A Decade of Namibian Fisheries Science
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A DECADE OF NAMIBIAN FISHERIES SCIENCE

AN INTRODUCTION BY THE HONOURABLE MINISTER OF FISHERIES AND MARINE RESOURCES OF NAMIBIA, DR ABRAHAM IYAMBO

I am delighted to have been asked to introduce this volume of definitive focused research conducted on the living marine resources of Namibia during the final decade of the 20th century. The 1990s saw major changes in the Namibian political landscape after the country gained its Independence in March 1990. One of the first priorities of the first democratically elected government was to enact laws and regulations that would fuel the recovery of Namibia's valuable marine resources after decades of overexploitation by foreign fleets. The second priority was to ensure that Namibians gained greater benefit from the rich resources, both economically and in terms of employment.

It was recognized immediately that, in order to achieve these aims, management decisions would need to be based on high-quality scientific information. To this end, two new research institutes were built: the National Marine Information and Research Centre in Swakopmund and the Lüderitz Research Centre. Historically, most Namibians had little interaction with the sea and this, together with pre-Independence education policies, left Namibia with few trained or experienced marine scientists. Some scientists were recruited from the terrestrial and ecological sciences, and an aggressive training programme was initiated to give young Namibians the necessary skills to undertake the required scientific monitoring and assessments required to provide advice to decision-makers on how to manage Namibia's valuable living marine resources.

This volume summarizes some of the excellent research conducted in Namibia during the 1990s, its quality reflected in the content of the papers contained herein. Not all of the research being conducted on the Namibian marine ecosystem is included here because much of it is still in its formative stage and not yet ready for publication, although developments in most major marine research disciplines are recorded. I am confident that this volume, detailing the achievements of this small group of young and dynamic Namibian marine scientists, as well as their collaborators from other countries, will stand for many years as an icon of what can be achieved by a developing country with the will to take its place among the ranks of those advocating and practicing the principle of sustainable utilization of its resources.

The Namibian marine ecosystem

A cursory glance at Namibia's EEZ fails to indicate the rich resources that lie below the surface of the water. The coast of Namibia and the hinterland are arid, falling within the Namib Desert biome. The waters off Namibia are, however, among the most productive in the world (Boyer and Hampton 2001).

Namibia's continental shelf is part of one of the world's major eastern boundary currents, in this case the Benguela Current. The Benguela Current is bordered to the north by the Angola Current and to the south by the Agulhas Current, both warm water currents. It flows towards the Equator and is deflected away from the coast by the Coriolis force resulting from the Earth's eastward rotation and the prevalent southerly winds, leading to upwelling. The major upwelling cell of the whole Benguela Current is off Lüderitz, although upwelling occurs with a lesser intensity along the entire south-western African coastline. Nutrient-rich water upwells for much of the year and, because Namibia is located in subtropical latitudes, there is sufficient solar radiation to allow almost continuous photosynthesis, so generating the high level of productivity with which the Namibian marine ecosystem and the Benguela Current in its entirety has become synonymous.

Namibia's living marine resources

Commercially the most important resources harvested are Cape hake *Merluccius capensis* and *M. paradoxus*, Cape horse mackerel *Trachurus t. capensis* and southern African sardine *Sardinops sagax*. Other notable resources are monkfish *Lophius vomerinus*, orange roughy *Hoplostethus atlanticus*, southern albacore *Thunnus alalunga*, West Coast rock lobster *Jasus lalandii*, deep-sea red crab *Chaceon maritae*, and guano from Namibia's extensive seabird populations and Cape fur seal *Arctocephalus pusillus pusillus*. Seals are also an important constituent of Namibia's valuable tourist resources, while the silver kob *Argyrosomus inodorus* and other inshore linefish species further attract a large recreational fisher population, many from outside Namibia.

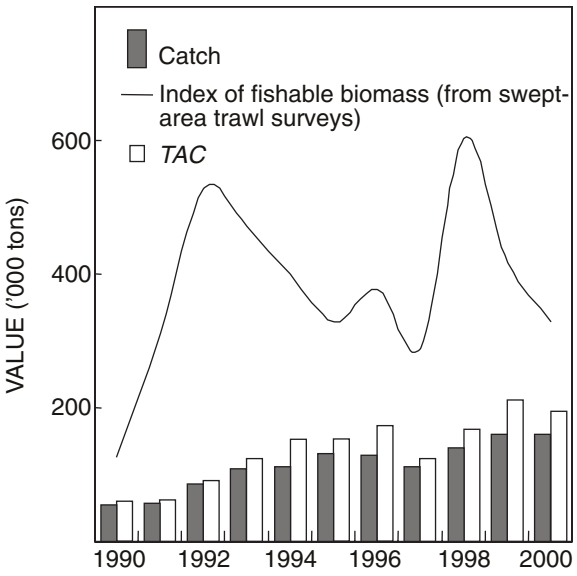

Fig. 1: *TAC*, catch and an index of annual mean estimated biomass of hake off Namibia during the 1990s (after Boyer and Hampton this volume)

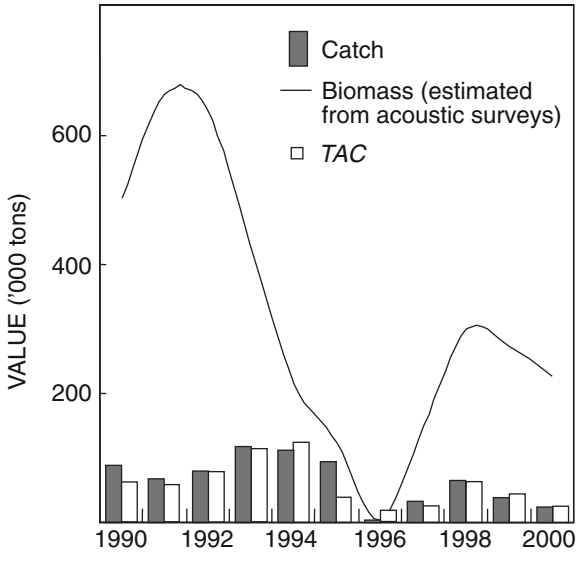

Fig. 2: *TAC*, catch and annual mean estimated biomass of sardine off Namibia and Angola during the 1990s (after Boyer and Hampton this volume)

Many of the resources were seriously depleted at Independence in 1990. Since then some have started to recover, a few dramatically, whereas others remain depressed.

Cape hake was one of the most depleted of Namibia's resources at Independence and, as a result, the decision was taken to reduce the annual total allowable catch (*TAC*) from several hundreds of thousands of tons in the 1980s to a mere 60 000 tons in 1991. A gradual, but steady improvement in the state of the stock has since allowed an increase in the *TAC*, such that by 2000 the hake industry harvested almost 200 000 tons of hake (Fig. 1), making it Namibia's most economically important living marine resource (Van der Westhuizen 2001). As for sardine, a resource that once yielded (in the late 1960s) more than 1 million tons annually, but was severely depleted at Independence, the stock showed signs of recovery in the early 1990s, but a period of anomalous environmental conditions in the mid-1990s allied to some insufficiently cautious management measures resulted in a series of recruitment failures. Despite a slight recovery in the latter part of the decade, the stock remains depleted (Fig. 2; Boyer, Boyer *et al.* 2001) and a moratorium on fishing this species is being seriously considered. Another major resource is horse mackerel, a species targeted by both purse-seiners (as juveniles) and midwater trawlers (as adult fish) off Namibia. For several decades the stock remained resilient despite heavy fishing pressure. Catches during the 1990s remained high, between 300 000 and 500 000 tons per year (Fig. 3), making it Namibia's most harvested resource by volume.

The fishery for monkfish has also shown a sustained increase throughout the 1990s and has become a valuable addition to the Namibian export market (Maartens and Booth 2001). Similarly, the two crustacean stocks, West Coast rock lobster and deep-sea red crab, are showing signs of recovery from their previously depleted states (unpublished statistics for rock lobster, Le Roux 2001 for red crab). Seals have increased in abundance during the decade, despite several periods of starvation and recruitment failure attributable to the temporary lack of available food, while seabird populations have in general fared poorly; indeed, several are considered vulnerable or endangered (Crawford *et al.* 2001, Kempner *et al*. 2001). The recreational fishery for surf-fish also previously suffered from overfishing, and efforts to regulate and reduce fishing effort are now hoped to be yielding signs of improvement in resource status (Holtzhausen *et al.* 2001).

Some new fisheries developed off Namibia during the past decade. For a brief period in the mid 1990s

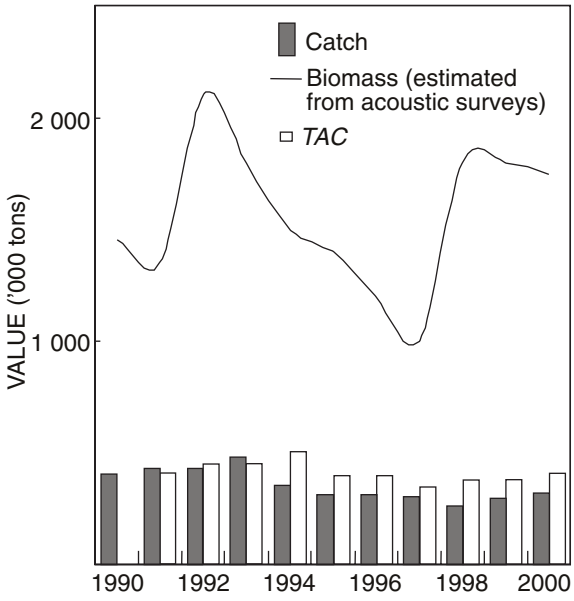

Fig. 3: *TAC*, catch and annual mean estimated biomass for horse mackerel (juvenile and adults combined) off Namibia during the 1990s (after Boyer and Hampton this volume)

Namibia's orange roughy resource attracted much local and international attention, with the discovery of several large aggregations. However the stocks were only able to sustain annual catches of around 10 000 tons for a few years, after which the stocks declined. Today the resource supports a relatively small, but still valuable, fishery (Boyer, Kirchner *et al.* 2001). Local fisheries for tuna, swordfish and sharks have all developed and are showing some promise for the future.

International cooperation

The basic monitoring and research on Namibia's marine resources has largely been conducted by Namibians, the work funded through levies on catches. The fishing industry has long recognized that high quality research and monitoring as well as rigorous control are the keys to a profitable and sustainable industry. As a result Namibia's fishing industry has often contributed in excess of its statutory obligations to research effort, either in making fishing records readily available to scientists or in providing fishing vessels from which surveys or experiments have been conducted.

The results reported in this volume would, however, not have been possible without the comprehensive support of a number of nations who have helped Namibia's own marine researchers develop into a modern scientific unit able to hold its head high in the presence of internationally respected practitioners of marine research and advice from much richer countries.

Norway, primarily through the Nansen Programme in Namibia, has provided the platform upon which much of Namibia's early marine research was conducted; its research vessel the *Dr Fridtjof Nansen*. Much of the *Dr Fridtjof Nansen* research effort was directed at assessing and monitoring the abundance of the commercially important resources, critical information to fisheries management. The Norwegians, primarily through the Institute of Marine Research in Bergen, also provided much of the technical expertise to support this research as well as training opportunities to raise the education and experience of Namibian fisheries biologists.

The German Technical Assistance Project (Deustche Gesellschaft für Technische Zusammenarbeit or GTZ), through the Institute for Baltic Sea Research (IOW) at Warnemünde and the Max Plank Institute (MPI) at Bremen, also provided valuable support to Namibia's marine research effort, mainly in the field of marine environmental science. This involved funding vessels to conduct research in Namibian waters, but also in the provision of much-needed equipment and training for Namibians.

Many other countries provided support for Namibia in developing its marine research capacity. Foremost are our neighbours, Angola and South Africa, who have fully supported Namibian marine research, including in the formation of the BENEFIT Programme (see below). South Africa, with its long history of marine science, has always been ready to provide support and to collaborate with its less experienced neighbours, not least of which was the generous offer to dedicate this volume to Namibian marine research. Japan, through the Japanese International Cooperation Agency (JICA) donated a research vessel, the *Welwitchia*, which today carries out many of the fisheries assessment surveys (often in tandem with commercial vessels) and also conducts a comprehensive environmental monitoring programme. Iceland, through the Icelandic International Development Agency (ICEIDA), supported the operation of this vessel for many years and also provided technical support to the Namibian researchers. Spain, France, the United Kingdom, the European Union, the United States of America and the United Nations Food and Agricultural Organization have all provided support, mainly through cooperative research activities and training.

The future

Owing to Namibia's desire to ensure the long-term sustainability of national and regional fish stocks, the Ministry of Fisheries and Marine Resources has played a central role in the formation of several international fisheries research and management organizations.

In 1997 the Benguela Environment, Fisheries, Interaction and Training (BENEFIT) research programme brought the marine biologists of the three countries bordering the Benguela ecosystem, Angola, South Africa and Namibia, together, and with support mainly from Norway and Germany enabled a holistic research approach to be taken towards understanding the dynamics of the Benguela ecosystem and the factors controlling the abundance of the living marine resources. As part of the BENEFIT programme, a hugely successful at-sea training programme for young scientists from throughout the southern African economic region was undertaken. That project was underpinned by financial and infrastructure contributions from the African Development Bank, South Africa and Namibia and generated a sister volume of research contributions published in the South African Journal of Science (Vol. 97(5 & 6), of May/June 2001).

Complementing BENEFIT, the World Bank, through the Global Environmental Facility, has approved funding for a 5-year Benguela Current Large Marine Ecosystem (BCLME) Programme. This programme, of which BENEFIT will guide the living marine resources research sector, aims to investigate anthropogenic impacts on the Benguela marine ecosystem, including all forms of utilization and the socio-economic consequences of the various management strategies applied. An underlying objective of the BCLME is to establish an ecosystem-wide management strategy, to be implemented through the formation of a Benguela Current Commission.

Recently the South-East Atlantic Fisheries Organization (SEAFO) was formed under Article VIII of the UNCLOS agreement relating to Straddling Fish Stocks and Highly Migratory Fish Stocks. SEAFO will coordinate the control and management of high seas fisheries outside of the EEZs of the countries bordering the Benguela Current. Namibia was one of the primary driving forces behind this initiative.

Summarizing, therefore, while the basic monitoring of Namibia's marine researchers will remain with Namibian fisheries scientists, understanding the processes affecting the resources will be investigated through international programmes attracting some of the world's best marine scientists to Namibia.

At Independence in 1990, Namibia had a limited capacity to research and manage its rich living marine resources. I am delighted to introduce this volume as a means of demonstrating how Namibian marine science has developed and matured, boding well, I believe, for the future of the northern Benguela ecosystem, the Namibian fishing industry, and the Namibian economy as a whole.

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