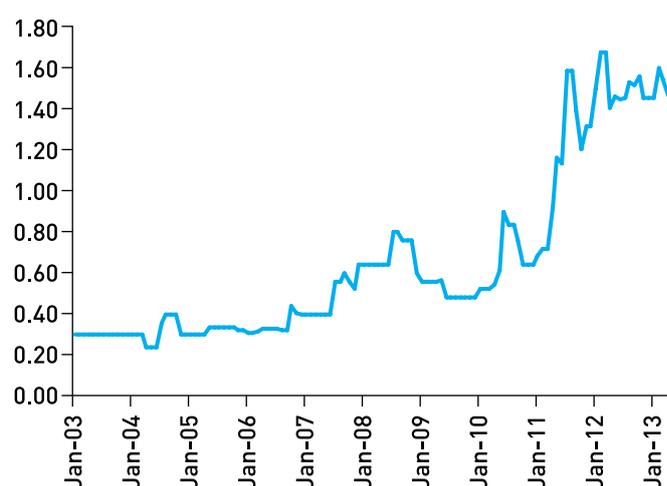
In the last 10 years, prices of tuna have increased in both the Maldivian and world markets, owing to a slow growth in supply, coupled with a rapid increase in demand, from markets such as the European Union and Japan. As the FAO has noted, supply in the fishing industry is naturally uncertain, but in the case of tuna demand is perhaps more volatile than in other markets:

“Market demand for tuna is strongly affected by the availability of many substitute products and other external elements such as health and safety concerns, preferences for low-fat and high-protein foods, environmental concerns, trade barriers, exchange rates, and/or the global economy.” (FAO, 2010)

Regional prices for fish, particularly for cannery grade skipjack, “once converted into dollars, are very closely related to the world prices in dollars” (FAO, 2010).

Owing to its processing industry, Thailand acts as the price-setting market for much of the world, and the Indian Ocean

Figure 9: Domestic price of skipjack tuna, 2003-2013 (US\$/kg)

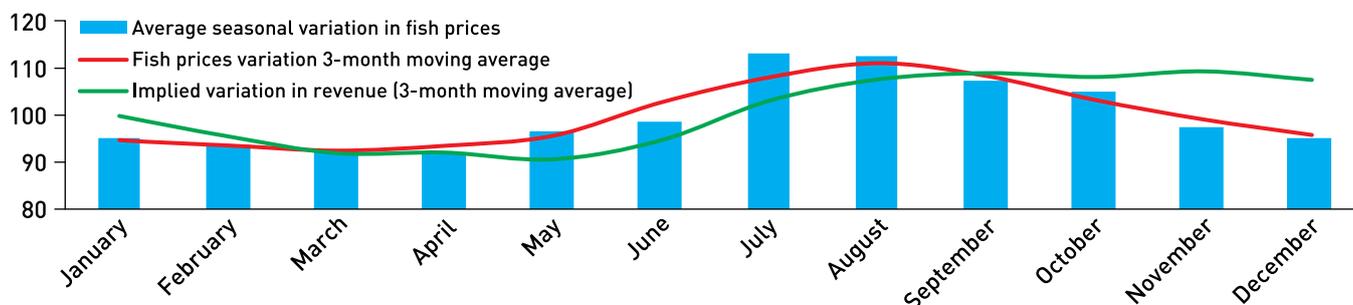


Source: Horizon Fisheries (2013)

in particular, and prices in the Maldives follow the trends in this market. However, Maldivian fish commands a significant premium compared to purse seined fish delivered to Bangkok, which has recently been in the range of US\$250/t (Burton, 2013b). Kooddoo, the largest purchaser of fish, acts as the leader in the domestic market, and determines the price level and, while fishermen depend on exporters for access

4 VULNERABILITY CONTEXT

Figure 10: Seasonal variations in fish prices and revenue, 2004-2011 (annual moving average = 100)



Notes: Ratio of each month calculated as that month's fish catch over the 12 month moving average. Graph shows average values for each month over the years 1992 to 2010.

Source: Horizon Fisheries, author's calculations

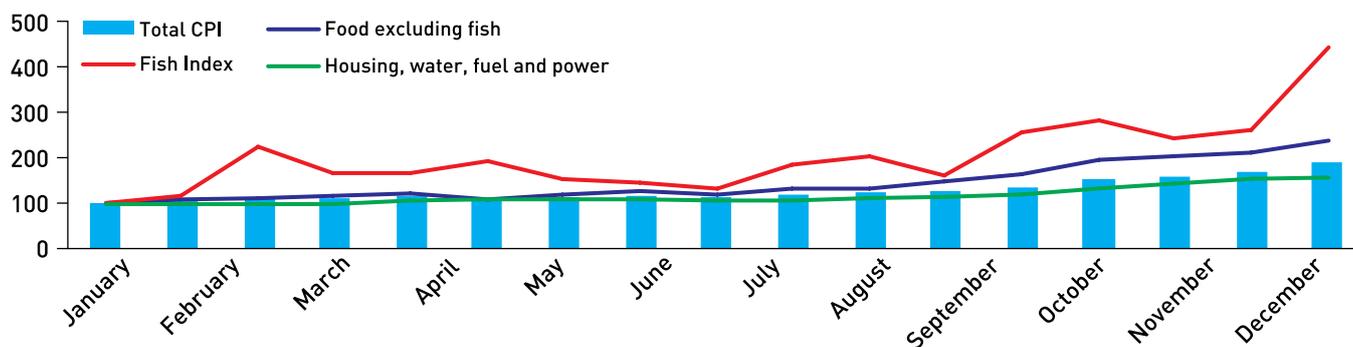
to the world market, so that domestic prices need not necessarily follow global trends, political pressure contributes to maintaining a degree of parity between world and local prices (Ali, 2013). Although purchasing prices have always exceeded the base level, the government has not yet taken the step to abolish base prices for tuna (Sinan, 2011).

As with fish catch, fish prices exhibit a degree of seasonality, as the result of seasonal trends in supply and demand on the world market. Since supply trends in the Maldives are driven by local ecological and meteorological variations that may vary from global trends, seasonality in fish prices and fish catch do not wholly coincide. Multiplication of the two indices for the seasonality of fish catch and fish prices provides an estimate of the implied seasonal variation in total revenue. Since fishermen's income is tied to total revenue, *Figure 10* shows that income is – on average – lowest in the first half of the year and in an average year might vary around 30% between months.

Although revenue has increased as a result of increased fish catch and higher prices, the cost of living has also increased, at an average rate of inflation of 4.2%py since 1995. Due to the small size of the economy and its lack of natural resources, the Maldives is highly dependent on imports (World Bank, 2006). Consequently, changes in the exchange rate or in the cost of fuel have a high impact on consumer prices in the Maldives.

No category of consumer products has increased as much as fish products, prices having risen over 342% since 1995. Fish products are weighted at only 4.6% in the consumer price basket (MPND, 2012), but are estimated to account for 44% of domestic protein consumption (FAO, 2013). The rapid rise in the cost of living and particularly that of fish products is a cause of concern, particularly for those parts of the population whose incomes are not tied to the export market or inflation-adjusted wages.

Figure 11. Consumer price indices (1995 = 100)



Notes: Ratio of each month calculated as that month's fish catch over the 12 month moving average. Graph shows average values for each month over the years 1992 to 2010.

Source: MPND (1982-2012)

4.3 CLIMATE EFFECTS

The Maldives does not represent an isolated ecosystem, and is directly affected by climatological changes in the rest of the Indian Ocean, and developments in the world's climate as a whole. In 2009, President Mohamed Nasheed made headlines by organising a headline-grabbing underwater cabinet meeting to call attention to rising sea levels threatening the existence of the islands, although his successor, Mohamed Waheed Hassan Manik, played down such fears (Daily Mail, 2009; Haveeru, 2012).

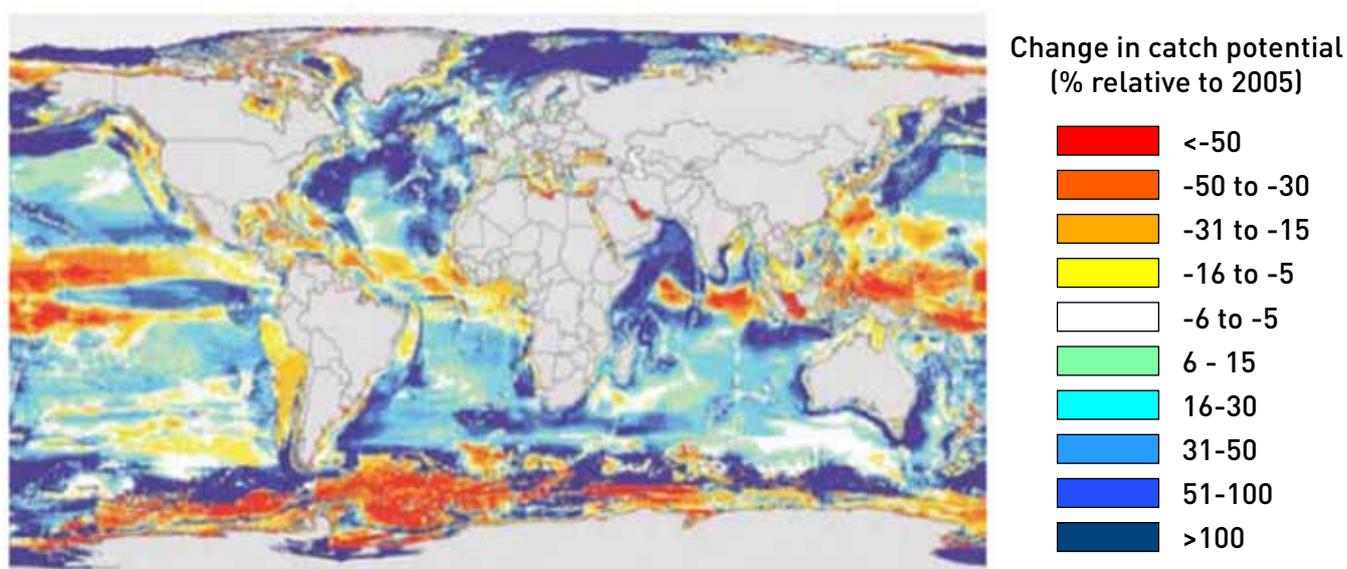
As regards the fisheries, a more immediate threat may pertain to changes in the temperature of the ocean, affecting oceanic flows and the availability of nutrients. Pole-and-line fishery may be particularly susceptible to these changes, as the method targets fish swimming close to the surface, while rising temperatures are believed to result in fish swimming deeper in search of cooler temperatures (Adam, 2013). A study exploring exposure of the world's fisheries to such effects found that the Maldives is located in a zone where fish catch might decline up to 50% to 2055, compared to 2005 (Huelsenbeck, 2012). In combination with the atolls' dependence on the fishery sector and the Republic's lack of adaptive capacity, the study found the Maldives to be the most vulnerable country in terms

of food security, as a result of the impact of climate change on fishery.

In addition to the long-term effects of climate change, the exposed and low-lying nature of the islands also renders the Maldives vulnerable to environmental disasters such as the 2004 tsunami. The tsunami resulted in damage to 69 out of 199 inhabited islands, and the displacement of around 13,000 people. In the fisheries, damage was estimated at around US\$25 million, including the loss of 120 vessels, partial damage to an additional 50 vessels, damage to boat equipment and ocean cages, and the loss of equipment by 347 (mainly small-scale) fish processors. The tsunami was found to have caused only minor damage to the country's coral reefs (UNEP, 2005).

While warning systems have improved since 2004, the Maldives remains vulnerable to disasters such as these, and the possibility of a repetition of such events must be taken into account as part of the overall context of vulnerability in the country, and the fisheries in particular. Following the tsunami, the sector recovered quickly, in part because damage was restricted by the fact that most fishing vessels were at sea at the time of the tsunami and survived mostly unharmed. The sector received around US\$2.35 million in aid (Linton and Shareef, 2011).

Figure 12. Predicted change in catch potential in Exclusive Economic Zone (EEZ) by 2055



Source: Adapted from Cheung et al (2010), reprinted with permission

5 POLICIES, INSTITUTIONS AND PROCESSES

5 POLICIES, INSTITUTIONS AND PROCESSES

The management of the fisheries in the Maldives has been described as “mostly limited to bans, prohibitions, setting up quotas, licensing schemes, and levying fees” (Adam, 2004). While management of the fisheries has improved, in part motivated by MSC Certification and IOTC membership, the fisheries still lack an integrated long-term development plan, and most policies appear to be adopted on an ad hoc basis. However, while the fishery sector has emerged from traditional roots, government policy has played an active role in shaping, maintaining and transforming aspects of the fishery. It is these policies that have defined the modern appearance and organisation of the sector, and that have ultimately determined the extent and distribution of the socio-economic benefits derived from the sector.

- **Monitoring, research and enforcement:** The Fisheries Management Agency (FMA) is responsible for monitoring and data-collection, while the Marine Research Centre (MRC) is responsible for scientific research related to the country’s marine resources. Policy is coordinated by the Ministry of Fishery and Agriculture (MOFA). Local monitoring and data collection is carried out by island collection offices, although this system was being phased out as of 2013 in favour of direct monitoring by FMA staff. Enforcement is also conducted with the assistance of the coast guard and the Maldives Police Service, which is responsible for patrolling the seas against the incursion of foreign fishing vessels.⁸ A vessel monitoring system (VMS) is currently being introduced, and an on-board observer scheme remains in the pipeline (Sinan, 2013; Adam, 2013b).
- **Licensing scheme:** The most significant policy adopted by the government is its commitment to the traditional pole-and-line method of fishing, operated by domestic fishermen. Restrictions on other forms of commercial fishing is implemented by means of a licensing system, through which the Maldives does not issue licenses to foreign-flagged vessels, nor to purse-seining vessels

(IOTC, 2011). Foreign longliners were previously allowed to operate in Maldivian waters, but renewal of these licenses was suspended as of May 2010. The government planned to develop a local fleet to target yellowfin and big-eye tuna of up to 30 vessels by 2012, but for most of 2012 only two vessels were operated in the Exclusive Economic Zone (EEZ). Licenses are renewed annually against the payment of a nominal fee (Sinan, 2011; Adam et al, 2012).

- **Foreign investment:** The suspension of licenses of foreign vessels more generally reflects a reluctant approach towards foreign investment in the fisheries as a whole. The fisheries, as opposed to tourism, are seen as a primordial traditional Maldivian activity, and foreign ownership of companies in the sector is deemed politically sensitive and is actively opposed by local fishermen, which contributed to the suspension of the foreign long-line programme in 2009 (Sinan, 2013; Adam, 2013). Consequently, while foreign investment and financing played an essential role in the modernisation of the fisheries from the 1970s onwards, as of 2013 all fish processors and exporters were fully Maldivian-owned, and the government does not plan to issue any new licenses to foreign vessels.⁹
- **Privatisation:** Another important policy, privatisation, was originally mandated as part of assistance programmes ran by the World Bank, and resulted in the split-up of MIFCO in 2000, and the auctioning of some of its assets. Even before the break-up of MIFCO, its various facilities were not equally profitable, and pressure from the local population in Kooddoo, where the most profitable part of the enterprise was located, may have contributed to the break-up (Kooddoo Fisheries, 2013). In 2006, the World Bank noted that the main operations of MIFCO, “will be further privatized over time, although the schedule and approach have not been finalized” and little progress appears to have been made in terms of outlining a strategy for the future of these companies (World Bank, 2006).

⁸ Sinan (2011) reports that local fishers suspect that large amount of foreign unlicensed vessels operate in the Maldivian EEZ. There have been several cases of unlicensed vessels being caught by local fishers and the Coast Guard operated by the Maldives National Defence Force (MNDF).

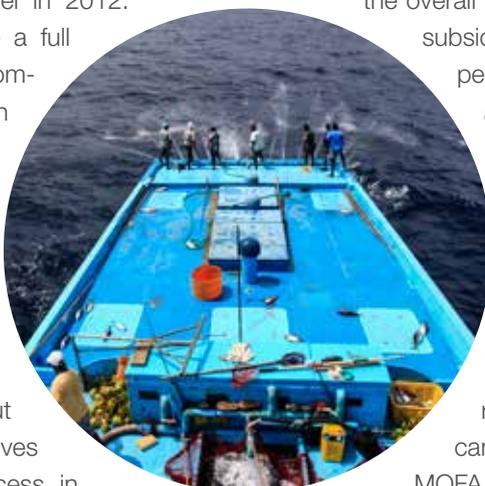
⁹ One area where foreign investment may be welcomed is in aquaculture, which is recognised by the Ministry as a sector that would fit in with its policy of diversification and in which there is little domestic expertise. An American company, Blu Bridge is in the process of starting a pilot project, but progress has been hampered by changes in governance and the lack of continuity in policy agendas (Russ, 2013).

Privatisation and the break-up of MIFCO is not considered an unqualified success (Shafeeu, 2013), but political and financial interests, coupled with a high turn-over rate in the government and the boards of the three daughter companies has made strategizing in the fisheries a sensitive affair.

- **MSC certification and IOTC membership:** In more recent years, an important part of MOFA's policy has been its commitment to MSC Certification and IOTC membership. The Maldives entered the MSC assessment process in 2009, and received the eco-label in 2012.

Concurrently, the Maldives became a full member of the Indian Ocean Tuna Commission (IOTC) in 2011, and played an instrumental role in passing a resolution on fishing targets and reference points in 2012 (MSC, 2012). Initially, pressure from environmental groups such as Greenpeace, the International Pole & Line Foundation (IPNLF), and European retailers helped initiate the process, but these partners confirm that the Maldives soon acquired ownership of the process, in recognition of the economic potential of a certified fishery (Ali, 2013; Burton, 2013a; Shafeeu, 2013). Certification has required the improvement of monitoring and management practices, but as the fisheries were already based on largely sustainable practices and a licensing system was already in place, the practices of fishermen and their vessels have not significantly been affected. As such, the primary effect of the MSC label and IOTC membership has been to maintain access to EU markets, at premium prices (Shafeeu, 2013).

- **Revenue and subsidies:** In 2011, total government revenue excluding grants amounted to US\$584 million. The government does not explicitly report the amount of



revenue generated by the fisheries, but an analysis of the government's balance sheet suggests the figure may be as a low US\$2 million in 2011.¹⁰ The Minister for Economic Development confirms that the sector "brings in little revenue to the treasury". In terms of expenditure, in 2012 expenditure of the fisheries stood at 55.5 million Maldivian Rufiyaa (MVR) (US\$3.64 million) or 0.3% of total government expenditure (Mohamed, 2013). In 2013, the government allocated US\$6.5 million in fuel subsidies to fishermen (Powell, 2012). Given the earnings of fishermen and

the overall profitability of fishing as a livelihood, fuel subsidies do not appear to be an economic imperative. Instead, the status of the fishery as a net recipient of government funds more likely reflects the sector's status as a socially and politically important one.

- **Diversification and value addition:** As a result of the graduation of the Maldives from LDC status, exports to Europe are at risk of a steep decline or significant upheaval. Interview results suggest that MOFA is aware of the issue and remains "very worried" (Shafeeu, 2013). In response, MOFA intends to promote a policy of product and market diversification, although alternatives are not readily apparent, particularly in terms of other markets that would be willing to pay a premium for sustainably-sourced fish that represents the main competitive advantage of the Maldives. While some initiatives are underway (such as the development of a grouper management plan that could prepare the way for active fishery or aquaculture of this species), a clear strategy or timeline to address these issues is not available, nor is it clear to what extent these could absorb the impact the imposition of a European export duty is likely to have.

¹⁰ In the years from 1994, revenue from MIFCO, the state-owned fisheries company, has only been reported three times: US\$425,000 in 1994 and 1998, and US\$140,000 in 2008. Revenue from import duties amounted to US\$172 million in 2011, but in 2003 (the only year for which data is available and when fish catch exceeded that of 2011) the fisheries accounted for only 0.8% of imports of good, and are estimated to have accounted for approximately US\$1.3 million in 2011. Business profit, goods and services tax, and revenue from other sources such as licences and fees amounted to US\$15 million in 2011, but as the fisheries are not estimated to have exceeded 3.5% of total GDP, part of which is accounted for by informal and government enterprises, revenue from these sources is not estimated to have exceeded US\$525,000, resulting in total estimated revenues of under US\$2 million in 2011 (author's estimates).

6 LIVELIHOOD STRATEGIES AND OUTCOMES

6 LIVELIHOOD STRATEGIES AND OUTCOMES

With a fish catch of just over 120,000t in 2012, the entire fish catch of the fisheries could conceivably be taken over by a handful of large purse-seining vessels (Ali, 2013), each of which would only generate direct employment of 20-30 people (Greenpeace, 2013). Previous studies suggesting that a purse seining fleet would be more fuel efficient than pole-and-line fishery do not appear to be representative of the fisheries in the Maldives¹¹, but owing to the larger-scale of these enterprises and the lower labour requirements, the overall financial costs of such an approach might well be lower, at least to the owners of the fishing vessel.¹² The net profits to *the enterprises operating the vessels* would likely be higher, even if the product attracts a lower price due to the loss the premium earned in European markets (Ali, 2013). In the West and Central Pacific Ocean island nations, over 80% of fishing is in the hands of foreign nations operating purse-seiners and long-liners, and consequently, the island nations in this region receive only 6% of

the value of the tuna caught in their waters (Greenpeace, 2012; citing Asian Development Bank, 2003, and Oceanic Fisheries Programme Secretariat of the Pacific Community Noumea, New Caledonia, 2008).

The government's ban on purse seining and its support to ecological fishery is, therefore, primarily a social and economic policy, which renders traditional pole-and-line fishing economically viable, and permits the fisheries to continue to rely on single or two-boat operations, rather than on larger foreign-owned enterprises. The International Pole & Line Foundation (IPNLF) also highlights the social dimension of its promotion of pole-and-line fishing, and emphasises the high-level of community-engagement in the fishery that such fisheries entail (Ali, 2013; Burton, 2013a).

Whereas a modern purse-seining vessel might cost €25 million (Greenpeace, 2012; citing Cintranaival, unverifiable), the average cost of vessels of 85ft and above, including engine

¹¹ A study based on a fuel consumption survey in 2009 found that purse seining vessels had a fuel use intensity (FUI) of 368l/t, compared to 1,485l/t for pole-and-line vessels (Tyedmers and Parker, 2012). The data on pole-and-line fishing was based exclusively on albacore and bigeye tuna fishing in the Atlantic Ocean, and is unlikely to be representative of actual fuel use in the Maldivian skipjack industry. During interviews, none of the vessel captains reported using more than 1,000 liters per fishing day, which at 137,784 fishing trips by mechanised dhonis catching 114,900mt in 2011 would imply a *maximum* FUI of 1,200l/t. Self-reported catch figures and fuel consumption figures suggested actual FUI was likely to be significantly lower and probably below 400l/t (Höhne-Sparborth, 2013a), although a larger-scale survey would be required to verify such an estimate conclusively.

Tyedmers and Parker (2012) cite early studies on hook and line skipjack fishery in the Pacific, which found FUIs of 1,163l/t and 1,483l/t in 1975 and 1980 respectively (Nomura, 1980; Watanabe and Okubo, 1989). Owing to the use of radio, GPS and floodlights, as well as the use of larger and more powerful vessels, fishing efficiency has improved since the 1980s (as reflected in the increased fish catch). Whereas in 1980 mechanised masdhonis had an average catch rate of just 326kg per fishing day, this figure had increased to 1,024kg in 2006, before declining to 834kg in 2011. It seems likely that these improvements in catch rate would have contributed to a decline in FUI. Indeed, a study by Monintja & Mathews (2000) found that FUI had declined from 1,007l/t in the period from 1980-1984 to 535l/t in 1985-1989, and although more recent studies on pole-and-line FUI are not available, it does not seem unlikely that this trend towards greater efficiency would have continued in the 1990s and 2000s. The IPNLF has challenged the findings of the Tyedmers and Parker (2012) study, and Burton (2013b) reports that the International Seafood Sustainability Foundation (ISSF), which commissioned the study, has acknowledged the relative efficiency of the Maldives' pole-and-line fishery.

An alternative estimate of FUI can be derived from a cost and earnings survey conducted in August 2011 (Sinan and Rasheed, 2012, unpublished), reporting on daily fuel costs, the average number of days spent fishing, and reported catch by 51 vessels of varying sizes. Combined with an estimate of the average cost of fuel in the Maldives, these figures provide an estimate of FUI in 2011, by vessel size. Since the dates of the various estimates vary, these figures are a rough estimate only, but highlight that FUI is likely significantly lower in the pole-and-line industry (at least in the Maldivian fishery) than previous studies, suggesting that a new study using more recent data would be beneficial.

Table F-1: Estimated fuel consumption and catch by vessel size

	<45ft (13.7m)	45-65ft (13.7-19.8m)	65-85ft (19.8-25.9m)	>85ft (25.9m)
Daily fuel cost (MVR, August 2011)	1,090	4,576	10,921	15,481
Diesel price (MVR per litre, May 2011)	15.65			
Days spent fishing (avg. 2005-2010)	148	150	145	138
Estimated fuel consumption (liter, 2011)	10,288	43,786	101,255	136,197
Estimated catch (avg. kg/year, 2004-2010)	44,173	137,781	254,102	384,971
Estimated FUI (l/t, 2011)	233	318	398	354

Source: Sinan and Rasheed (2012, unpublished); TNMV (2012) for fuel price estimate; author's calculations for estimated fuel consumption and FUI

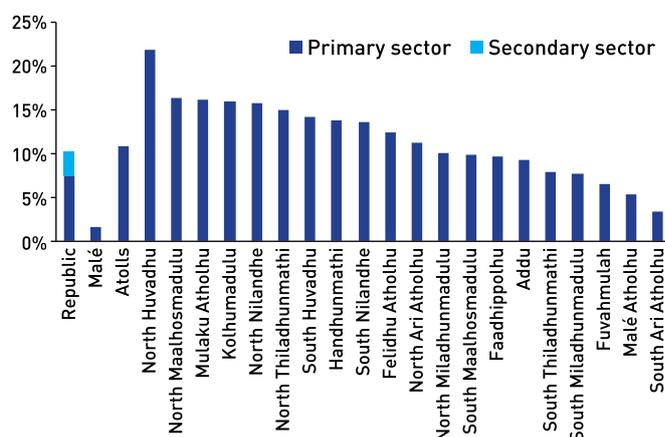
and fishing gear, was reported to be around 5.7 million MVR or around US\$375,000 (Sinan and Rasheed, 2012), employing an average of 21 crew members. Such a €25 million investment would thus contribute over 1,800 positions when invested in pole-and-line fishery, where the revenue generated is, moreover, distributed equitably among fishermen, who receive a share of the earnings rather than fixed salary.

The immediate effect of the pole-and-line fishery is thus to create an important source of livelihoods, which is of particular social importance in the more remote atolls, and has low barriers of entry, even for low-skilled workers.

According to the 2006 Census, 8% of the local population was engaged in fishery in the primary sector, with a further 3% of the population involved in the fish processing industry. Statistics for the individual atolls are not available for the fish processing industry, but show significant variation with respect to the proportion of fishery workers, which reaches 11% for the atolls (excluding the capital of Malé), and a maximum of 22% in the North Huvadhu atoll. Estimates by the FMA are higher still. In 2006, whereas the Census of that year reported 8,388 fishery workers, the FMA estimate was nearly 67% higher, estimating a total of 13,980 fishermen, although not all of these may have been actively engaged in fishery at the time (MPND, 1982-2012; FMA, 2013).

Fishing in developing countries may intuitively be conceived of as marginal economic enterprise, frequently bordering on subsistence activity, but fishermen in the Maldives do not conform to this image. Fishing in the Maldives is a modern industry and new fishing vessels are increasingly constructed out of fiberglass, and may measure 85ft or more, with on-board sleeping quarters. The introduction of radio systems significantly improved fishing efficiency by allowing fishermen to share information about fishing grounds and weather changes, and nowadays vessels are equipped with satellite navigation systems, floodlights and diving equipment. It is not uncommon to see fishermen carrying a BlackBerry or similar gadgets. Fishermen are generally literate, and some have held white-collar jobs, before moving into fishery in pursuit of higher earnings (Höhne-Sparborth, 2013a).

Figure 13: Employment by Atoll, 2006 (% of total employment)



Source: MPND (1982-2012)

Few women are employed in the primary fishery industry, as fishermen are exclusively male. More women are engaged in fish processing, both in cottage industry and industrial processing facilities. Artisanal fish smoking and drying is a small-scale industry often run as a family business, by relatives of fishermen or as independent operations. Employment figures from the census may underestimate the size of the industry, as these do not include additional subsistence activities. The census found 22% of unemployed females were engaged in subsistence activities, such as production of agricultural crops, processing of fish, or clothes manufacturing.

As of 2012, while there were 79,777 registered foreign workers employed in the Maldives in only 1,103 of these were active in the fisheries, and the possibility of foreign workers being employed as fishermen currently appears unlikely, both due to political reasons, and as the use of the pole-and-line method is a local skill (MPND, 1982-2012; Ali, 2013). Given that the youths of 15-24 represent the largest population group in the country, accounting for 25% of the population, and the proportion of the ageing population is small, there appears to be no immediate need to increase reliance on foreign workers in the sector. However, some foreign workers have been employed as boat crew (Mohamed, 2013).

¹² A report by Greenpeace (2012) disputes this, citing estimated production costs of US\$479-525 per tonne for pole-and-line fish and upwards of US\$900 per tonne for purse-seiners in the Eastern Pacific, but the sources cited by the report for these figures are not scientific sources. Mohammed (2007) also claims that pole-and-line fishing in the Maldives has a lower production cost than purse seine fishing. However, owing to the higher labour costs in pole-and-line fishery (which represents the main socio-economic benefit of this type of fishery), it seems unlikely that production costs would be lower, as affirmed by Ali (2013) and Burton (2013b), who estimated production costs in the Maldives at around US\$1,000/t, which is likely higher than the costs faced by purse seiners.

7 SOCIO-ECONOMIC STATUS OF THE FISHERIES

7.1 NATURAL CAPITAL

Arable land and agricultural crops in the Maldives are restricted to a mere 10% of total land use each (CIA, 2013), and aside from a limited amount of timber, the marine environment therefore represents the main natural resource of the Maldives. The country's Exclusive Economic Zone (EEZ) amounts to 916,189km², the vast majority of which comprises deep ocean waters that are host to the schools of tuna targeted by the fisheries.

Tourism and fishery are the two sectors that extract value from the country's marine environment, and have at times been in competition with one another. Until 2010, the Maldives had a centuries-old but small-size shark fishery, and annual catch averaged around 1,440tpy from 1977-2006 and shark stocks were likely over-exploited (Sinan, 2011). Yet, while the fishery sector was focused on the exploitation of these resources, the tourism industry sought to extract value from the preservation of sharks, and brought in an estimated US\$2.3 million in 1992, against a total value of shark exports of US\$0.7 million in that same year (Anderson and Ahmed, 1993). Recognition of the economic importance of maintaining the shark population ultimately led to a complete ban on shark fishing in 2010, following financial compensation to the shark fishers (Sinan, 2011).

As both tourism and fishery have expanded in size, the potential for conflicts may have increased, but aside from minor incidents involving bait-fishing too close to the resorts, at present neither the Ministry of Tourism nor individual fishermen report any significant concerns (Höhne-Sparborth, 2013a; Jamal, 2013). As the fisheries were for the most part sustainably-operated even before the advent of tourism, few

restrictions have been needed to be imposed, and most of the conflicts between the sectors resulted from the high demand for reef fish products from the tourism industry itself (Shafeeu, 2013). With hundreds of islands left uninhabited, however, there is no immediate shortage of space, and as both sectors recognise the importance of the sustainable management of the country's fish stocks, the interests of the two sectors are not diametrically opposed.

While the exploitation of natural capital involves a calculated decision between short-term consumption and maintenance of a long-term balance, skipjack is a highly migratory species and therefore requires management not just at a local but also at a regional level. While at the national level there is "increased commitment to a precautionary approach", concerns remain over the ability of the Indian Ocean Tuna Commission (IOTC) to implement the appropriate policies, owing to the short-term interests of other nations that could boycott such policies (Anderson et al, 2012).

Natural capital is the primary resource that the fisheries derive their economic value from, and is the asset to which all other forms of capital discussed in this section relate. There is also growing evidence that the Maldives is increasingly ambitious as regards the preservation of its natural capital, with current discussions including plans to achieve nationwide carbon-neutrality by 2020, the phaseout of hydrochlorofluorocarbons (HCFCs) and at the 2012 Rio+20 UN Conference on Sustainable Development, the Maldives announced its intention for the entire Republic to become a biosphere reserve within the next seven years (Shafeeu, 2013; Adam, 2013b).

7.2 SOCIAL CAPITAL

The role of the fishery in the overall cultural definition of the Maldives should not be underestimated. In a historical sense, the very identity of the Maldives has depended on the ability of the atolls to connect to one another. As an island nation, such connections depended necessarily on seafaring vessels, thus attributing an important role to fishermen in terms of trade, communication, and cultural exchange. Today, fishery is seen as an inseparable part of the Maldivian identity.

In a study of the social linkages of Hawaiian fishermen, researchers have studied the networks of fishermen in terms of (1) bonding with likeminded groups and individuals; (2) bridging with somewhat similar but different groups, (3) and linking

to groups of different hierarchical levels (Barnes-Mauthe et al., 2012). This research found that fishermen generally frequently engage in information-sharing, and found that while some fishermen had extensive social networks, the variation in the degree of isolation or social connectedness varied considerably between fishermen, and different ethnic groups. In comparison, fishermen in the Maldives form a relatively homogenous group, and interviews revealed few differences in terms of attitudes, priorities and uncertainties (Höhne-Sparborth, 2013b).

Another contrast with the Hawaiian case and its relationship to social capital may be found in the nature of the regulatory



Maldivian pole-and-line fishermen in action. This responsible fishing method can support coastal communities and contribute to resilient tuna stocks.

framework, designed to maintain catch levels at a sustainable level. In Hawaii, the longline swordfish fishery is managed by a restricted number of permitted fishing days, and a set quota for permitted levels of by-catch of turtles, which results in fishing being halted for the remainder of the year when the quota is reached. Such an approach, it has been noted, “depends on how well swordfishers can coordinate to internalize the externalities of their individual swordfishing operations to the entire swordfishery sector” (Arita et al, 2011), ensuring a fair allocation of the quota to each fisherman. In contrast, in the Maldives, the licensing scheme and maintenance of the pole-and-line method acts as the main safeguard of the sector’s sustainability, which therefore does not depend as critically as in the Hawaiian case on coordination between fishermen, although linkages between fishermen play a role in self-policing against harmful practices (Höhne-Sparborth, 2013b).

Owing to their high level of income, fishermen in the Maldives are also a respected part of the community, and may become island leaders, or marry into other social classes. Consequently, fishermen also constitute a powerful political force. Fishermen are nominally organised through the Fishermen’s Association, which has chapters in several atolls, but informal networks are probably more important in ensuring the representation of fishermen’s interests at the island and national level. At most islands, islands elect or otherwise select senior fishermen to act as their representatives, and the political culture in the Maldives is closely attuned to the

moods of the fishery sector – as is apparent, for instance, from the generous subsidies awarded to the industry, and the establishment of minimum fish prices (Sinan, 2011; Sinan, 2013).

Conversely, the importance of the fishermen and their households as a constituency also hampers the ability to engage in effective policy-making. The developments of an integrated fishery strategy, for instance, are complicated by the unwillingness to address issues such as the further privatisation of the sector in politically turbulent times. Conversely, the political atmosphere affects social networks in the fisheries as well. In May 2013, upcoming elections had contributed to a degree of social polarisation along party lines, to the extent that individual fishing vessels not uncommonly carry flags identifying their political affiliation.¹³

The income generated by the fisheries also acts as a social cohesive in times of need, particularly within and between households, although interviewees report that such links were stronger before democratisation. Interviewees suggest that the majority of island improvements were funded by foreign aid or the central government, but occasional community projects are financed through donations of islanders, to which fishermen are likely to contribute. Finally, the second most common priority named by fishermen in terms of the allocation of their savings – the pilgrimage to Mecca – also highlights the potential of the fishery to contribute to religious well-being, which is often considered a form of social capital.

¹³ During a town-hall meeting with a group of fishermen in Kolamaafushi island in Gaafu Alif atoll, even an discussion about seemingly non-political fishery topics was interrupted through a disturbance between attendees over rival political affiliations, showing that the fisheries are a sensitive and politicized issue.

7 SOCIO-ECONOMIC STATUS OF THE FISHERIES

7.3 HUMAN CAPITAL

The highly-dispersed nature of the population of the Maldives results in high costs of delivery of public services, such as health and education. While the Maldives outperforms other countries of a similar income per capita in terms of educational achievement, enrolment in higher-level education is restricted owing to issues related to access. Whereas gross enrolment in lower secondary level education was approximately 117% in 2011, gross enrolment in higher secondary education was only 21% in the same year, as only 38 out of 225 schools in the country offered this level (WB, 2012). There is only one university in the Maldives, located in Malé, where living costs are significantly higher than in the atolls, increasing the cost of attendance.

There are no statistics available about specific enrolment rates among fishermen, or their families, and at any rate, the effects of recent increases in the income of fishermen may be too recent to be reflected in educational statistics. However, literacy rates do not seem to vary significantly with the proportion of fishermen in atolls. In the top 10 fishing atolls (measured as the proportion of employed workers engaged in fishery), the 2006 literacy rate averaged 96.2%, against 95.8% in the bottom 10 atolls (2006 census), excluding Malé. In comparison, in Tanzania 32% of fishermen interviewed were found to have received no formal education, suggesting that the Maldives may compare well on this basis with other developing countries (Igulu, 2013). During interviews, some fishermen indicated that they had previously held alternative employment including white-collar jobs in such sectors as the civil service, which they abandoned in favour of the higher incomes available in the fishery (Höhne-Sparborth, 2013a).



The nets are prepared and bright lights are used to attract bait fish to the sea's surface.

During interviews education was consistently named as one of the primary priorities to which fishermen intended to allocate their savings. Fishermen and their families report that they wished for an easier life for their children, and education is seen as the means by which to achieve this, but it is recognised that such education comes at a high financial cost.

As noted in a World Bank report (2012), the educational system is not well-g geared to the demands of the economy and is exacerbated by a bias against vocational jobs, which are seen as inferior in comparison to white-collar jobs. Given the size of the economy, there is a low demand for specialists and a high demand for generalists, and specialist courses are not offered by the university. These may be unavoidable constraints, but as a result, it is not immediately apparent which jobs educated workers could aspire to that would offer similar benefits as the fishery. Hence, although the fisheries may generate sufficient household income to support the attainment of higher educational diplomas, the skills thus obtained may end up being underutilised if the fishery remains the most immediately appealing sector in a financial sense.

On the other hand, productivity in the fishery sector can also be viewed as being affected by education, and "fishing need not be viewed as a job which is just for the unskilled or for the non-educated" (Mohamed, 2013). A modern fishery requires skilled workers, especially as regards fishing, boat management, and an understanding of the basic ecological patterns driving fish catch. Recently, the Minister of Education has indicated that vocational courses in agriculture and



A Maldivian fisherman in snorkel gear prepares to dive over the side of the boat, to collect bait fish.

fisheries is one area that the ministry intends to promote, although no specific plans have been announced (Ministry of Education, 2013). The government is also promoting the diversification of the sector, for instance through the introduction of mariculture and aquaculture, which will require skilled and educated personnel to succeed (Mohamed, 2013).

Human capital in the Maldives, and among the households of fishermen, is also impacted by the very fishermen's lifestyles. Fishermen generally spend long hours at sea, and in the case of the yellowfin fishery, may be away for up to two weeks, which affects the management of households,

for instance as regards the upbringing of children. Fishery, while not generally described as a high-risk occupation, nonetheless carries greater risks than many shore-based jobs, and loss of life or injury is of particular concern due to the lack of life or personal accident insurance.¹⁴ Since fishery is also physically demanding, the income of fishermen is threatened by disease, disability, and even mere age (interview results). Fish processing has traditionally been the natural means of alternative employment, but as this sector is now struggling, fishermen's households are vulnerable to health-related income shocks.

7.4 PHYSICAL CAPITAL

Ships are owned either by fishermen, their relatives, or independent owners, but it is rare for more than two vessels to be owned by a single person (Sinan, 2013). Vessels and fishing gear may cost US\$150,000 to US\$500,000 and are typically financed from personal savings. Commercial loans are commonly used to finance the engine, for which the vessel is used as collateral. Other means of acquiring a vessel include development loans, credit provided by purchasing companies, and leasing (Linton and Shareef, 2011). Interest rates on commercial loans frequently exceed 10%, and a penalty system is in place if payments are not completed on time (own interviews).¹⁵ Commercial loans issued by the Bank of the Maldives are pre-conditioned on the borrower concluding an insurance agreement.¹⁶

In 2011, an average of 841 fishing vessels were engaged in fishing activities per month, of which 94% were mechanised, compared to 1,685 vessels in 1995, of which 87% were mechanised (MPND). While a number of these vessels may have been taken out of service, there appears large surplus capacity, consisting of vessels deemed obsolete due to

size, age or cost of operation. Fishing vessels have rapidly increased in size over the last years. Sinan and Rasheed (2012, unpublished) report that whereas in 2004, there were only 16 vessels of 85ft or more, by the end of 2010 this figure had increased nearly 600% to 122. The same source reports that larger vessels are generally assumed to be more efficient, covering a larger area and able to carry more bait-fish, reducing the time per unit spent on travelling to-and-fro bait fishing grounds and fish purchasers.

Large capital investments have also been made by processors. Kooddoo owns seven collection and one mother vessels, and a cold storage and freezing complex, and is planning a similar complex in the southern atolls. Horizon Fisheries owns five collection and three mother vessels, a 3,000mt cold storage complex, and 220mt freezing facilities that were recently completed, as well as canning facilities and a newly-completed super-freezing installation. Linton and Shareef (2011) estimate that the capital investment required for such complexes may have exceeded US\$20 million, which in the case of Kooddoo and Felivaru were

¹⁴ During a town-hall meeting, fishermen commented that safety on vessels could be improved.

¹⁵ Some villagers report that owners that invested in their new boats prior to the decline in fish catch since 2007 experienced difficulties repaying their loans, and that missed payments led to a rise in the interest rate to 15%. At this higher rate, some owners have struggled to repay loans, leading in at least one reported case (that could not be verified directly) to imprisonment. A scheme to allow for such toxic loans to be re-structured or re-negotiated does not appear to be in place.

¹⁶ In one interview, one fisherman reported having ceased payments to the insurance scheme after failing to obtain a pay-out for damages, and that the scheme is not strictly enforced. During a town-hall meeting with a larger group of fishermen, however, few comments were received with respect to the functioning of these insurance schemes.

7 SOCIO-ECONOMIC STATUS OF THE FISHERIES

financed using funds from a World Bank loan. The same authors estimate that the smaller enterprises exporting fresh fish have a typical start-up capital expenditure of US\$10,000 – US\$100,000.¹⁷

Foreign investment in the 1970s, combined with World Bank-financed credit schemes, and the privatisation of the fisheries have each contributed positively to the accumulation of physical capital in the fisheries. Government subsidies may also have played a role in this, by changing the

expected returns of investments in assets such as fishing vessels.¹⁸ The physical capital provides a sustainable income base and provides a means of livelihoods. In addition, owing to the large excess capacity in the industry and the presence of insurance schemes (at least in rudimentary form), the fisheries appear relatively resistant to threats such as disaster and accidental damage and thereby contribute positively to reducing the vulnerability of the population to loss of income.

7.5 FINANCIAL CAPITAL

Anecdotal evidence gathered during interviews suggests that fishermen are among the highest paid workers in the economy. Fishermen report that they earn more than government employees, and among fishermen that have previously held other employment, higher income is cited as the primary reason for the change into fishery (Interviews, 2013). Fishermen are not salaried employees, and instead share in the revenue generated by the crew as whole. Consequently, income of fishermen varies according to fish catch (itself a function of fishing effort), and the average price of fish.

In 2006, the fishery sector contributed an estimated US\$94.6 million to GDP in 2012 constant dollar terms. Of this amount, US\$46.9 million was accounted for by the primary fishing industry, with the remainder accounted for by the fish processing sector. The number of fishery workers was estimated at 8,388 in the census of that year, resulting in a contribution to GDP per fishery worker of US\$5,587. Average revenue generated per fisherman can also be de-

rived from FMA estimates of fish catch and the number of fishermen¹⁹, combined with data on historical prices.²⁰ On this basis, revenue generated per fisherman is estimated at US\$4,640 in 2006, of which approximately half is assumed to represent the income of fishermen, as explained below. In comparison, findings from a 2006 survey suggest that the average income in the tourism sector was approximately US\$384 per month (Ministry of Tourism).

From 2006 to 2011, fish catch decreased by 34%, along with a 22% decline in the number of fisherman, and a 193% increase in the average dollar price of fish, resulting in an estimate of output per fisherman of US\$11,369 in 2011. In 2012, the dollar fish price increased a further 43% and although statistics are not yet available at the time of writing, fish catch is also believed to have increased, contributing to a 94.1% increase in exports in 2012 (UN Comtrade). It thus appears likely that the output per fisherman increased to somewhere in the range of US\$22,000, using the FMA

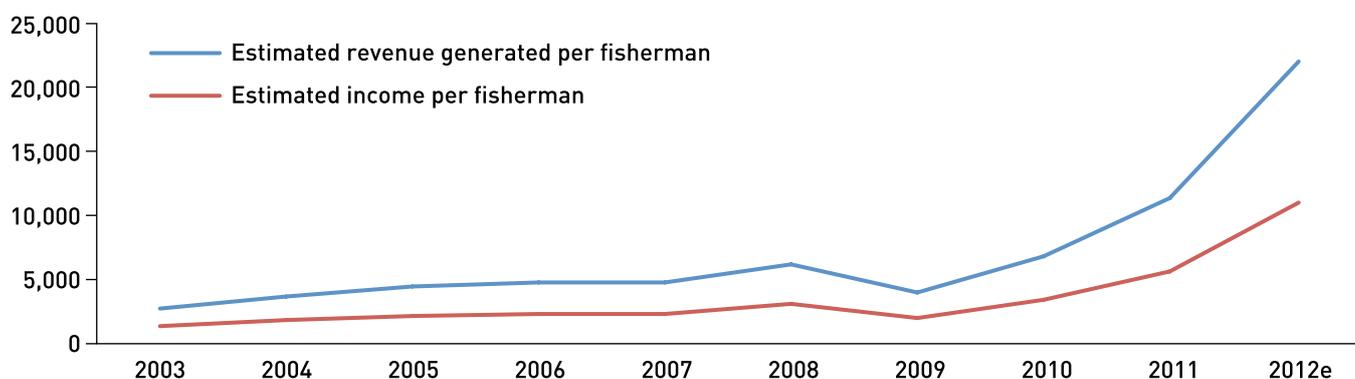
¹⁷ Despite privatisation, fish processing companies are generally held privately by a limited number of investors, rather than through public ownership. The tourism sector has experimented with public ownership of a national investment company, which initially achieved some success (Jamal, 2013), but the model does not appear to have been introduced to the fisheries. Given the apparent abundance of capital among fishermen, their investment in the process of value addition could remedy cash-flow issues higher-up in the value chain, and could re-structure financial interests to facilitate the re-negotiation of fish prices. However, such an approach seems unlikely in the context of an underdeveloped financial sector and the low mobility of capital in the economy (poverty), and the lack of a clear strategy with respect to the ownership, privatisation, and direction of the fish processing industry.

¹⁸ Sinan (2013) reports that the FMA also considered promoting subsidies in the form of physical assets, such as on-board ice plants, rather than fuel subsidies, as were adopted in December 2012.

¹⁹ The FMA estimate of fishermen is significantly higher than the 2006 estimate of fishermen. In 2006, the FMA reported 13,980 fishermen, against the census estimate of 8,388 workers. The use of the FMA figure thus results in a more conservative estimate of output per fisherman.

²⁰ Data on historical prices based on the average price of fish paid by Horizon Fisheries, as a weighted average of skipjack and yellowfin purchases.

Figure 14. Estimated revenue and income per fisherman, 2003-2012e (US\$)



Source: Fisheries Management Agency, Horizon Fisheries, author's calculations

estimate for the number of fishermen. Taking into account that not all reported fishermen may be actively engaged in fishery, the figure for active fishermen only could be as high as US\$29,000-37,000.²¹

Most commonly, the boat owner takes a 50% share of the revenue to cover capital and operating costs and profit, with the remainder of the revenue shared among crew members. On the basis of the calculation above, the average income of fishermen in 2012 is estimated at US\$11,000 to US\$18,500 per fisherman. During interviews, few interviewees could confidently self-report their average income, as incomes fluctuate from month-to-month, while generally having increased for several years. Instead, fishermen reported incomes of up to 40,000MVR or US\$2,560 in good months, while several vessel owners reported paying fishermen a minimum income of at least 10,000MVR or US\$640 in a bad month, suggesting some lower and upper limits for the estimated income of fishermen.²² In comparison,

artisanal fishermen in Tanzania were estimated to have an income of around US\$3-31 per fishing day, with an average of around US\$12, depending on the catch of the day (Igulu, 2013), suggesting that Maldivian fishermen are considerably better-off in this economic sense than their Tanzanian counterparts.

The saving rate among fishermen fluctuates according to income and the Maldives faces high costs of living owing to the cost of imported goods, but in 2013 some fishermen reported that they are able to save more than half of their earnings (Interviews, 2013). Fishermen most commonly name their children's education and savings for the pilgrimage to Mecca as the primary goals towards which these funds are saved. Some income is also re-invested, with younger fishermen expressing the desire to one day own their own vessel, and private funds are a common source of finance for the acquisition of new or larger fishing vessels (Linton and Shareef, 2011). There is little evidence of an upward spread

²¹ The lower figure is based on the 2006 census figure of 8,388 fishery workers. The higher figure is based on the observation that in 2006, the number of fishery workers as estimated by the census was 40% lower than the FMA estimate, and the application of this same percentage to FMA's estimate of 10,971 fishermen in 2011.

²² It should be noted that an earlier and unpublished survey conducted by the FMA in August 2011 found lower reported earnings. The survey found that average earnings varied according to the size of the vessel, with annual salaries ranging from 34,879MVR (US\$2,458) per year for crew members of boats of 45-65 feet, to 72,608MVR (US\$5,095) for crew members of boats of 65-85 feet. Larger vessels face a different economy than smaller ones, and may catch more fish per trip, but go on fewer fishing trips per year owing to higher operating costs. The authors of the survey warn that the data is based on a only a single month of data, during a time when fishermen were pre-occupied with government subsidies, and are likely to have over-reported expenditure and under-reported revenue owing. Consequently, the survey found that on average vessels of any size were economically unprofitable when including opportunity costs, which seems unlikely. While these findings should therefore not be interpreted as being indicative of actual incomes, it is likely that income indeed varies according to the type of vessel.

7 SOCIO-ECONOMIC STATUS OF THE FISHERIES



In 2013 some fishermen reported being able to save more than half their earnings – their children's education is cited as a priority for savings.

of capital along the value chain, and fishermen are not generally invested in the process of value addition, other than through the artisanal cottage industry (Höhne-Sparborth, 2013a). However, a high saving rate may provide an incentive to fishermen for diversification of their activities, creating new opportunities for income-generation and reducing the dependence of the local population on the performance of a single sector (Mohamed, 2013).

Moving upwards in the value chain, earnings seem to diminish. Fish processors in the artisanal industry may process 500-700kg per day, but face limited access to fish, as fishermen prefer to sell to the larger companies that can supply them with fuel and ice. Some fish processors report having to pay a premium to obtain the fish, or being restricted to the purchase of small fish rejected by the companies (Interviews, 2013). In a 2006 analysis cited by Linton and

Shareef (2011), smoked Maldivian fish was reported to have the lowest margin of all processing sectors, barely breaking even. Interview results with fish processors suggest that in previous years the situation may not have been as dire as that, and fish processors report their past incomes ranging from 3,700 to 27,000 per month. Incomes fluctuated according to seasonal variations or access to fish and processors relied on loans from local shops to overcome short-term shortfalls in income.

However, while the rising price of fish has increased the overall benefits generated by the fishery sector, the high price and limited availability of raw material has worsened conditions in the cottage industry. In May 2013, processors reported selling fish paste at around 80-90MVR per kilo (Höhne-Sparborth, 2013b), but although these prices were rising, a raw material utilisation rate of 18% (Linton and Shareef, 2011) would imply a break-even fish price of 14-16MVR per kilo. Actual market prices of raw fish, however, had increased to 22.50MVR in May 2013. Processors in two villages that were sampled report that many artisanal processors have left the industry or are trying to supplement their income with alternative employment, working in shops or agriculture. Lack of access to finance or credit schemes is reported as an obstacle to such transitions (Interviews, 2013) and no government strategy appears in place to either support this sector or the creation of alternative livelihoods for fish processors forced out-of-business.

The same 2006 analysis cited previously (Linton and Shareef, 2011), found the production of fresh yellowfin to have the highest margins, followed by frozen skipjack and canned tuna, and feedback from the private sector suggests that this situation remains unchanged (Ali, 2013). The export of fresh yellowfin, however, is hampered by access to appropriate air transport facilities so that companies further removed from the capital focus on canned and frozen tuna. Kooddoo primarily focuses on the export of frozen fish to Thailand, and this appears to be a profitable enterprise, with the company planning to expand processing facilities to the southern atolls to expand capacity and access to fish. Horizon Fisheries is the largest producer of canned tuna, but its facilities were completed in 2006 at a time after which a declining fish catch coincided with rising prices, resulting in a low capacity utilisation and high fixed costs per unit of fish produced.

In the retail industry selling imported tuna from the Maldives, margins on pole-and-line tuna appear low, although

these vary by country. In the United Kingdom the margin is limited to approximately 5% (Greenpeace, 2012). Sainsbury's reports that the product does not command a premium, but is, instead, supported by the company's commitment to ecologically-responsible business and branding considerations (Dingwall, 2013).²³ The strategy appears to be at least partially successful, with the commitment by retailers now monitored by independent groups, for instance through the publication of a tuna league table (Greenpeace, 2011).

As the product is marketed at low margins in markets such as the United Kingdom, it appears unlikely that retailers would be willing to absorb the increased cost associated with a European import duty resulting from the graduation of LDC status. It is equally unlikely that this increase in cost would be passed onto end-use consumers, as the price is close to the limit consumers would be willing to pay for the product (Dingwall, 2013). Consequently, the cost of the import duty must be borne by processors and the fishermen in the Maldivian supply chain, which will affect the profit-

ability throughout the value chain, with the canning industry at particular risk. At present, duty-free imports into the European Union from the Maldives provide a cost-advantage compared to fish processed and canned in Thailand, which are charged with a 24% import duty. Once a similar (albeit slightly lower) duty is imposed on products imported directly from the Maldives, this advantage is likely to disappear. This will in turn likely shift processing activity away from the Maldives to Thailand, unless costs can be significantly reduced (Burton, 2013b).

Increasing capacity utilisation to reduce fixed costs or reducing the price of fish may thus be the only viable options for the industry. There appears to be a broad awareness among government, foreign importers and the processing companies of the challenges posed by graduation from LDC status and of the possibility that prices of fish may need to be lowered but awareness of these challenges does not appear to extend to the level of fishermen, and the matter is currently not actively communicated by the government (Ali, 2013; Shafeeu, 2013).



The fishermen land the tuna they catch by hand. The market's low margins mean that the cost of import duty must be borne by processors and the fishermen.

²¹ During a town-hall meeting with fishermen, fishermen enquired into the price their product fetches in the UK market and it was a matter of some surprise to them to find out that prices are similar to local retail prices and are essentially subsidised by the UK retail industry.

8 DISCUSSION AND RECOMMENDATIONS

8.1 BENEFITS

The Maldives is in the ambiguous position of having one of the most richly-endowed marine environments in the world, while at the same time facing greater natural risks than nearly any other country. ***The Maldives, as a small part of a larger oceanic ecosystem, is particularly exposed to threats such as over-fishing and over-exploitation.*** The fishery in the Maldives is based on an Indian Ocean stock that is considered highly migratory and straddling (Adam, 2013b). Rising demand of tuna has pushed up prices, but also skews the incentive structure for the fisheries elsewhere in the Indian Ocean, adding ever greater importance to a precautionary form of management of the fish population. Meanwhile, the Maldives potentially face serious threats from climate change, not only from the worst-case scenario of rising sea levels threatening the existence of the atolls, but also from changing oceanic conditions including acidification and rising surface temperatures.

The fisheries in the Maldives have, throughout their existence, been based on a sustainable model that primarily relies on pole-and-line fishing. Over the last decades, ***the pole-and-line model has evolved from a traditional practice to a legally protected industry***, through the introduction of a license system and, more recently, the completion of MSC certification and full membership of the IOTC. With growing consumer awareness of ecologically-responsible tuna, the Maldives has been heralded for its adoption and support of best-practices in fishery, and now forms a model promoted by

environmental interest groups, and keenly observed by other island and oceanic states.

But, as this report has sought to emphasize, the government's support to the pole-and-line method of fishing is as much a social and economic policy as an ecological one. Policies such as the ban of shark fishing may have been put on the agenda through environmental pressure groups, but ***their passage has depended on recognition of the economic value in maintaining the marine environment.*** Similarly, MSC certification and IOTC membership have been driven by the need to maintain access to EU markets – access that is now threatened by the impending loss of LDC status and imposition of import duties on fish products from the Maldives.

For the population of the Maldives, ***the fisheries provide a sustainable, and accessible means of a generating a livelihood.*** Whereas the entire fish catch of the Maldives could easily be taken over by a few large purse-seining vessels, the maintenance of the pole-and-line fishery and the exclusion of foreign operators have maintained the industry's organisation into small, single vessel or two-vessel operations. At present, fishermen are among some of the most highly paid workers in the economy, and their income carries over indirectly to the rest of the economy, through consumer spending, re-investment and the promotion of higher educational goals for their offspring. ***The social role of the fisheries is of particular importance in the remote atolls***, where fewer economic alternatives are currently available.

8.2 CHALLENGES

As the majority of fish products are exported, the economy is highly exposed to changes in global trends in demand and prices, to changes in the exchange rate, and shipping costs. Over the past years, prices in the international market have increased dramatically. Whereas in 2009 purse seined skipjack traded in the range of US\$1,000-1,500/t, in 2012 and 2013 prices ranged between US\$2,000-2,500/t, while pole-and-line fish has maintained a steady premium (Burton, 2013b). This increase in prices has largely been passed on to fishermen, who have seen their incomes soar. On the other hand, ***a decline in the Bangkok market would put this newly-acquired economic wealth at risk.*** While fishermen presently save a significant portion of their income, through banks or more informal means, a sustained drop in prices would be harshly felt. However, the risk of a sustained drop

in prices in the international market appears unlikely owing to increasing demand and supply affected by catch control measures, and the premium received for Maldivian fish presently remains generous.

The issue is especially urgent in the context of the imposition of European import duties. Prices of tuna in the Maldivian market appear to be at the natural limit of what consumers are willing to pay, and ***to maintain competitiveness in the EU market, production costs in the processing sector will need to drop significantly for canning not to be displaced to Thailand.*** At present, it is unclear how such a drop in prices would be distributed throughout the value chain. Companies such as Horizon Fisheries and Felivaru presently operate at low capacity and a high average cost of production, and reducing their cost of operation will require



Over the last decades the pole-and-line model has evolved from a traditional practice to a legally protected industry.

either raising production, or decreasing the cost of the raw materials.

Owing to the high dependence of the Maldives on its fishery exports, the effects of a decline in exports to the European market could be significant. As the Minister for Economic Development states, “**any negative drawbacks in any of our major export markets will mean ripple effects throughout the economy**, the hardest hit being the local fishermen as this would mean loss of job opportunities and sharp falls in income to primary fishermen who sell their fish to processors” (Mohamed, 2013). Given the large portion of the electorate that fishermen and their dependents represent, any decrease in prices or income is also politically sensitive.

Involving fishermen in the process of value addition could be one solution, but is likely too ambitious in the present context. Paradoxically, then, although the high degree of political influence of the fisheries has helped to bring about the present model of the fisheries, **the politicisation of the fisheries threatens to hamper the development** and implementation of sound developmental policy. The recent passage of US\$6.5 million in fuel subsidies, for instance, does not seem to cater to an urgent economic need, as since 2006 and 2007, the rapid rise in the income of fishermen has coincided with a fall in the price of fuel. Instead, policies such as these appear motivated by a reluctance to upset the expectations of fishermen in a crucial election year. Inadvertently, however, the policy may also displace other social priorities, given the limited funds available to the central government.

On the medium to long term, **a clear strategy for the future direction and development of the fisheries is**

currently lacking, but urgently needed, if the industry is to continue to prosper. First, capacity within the sector is poorly structured, with much latent capacity in the northern atolls, combined with limited processing capacity in the south, where most of the fish catch is currently concentrated. Second, privatisation of the sector remains incomplete, and despite earlier commitments to further sale of government assets in the fisheries, the future of the government companies remains unclear, complicated by established political and financial interests.

A third point, and a more fundamental one at that, is the position of the fisheries in the economy as a whole. While large revenues are presently generated, the majority of these funds seem to remain confined to the sector itself. Government revenue from the fisheries remains minimal, and the sector appears to be a net recipient of government funds. In the context of the fisheries as a social policy this is perhaps not inappropriate, but **the limited revenue extracted from the sector does undermine the ability of the central government to engage in re-distributive and poverty-alleviating policies**. The rising price of fish vividly illustrates that the benefits from the fisheries are at times lopsided, since increased revenue for the fishermen has been coupled with consumer prices of fish products more than doubling over the span of ten years.

For instance, while the fisheries are a welcome source of income to many otherwise isolated communities the sector is not accessible to all – owing to gender issues, health constraints, and age. The artisanal fish processing sector is an example of a related industry in which many that are excluded from sea-faring fishery find their livelihoods, but the rising price of raw materials and competition from the large purchasing

8 DISCUSSION AND RECOMMENDATIONS

companies has threatens the existence of this industry. ***The transition of workers in the cottage industry is presently poorly supported***, owing to the lack of alternative employment opportunities, vocational training programmes, or government credit schemes. In cases such as these, the limited revenue extracted by the government from the fisheries obstructs the ability to implement re-distributive policies that could facilitate the smooth transition of sector such as these.

More generally, ***the prospects of growth in the fishery are limited***, as fish catch has a natural limit that cannot be infinitely stretched, and Maldivian fish catch is believed to be close to the maximum, and additional gains cannot be achieved by increasing fishing efforts (Adam, 2013b). In the last thirty years, tourism and fishery have contributed greatly to the economic prosperity of the country, but the fishing industry may now be approaching maturity. Consequently, a new developmental plan is needed, to identify those sectors that have the most po-

tential to contribute to future growth, determine any obstacles to be overcome, and the means by which the capital base in sectors such as tourism and fishery can contribute to the development of such sectors.

The issue of education is a particularly noteworthy example of this. While fishermen report that their children's education is a primary priority to them, the promise of a white-collar job alone may not prove sufficient to retain such newly-trained workers, as long as there is such a discrepancy in income between the fisheries and other sectors. The Maldives it seems thus has two options: either ***to create new avenues of financially-attractive employment*** to provide realistic opportunities for such educated workers (and to find alternative workers at home and abroad to fill the gaps in the fisheries), or to risk having the perceived returns to education diminished, and associated effects such as the under-utilisation of skills, a brain-drain out of the country.

8.3 RECOMMENDATIONS

On the whole, the net socio-economic impact of the fisheries is clearly positive, and the challenges outlined in this discussion primarily relate to the potential of the sector not being fully utilised.

The following recommendations could contribute to maximising the social and economic benefits of the fisheries:

- **Development of a clear plan for the further privatisation of the fishery sector**, outlining the direction of companies such as Kooddoo, MIFCO and Felivaru, identifying the challenges faced by the current private enterprises in the industry, supporting a healthier cash-flow within the sector to improve capacity utilisation, and the opportunities for re-development of the fisheries in the northern atolls.
- **Development and integration of the financial sector**, including encouraging the mobility of capital within the economy, support to commercial and government credit schemes, the re-evaluation of toxic loans in the fishery sector, and improved coordination between the Ministries of Finance, Tourism and Fisheries and Agriculture.
- **Diversification of products and markets**, to help alleviate the impact of the loss of LDC status, through promotion of the premium nature of Maldivian tuna in new markets and the development of new products such as the development of the grouper fish industry, as well as support to investments in value-addition.
- **Identification of vulnerable groups adversely affected by the rise in fish prices**, possibly leading to support for a transitional scheme for struggling workers in the fish processing sector, and including consideration of the impact of rising fish prices on the nutritional status of the population, particularly among the poorest stratum.
- **Re-consideration of the role of foreign investment**, particularly as regards the potential for transfer of knowledge and assistance to potential areas of growth, such as aquaculture.
- **Creation of educational and career opportunities**, in order to utilise the potential for growth in human capital, generated by the interest of fishing families in investing in their children's education, including through the development of training courses geared towards vocational skills, in fishery and other sectors.
- **Further research into the socio-economic status in the fisheries**, including implementing a larger survey into

the incomes of fishermen, their level of educational achievement, their past forms of employment, any additional forms of employment that they or their dependents may hold, saving rates, levels of (re-)investment, and costs of living.

Some of these policies are clearly long-term goals, and can neither be developed nor implemented overnight. Further research will also be required to identify the specific bottlenecks and needed investments in the various sectors and

services within the economy. However, as the fishery sector is growing increasingly mature, failure to consider the future development of the sector and the transition of the economy to higher-value products and services could lead to eventual stagnation.

That said, it appears unlikely that any significant progress on these policies can be made until the political situation in the Maldives has become more settled, following the elections in September 2013.



Fishermen in snorkel gear work together to collect bait fish. The benefit of excluding large-scale fishing has been to allow for a community-based model of fishing in which revenue is divided evenly among those involved.

9 CONCLUSION

9 CONCLUSION

While the ecological benefits of the pole-and-line tuna fisheries in the Maldives have been widely publicised, the significance of these fisheries as a social model has perhaps been under-emphasized. This report has illustrated that government policies that have helped to shape the present form of the fisheries are influenced by economic considerations, and have had a direct impact on the socio-economic status of the population.

The primary benefit of maintaining a licensed fishery that excludes large-scale fishing has been to allow for a community-based model of fishing, in which the revenue in the sector is divided relatively evenly among those involved in the sector, and over a large and geographically-dispersed part of the population. Negatives include the high degree of exposure to trends in foreign demand and prices, the high cost of fish to domestic consumers, and the possibility that the high returns to labour in the fishery sector may reduce

the returns to investments in education. Socio-economic benefits could be further improved through the development of a clear long-term strategy to address issues such as privatisation, diversification, and re-development of the north.

In sum, the Maldivian model may be deemed a successful one, and appears favourably to fisheries in countries such as Tanzania, where tuna fishery is already a major contributor to exports and local incomes, but remains vastly under-developed (Igulu, 2013). However, the Maldivian model is also highly context-specific, having benefited from a long established practice of pole-and-line fishery and political will strengthened by the large portion of the population engaged in fishery. While the model could therefore provide useful lessons to other island states, a degree of caution should be exercised with respect to the ability to replicate the Maldivian model.



The Maldivian model may be deemed a successful one and could provide useful lessons to other island states.



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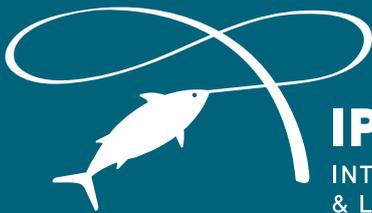
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The reliance on pole-and-line fishing in the Maldives means that the challenges of transplanting its model ought not to be underestimated.



IPNLF

INTERNATIONAL POLE
& LINE FOUNDATION

UK Office

Postal Address: IPNLF, CAN Mezzanine, 49-51 East Road, London,
United Kingdom, N1 6AH

Registered Address: 1 London Street, Reading, United Kingdom,
RG1 4QW

Registered Charity: 1145586 (England and Wales)

Maldives Office

Postal Address: IPNLF c/o 1st Floor, M. Mist, Fiyaathosi Magu,
Male-20223, The Republic of Maldives

Web: www.ipnlf.org

Email: info@ipnlf.org

Twitter: www.twitter.com/IPNLF

Facebook: www.facebook.com/InternationalPoleandLineFoundation