

# Local solutions to challenges of West Indian Ocean fisheries development

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## Abstract

The West Indian Ocean is rich in biodiversity and marine resources. This paper gives an overview of fisheries development and resource management in the region. There are many shared issues that must be addressed within countries and at the regional level. These are illustrated by examples from three countries. In Mozambique the issues of lack of information about artisanal fisheries, excessive harvesting of juveniles and conflicts between artisanal and commercial sectors are highlighted. Elements in addressing this include targeted research and decision-making support tools. The challenges faced in Somalia stem primarily from the political instability that contributed to an absence of sound fisheries policy. An example of a highly participatory process to develop the policy provides a model for other countries. In Tanzania, the issue of dynamite fishing was addressed by local communities initiating a program to promote wise use of the resources. There is a clear opportunity for better collaboration and greater integration of fisheries research and management on a regional basis. There is also much to be learnt by the sharing of experiences between countries. This has been initiated by some recently launched regional cooperation projects, but there are still many challenges facing this region.

## Introduction

The West Indian Ocean (WIO) is geologically fascinating. Created through the break-up of Gondwanaland millions of years ago, it is a sea with deep canyons, mid-ocean ridges, large fluvial banks, granitic islands, and coral atolls. There are regions of strong seasonal upwellings, narrow continental shelves, and some of the largest boundary currents on the planet. Its role in the early distribution of seafaring peoples, and subsequent trade and shipping routes, dates back many centuries. Equally fascinating is the rich biodiversity of this ocean, with its high levels of endemism and unique species – such as the nearly extinct coelacanth (*Latimeria chalumnae*). But its importance is not confined to its natural features alone. This body of water provides sustenance and job opportunities to an ever-increasing human population. The Indian Ocean is the only sea surrounded by developing countries with close to half the world's population. The challenges faced in meeting expectations and demands are enormous – especially so in times of drought and unsettled socio-economic development.

The Food and Agriculture Organization of the United Nations (FAO) has divided the world's marine environment into 19 major fishing areas. One of the largest of these is

the WIO, an area of 30 million km<sup>2</sup> and accounting for some 8 per cent of the total marine waters. While global trends in fish landings for most of the 19 areas are negative, the WIO has maintained a steady rate of increase in its total landings (FAO 2000). This has largely been the result of the increased harvest of tuna and mackerel-like species, with recent additions of toothfish and orange roughy. While the total catch is relatively modest at about 4 million t, being only 4.6 per cent of the world's total marine fish landings (FAO 2000), it is seen by distant fleets as an opportunity to offset their decreased landings from other regions.

## Fisheries development and management issues

Unfortunately, the WIO has not enjoyed the same level of research interest and coordinated resource management as many other regions. There was a spate of academic interest many years ago, mostly from countries outside the region (Table 1).

Many of these initiatives were of an exploratory nature and, while they did generate interesting scientific data, they did little to assist the sustainable development of resources for the surrounding countries.



Map of the West Indian Ocean

More recently, local institutions have implemented research programs of their own, many with a focus on sustainable fishery development. The results from some of these programs are available and several vexing issues have been resolved.

Table 1. List of past initiatives on resource management in the West Indian Ocean

Expedition	Activities and Outputs	Country	Year	References
International Indian Ocean expedition	Mapping of physico-chemical parameters	Numerous (36 ships)	1966-70	Wyrтки 1971
The Tyro expedition	Bio-physical research	Netherlands	1993	Wiese et al. 1994
Several Fridtjof Nansen surveys	Stock estimates	Norway	1960s –95	na
South West Indian Ocean Programme (SWIOP)	Fishery resources assessment	WIO countries, Norway and FAO	1986 – 87	na
Indian Ocean Commission (IOC)	Regional collaboration	WIO island states	1982-present	na

A few examples from different countries are detailed below.

## Mozambique

Mozambique has one of the longest coastlines in Africa, a total of about 2 750 km. The coastal areas have rich offshore banks, muddy estuarine bays, fringing reefs and islands, all of which contribute to potentially rich and diverse fisheries. Indeed, for many years these resources have been the primary contributors (about 40 per cent) to the GDP of Mozambique. More than 50 per cent of that nation's protein food intake is stated to comprise fish, while some 400 species are harvested for food in one way or another. Many Mozambicans also rely on fishing as a source of income. Historically, only the industrial fisheries received attention and a full recognition of the role and importance of the artisanal sector is comparatively recent. A census conducted by the Mozambican small-scale fisheries development unit at the Instituto para o Desenvolvimento da Pesca de Pequena Escala (IDPPE) in 1996 documented the magnitude of the informal and artisanal sector. It found that at least 80 000 artisanal fishers, located in 787 fishing centers, were woven into the fabric of life and culture of the Mozambique nation. This prompted the need for a closer understanding of the relationship between the artisanal fishers and the socio-economic development of coastal regions in several parts of Mozambique. With support from the International Fund for Agricultural Development (IFAD), the Norwegian Agency for Development Cooperation (NORAD) and FAO, an ambitious program was launched by the Instituto Nacional de Investigacao Pesqueira (IIP), with the aim of establishing clear development linkages between artisanal fisheries and regional development. The districts of Angoche and Moma were selected as pilot study areas,

as the intensity of the artisanal fishery there is exceptionally high, with an estimated 7 602 seine nets operational.

A comprehensive stratified sampling program was designed and, with the engagement of a dozen or more trained monitors, the artisanal fishery was surveyed on a daily basis for a period of four years. Backed by an in-house developed database, the results of some 50 per cent of all fisher outings produced some startling facts.

The estimated total catch made by the artisanal fishers in these two districts alone exceeded 30 000 t in some years, almost equal to the total catch reported by Mozambique to FAO. By far the largest proportion of the catch comprised small pelagic species, mostly anchovies and sardines. The availability of these short-lived species varied enormously from year to year, which has implications for the economies of the coastal communities.

Of particular note was the high incidence of juvenile and especially larval fish and shrimp in the catch. Overall these accounted for 11 per cent of the catch by weight. The high larval by-catch was attributed to the mosquito net liners that had been inserted into the nets. An entire "cottage industry" had developed where women would deep-fry the larvae as a quick snack along the roadside.

Not only did the larval catch potentially compromise future recruitment to the artisanal fishery, the larval shrimp catch was also seen as a threat to optimizing the valuable offshore industrial shrimp catches and, hence, creating a serious conflict of interest between the users. On the other hand, the industrial trawlers ventured extremely close to shore, thereby impacting the artisanal beach seine fishery. Clearly, this situation offered opportunities for compromise. Using the information

generated by the project, a management agreement was implemented whereby mosquito net liners were removed in exchange for trawlers remaining further offshore. The monitoring program soon recorded lower harvests of larval fish, down to 4 per cent of the total landings in the first season.

Despite the fact that the artisanal catch of shrimp was only 1.5 per cent of the industrial catch, with a further 0.2 per cent as juveniles, the industrial versus artisanal conflict remained. The IIP program provided decision-making support. Using a bio-economic model based on yield per recruit, and taking the market value of shrimps each month of their first year of life (by size), valuable information was derived concerning the size limits of the prawns. Although several assumptions had to be made, the model indicated that by closing the fishery completely for the first month of juvenile growth (either by banning fishing or changing selectivity) the potential total yield in terms of market value to the artisanal fishers increased by 18 per cent. The profitability increased for the first four months of juvenile life being closed to fishing, when it reached a potential 55 per cent increase in value in the fifth month of fishing. Thereafter, the profitability decreased substantially (Fig. 1).

Thus, while the artisanal fishers could potentially benefit from a 55 per cent increase in the value of their catch, the industrial fleet would also stand to benefit, although only marginally. While it was shown that a four-month closed season would increase the survival of the larval shrimps six-fold, the actual contribution to the industrial catch would be no more than one metric tonne – about 0.1 per cent of their total annual catch. Part of the reason for this lies in the fact that the natural mortality for shrimps is exceedingly high and that the artisanal catch of juveniles is relatively small.

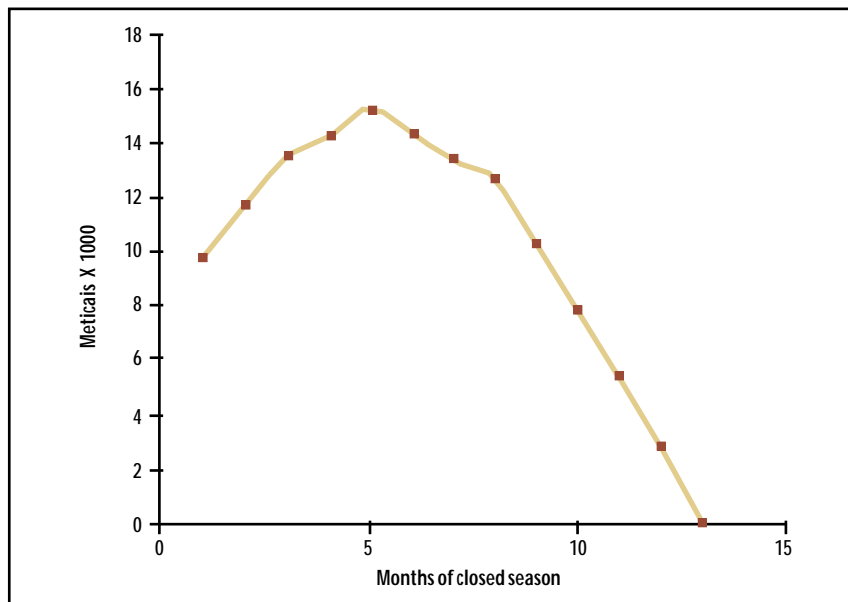


Fig. 1. Relative income to artisanal fishers from shrimp recruits (1 000 meticals per kg: 25 000 meticals = 1 US\$)

Tanga artisanal fisheries program that not only sought to monitor catches, but promoted the wise use of resources. Some fishing zones were declared voluntary sanctuaries. The use of dynamite was seen as a negative factor, not only for the environment but also for the community. The scourge of dynamite fishing has now been significantly reduced and co-management of fishery resources is generating perceptibly increased returns. Several other fishery-related initiatives in Tanzania have been successful. For example, the development of marine parks and, especially, the implementation of the Mafia Island Marine Park Management Plan, has led the way in participatory management and multiple-use of resources.

### Challenges and opportunities for fisheries management

The WIO is exceptionally rich in biodiversity and marine resources. The region supports a great many fisheries, ranging from subsistence gathering to the most sophisticated industrial fleets. Most countries in the region depend on these resources, either as primary contributors to their GDP or as vital elements of socio-economic stability in their coastal regions. In addition, fisheries in all these countries share similar problems and challenges. Examples include conflict between artisanal and industrial fishers, how to deal with the by-catch, management of straddling stocks, setting of regional harvesting targets for migratory species, etc. However, a number of competent marine research institutions are located in the region, many of which have excellent scientific know-how.

Yet, these countries have so far failed to implement a regional plan for fisheries. The potential benefits of a collective approach to living marine resources development in

### Somalia

Somalia presented a different challenge. With the longest coastline in Africa and its rich upwelling system off the Horn, theoretically Somalia has great potential for fishery development. Yet political instability has impeded the wise use of marine resources and little benefit has been generated for its citizens. The absence of a sound overall fisheries policy was seen as a key shortcoming and in response the World Conservation Union (IUCN) and the Oceanographic Research Institute in Durban (ORI), with donor support from the European Union (EU) and the Italian Aid Agency (COOPI), stimulated policy development in two of the more stable regions of Somalia, namely, Somaliland and Puntland. In a process that was executed by local NGOs, a comprehensive marine resource-use policy was formulated. Trained volunteers traveled thousands of kilometers under extremely difficult conditions to reach coastal communities in order to canvass their opinion on fisheries matters. In the end, a near-consensus draft policy was formulated and subsequently presented to the respective regional parliaments. An added bonus was the consensus reached between otherwise antagonistic factions that clearly shared similar problems and interests vis-à-vis fisheries.

Some of the key elements included in the policy are:

- Who owns the resources?
- How are fishing rights allocated and who has access to the resources?
- Approaches to resource management.
- Institutional structures for management of fisheries and resources.
- Funding and finance.
- Research, monitoring, awareness and training.
- Environmental protection.
- Coastal zone management.
- Surveillance and compliance.
- Fishery facilities.

One interesting element of the Somali policy initiative was that it could benefit from the South African experience of developing a new fisheries policy. Both countries were emerging from a troubled past and were thus presented with a unique opportunity to develop new policies.

### Tanzania

The five million people living along the 800 km coastline of Tanzania are heavily dependent on marine resources. Most fish are taken in freshwater lakes in Tanzania. The marine catch comprises 15 per cent of the total catch and is generally poorly managed and in some cases under threat. One cause has been the extensive use of dynamite in coastal waters, which has not only damaged fish stocks but has also destroyed large tracts of coral reefs. In response, local communities initiated the



Quinea netting for small shrimps and fish is a widespread activity amongst coastal women of East Africa

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Table 2. List of fisheries research and management projects/activities in the West Indian Ocean

Name of project	Purpose/Activity	Funding support
Regional Fisheries Information System	Standardized and verifiable fisheries data collection	DFID <sup>1</sup>
Monitoring, control and surveillance	Improving compliance	EU
Harmonizing fisheries policy	Towards compatibility in management of resources	FAO
Indian Ocean Tuna Commission	Sustainable management of tuna and related species in the IO	FAO
South West Indian Ocean Fisheries Commission	Sustainable management of non-tuna species in the WIO	FAO
East African Marine Eco-region (EAME)	Threats and root causes of biodiversity loss	WWF <sup>2</sup>
Global International Waters Assessment (GIWA)	Assessment of status of defined regions, including fisheries of Agulhas large marine ecosystem (LME).	GEF: UNEP/NOAA/Sida/Finland <sup>3</sup>
Somali and Agulhas large marine ecosystems (LME)	Understanding the two largest LMEs in the WIO	GEF – UNDP <sup>4</sup>
South West Indian Ocean Fisheries Project (SWIOFP)	Assessment and management of the offshore fisheries resources	GEF-World Bank
Jakarta Mandate: small-scale fisheries of the WIO	Identification, understanding and improved management of the small-scale fisheries of the region in the context of biodiversity protection	IUCN, NORAD

<sup>1</sup> Department for International Development

<sup>2</sup> World Wildlife Fund

<sup>3</sup> Global Environment Facility: United Nations Environment Programme/National Oceanic and Atmospheric Administration/Swedish International Development Cooperation Agency/Finland

<sup>4</sup> Global Environment Facility - United Nations Development Programme

the region have thus not been realized. Nor have the experiences in one country necessarily been beneficially shared with others. In addition, many coastal fisheries are poorly understood and often not well managed, while offshore stocks are mostly taken by nations from other parts of the world, hence, generating little real benefit to countries of the WIO region.

This situation offers opportunities for better collaboration and greater integration of fisheries research and management among countries in the region. Therefore, a number of regional cooperation projects have been launched recently (Table 2).

The Jakarta Mandate project, a marine component of the Convention on Biological Diversity (CBD), is now generating valuable insights. This work, managed by the IUCN office in Nairobi, has brought together a number of national institutions to document the great diversity of fishery types in the region. Based on existing knowledge, at least 100 different types of fisheries from Kenya, Mozambique, Tanzania, Seychelles and South Africa have been described. Preliminary assessment of these fisheries has revealed some disturbing findings.

- Very few small-scale fisheries in the study region are subject to any significant form of management.
- Most of the fisheries are open access,

- with little or no control over effort.
- The level of compliance is very low in most cases.
- Very few of the fisheries are subject to specific management plans or have published harvesting target levels.
- In many cases there is good scientific information available that could be applied to the management of a particular fishery.
- In less than 10 per cent of all the documented fisheries is there a reasonable linkage (or application) between scientific information and a structured management plan.
- There are a great many existing or potential conflicts between different fishery types and other forms of coastal and marine development.
- The level of wasted bycatch is quite low, as are its impacts on vulnerable species. However, impact on juveniles of target and other species is generally seen to be high.

Clearly, many problems remain to be solved. However, fascination with the wonders of the WIO may well hold a key to its future wise development. Interest in the study of this rich marine environment should be promoted. In particular, there should be a concerted effort to create, and be seen to create, career opportunities for the region's own citizens in this field. Part of a future vision should be that young people consider

a career in marine and fisheries science as a rewarding challenge in life. This will contribute to finding local solutions to the challenges facing the WIO fisheries.

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