

16 MARINE FISHERIES MANAGEMENT IN NAMIBIA: HAS IT WORKED?

Paul Nichols

Abstract

The history of Namibia's fisheries is characterised by massive and uncontrolled fishing, primarily by European and Eastern bloc fleets, followed by near collapse of many stocks. This period was followed by a dramatic recovery of the resources following Independence in 1990, and the implementation of a resource management system, that incorporated a highly effective, cost-efficient system of monitoring, control and surveillance. Namibia's successful post-independence track record bears testimony to what a young developing nation can achieve if sufficient resources and political will are provided in support of fisheries management.

INTRODUCTION

Largely as a result of up-welling of the nutrient-rich Benguela Current, Namibia's waters are highly productive. Prior to Namibian Independence in 1990, uncontrolled fishing on a massive scale - perpetrated mainly by Spanish and Soviet vessels, and to a lesser extent vessels from Portugal, South Africa, Romania, Poland, Bulgaria, and Cuba - greatly reduced the abundance of all the major fish stocks.

During the 1960s South African factory ships undertook fish processing at sea outside the then 22-kilometre jurisdiction of Namibia's fisheries administration. Over-exploitation caused sardine catches to plummet; when the vessels turned to anchovy, that stock also plummeted.

From 1964 foreign interest in Namibia's offshore fishing grounds grew rapidly, with the advent of long-distance freezer trawlers (Bonfil *et al.*, 1998; Sumaila and Vasconcellos, 2000). For example, in 1964 a mere 47,600 tonnes of hake were caught, but by 1972 hake catches were reported to be 820 000 tonnes although the true catch figure was probably much higher.

The International Commission for Southeast Atlantic Fisheries (ICSEAF), established in 1969 with the intent of good management, was in reality used by many of its 17 member states to legitimise plundering of fish stocks in the southeast Atlantic, and particularly in Namibian waters. Namibia declined to become a member of ICSEAF at Independence, and the organization is now in the process of being formally disbanded.

BUILDING A MANAGEMENT REGIME

Finding itself at Independence with a heritage of systematically depleted fish stocks, the newly elected Government moved quickly to establish a fisheries administration - the Ministry of Fisheries and Marine Resources. The policy framework for the marine fisheries sector is set out in the White Paper of December 1991, titled "Towards Responsible Development of the Fisheries Sector". The White Paper sets the goal of fisheries management and development as being:

"To utilize the country's fisheries resources on a sustainable basis and to develop industries based on them in a way that ensures their lasting contribution to the country's economy and overall development objectives."

This goal is pursued through four main strategies: (a) rebuilding stocks; (b) building a national fishing and processing industry; (c) Namibianisation, to ensure that the benefits of rebuilding stocks and building a fishing industry in Namibia accrue substantially to Namibians through increasing ownership of companies and vessels, new job creation and replacement of foreign labour by Namibian labour (Armstrong *et al.*, this volume); and (d) empowerment, to ensure an equitable balance of participation and increasing employment for Namibians, especially the previously disadvantaged.

Once a policy environment had been set forth, an appropriate legislative framework was put in place. One of the first acts of Parliament was the Territorial Sea and Exclusive Economic Zone of Namibia Act of 1990, underlining the importance attached to fisheries. In 1992 Parliament passed the Sea Fisheries Act. Namibia subsequently signed up to a number of international fisheries conventions, agreements and arrangements. These new international obligations prompted a revision of the 1992 Act, which was replaced in 2001 by the Marine Resources Act (2000). Key elements of the management system defined in the policy and legislation are outlined below, and are summarised in the Annex.

MANAGEMENT MEASURES

Fishing rights

Fishing rights, or rights of exploitation, are the central element of the fisheries management regime. The Marine Resources Act 2000 states “No person shall ... harvest any marine resource for commercial purposes, except under a right...” The main purpose of fishing rights is to limit entry to the fisheries sector in order to protect the fisheries resources and maintain sustainable operations. In 2002 there were 152 right holders in the various Namibian fisheries. Fishing rights are granted for a period of 7, 10, 15 or 20 years depending on various factors, in particular the level of investment and the level of Namibian ownership of the enterprise. Fishing rights are not freely transferable in Namibia, so as not to undermine the Government’s goals of Namibianisation and empowerment within the sector. The total number of existing rights in 2002 was 163. The table below shows the number and duration of existing harvesting rights for each species.

Fishing rights were first introduced in 1994, for periods of 4, 7 and 10 years. In June 2001, duration of rights was changed from 4, 7 and 10 years to, respectively, 7, 10 and 15 years. A number of 4-year rights (awarded be-

Table 1: Number and duration of existing harvesting rights as at December 2002.

Fishery	Duration of rights						Total
	Four-year	Five-year	Seven-year	Ten-year	Fifteen-year	Twenty-year	
Hake	4	0	10	5	19	0	38
Monk	2	0	2	0	5	0	9
Horse mackerel	0	0	0	11	1	0	12
Large pelagic	4	0	1	3	11	0	19
Red crab	0	0	1	2	0	0	3
Rock lobster	5	0	0	1	15	0	21
Linefish	2	0	1	2	7	0	12
Orange roughy	0	0	3	2	0	0	5
Sardine	0	0	5	17	0	0	22
Mulletts	0	17	0	0	0	0	17
Seals	0	0	3	1	0	0	4
Guano	0	1	0	0	0	0	1
Total	17	18	26	44	58	0	163

fore 2001) are still current and will eventually be phased out once they expire. Five-year rights apply only to guano and mullet fisheries and will similarly be allowed to expire.

Fishing licences

All vessels are required to obtain a licence in order to fish commercially within Namibia's 200-mile exclusive economic zone (EEZ). All vessels that fly the Namibian flag are required to have a specific licence to harvest any marine resources in waters outside the Namibian EEZ.

The number of licensed vessels operating in Namibian waters from 1998 to 2002 is indicated in the table below. A total of 335 vessels were licensed for commercial fishing in 2002.

Table 2: Number of licensed vessels by fishery, 1998-2002.

Fishery	1998	1999	2000	2001	2002
Small pelagic	35	33	30	26	25
Demersal trawlers	85	97	111	128	114
Longliners	6	20	24	38	10
Midwater	25	26	26	24	20
Deepwater	5	6	5	3	6
Large pelagic	47	54	56	68	71
Linefish	25	27	26	22	26
Crab	3	3	2	2	2
Rock lobster	29	27	29	29	38
Monk					23
Total	260	293	309	340	335
Percentage Namibian	84%	80%	80%	68%	71%

Total allowable catches

Total allowable catches (TACs) are set for seven species: sardine, hake, horse mackerel, red crab and rock lobster, orange roughy and monk.

TACs are established annually on the basis of the best scientific evidence available of the size and structure of stocks as determined by the fisheries scientists employed by the Ministry. The purpose with the TACs is to ensure sustainable fishing operations; that the level of fishing effort does not undermine the status of each stock.

Table 3: Total allowable catches, 1990-2002 in tonnes.

	Sardine	Hake	Horse mackerel		Red crab	Rock lob- ster	Alfon- sino	Orange roughy	Monk
1990	40 000	60 000	150 000		n.a.	n.a.	n.a.	n.a.	n.a.
1991	60 000	60 000	465 000		6 000	1 200	n.a.	n.a.	n.a.
1992	80 000	90 000	450 000		6 000	100	n.a.	n.a.	n.a.
1993	115 000	120 000	450 000		4 900	300	n.a.	n.a.	n.a.
1994	125 000	150 000	500 000		4 900	130	n.a.	n.a.	n.a.
1995	40 000	150 000	400 000	(50 000)	3 000	230	n.a.	n.a.	n.a.
1996	20 000	170 000	400 000	(90 000)	2 500	250	n.a.	n.a.	n.a.
1997	25 000	120 000	350 000	(100 000)	2 000	260	10 000	12 000	n.a.
1998	65 000	165 000	375 000	(75 000)	2 000	300	0	12 000	n.a.
1999	45 000	275 000*	375 000	(50 000)	2 000	350	n.a.	6 000	n.a.
2000	25 000	194 000	410 000	(50 000)	2 000	350	n.a.	2 400	n.a.
2001	10 000	200 000	410 000	(50 000)	2 100	400	n.a.	1 875	13 000
2002	0	195 000	350 000	(40 000)	2 200	400	n.a.	2 400	12 000

Notes: n.a. means 'not applicable'. Figures in brackets indicate the portion of the TAC (column immediately to the left) of juvenile horse mackerel caught for fishmeal. *There was a change-over for the hake fishing year from a calendar year to the period May-April. As a consequence an interim TAC of 65 000 was given for the period January to April 1999, followed by a TAC of 210 000 for the new fishing year May 1999- April 2000.

Individual (non-transferable) quotas

Once a TAC has been set for a fishing season, it is distributed among the right holders in each fishery in the form of quotas. The main purpose with the quota allocation is to promote economic efficiency – to give companies sufficient knowledge about expected catch levels for the year for proper planning of their fishing activities. Quotas are not permanently transferable for the same reasons that rights are not transferable. Production of marine resources for the period 1998 to 2002 is given below.

The sardine stock remained low during 2002, and as a result a zero TAC was declared for the sardine fishery in 2002. The catch that appears in the table was taken as by-catch in the horse mackerel and anchovy-directed purse seine fisheries, despite strict controls that were in place to minimise sardine by-catch. Despite the low spawning stock biomass recorded in March 2002, recruitment from the 2001/2002 spawning season was excellent and the October 2002 survey estimated that the stock had increased to more than 360 000 tonnes, allowing a 20 000 tonne TAC to be issued in 2003.

Table 4: Harvest of the main commercial species, 1998-2002 (tonnes, except seals).

Species	1998	1999	2000	2001	2002
Sardine	68 562	44 653	25 388	10 763	4 160
Hake	150 695	164 250	171 397	173 277	154 588
Horse mackerel	312 422	320 394	344 314	315 245	359 183
Monk	16 429	14 802	14 358	12 390	15 174
Kingklip	2 211	3 706	3 922	6 607	7 210
Tuna	1 442	1 155	2 401	3 198	2 837
Crab	2 283	2 074	2 700	2 343	2 471
Rock lobster	350	304	365	365	361
Other fish species *	51 271	26 500	22 987	30 810	77 407
Total fish harvest	605 654	577 838	588 404	554 998	623 391
Seals (numbers)	29 475	25 161	41 753	44 223	40 000
Seaweed	8 973	6 600	829	800	500

* Other fish species include orange roughy, alfonsino, anchovy, sharks, sole, and line-fish species.

Fees

Fees form an important part of Namibian fisheries management. Their role is twofold: firstly, to earn revenue for the government, and secondly to create incentives that work towards the goals of the management system, both conservation and Namibianisation.

The most important are quota fees, which are payable on allocated quota. By-catch fees are applied in order to deter right holders from targeting species other than those for which they have been issued a quota. This is a feature of the Namibian management system that is not seen in many other countries. Such fees provide an incentive to avoid catching non-target species. By-catch fees are carefully balanced to discourage the capture of non-target species, but are also not so punitive as to encourage dumping. A certain percentage of by-catch is not levied, since a reasonable amount of by-catch cannot be avoided. A Marine Resources Fund levy is imposed per tonne of landed catch to finance fisheries research and training initiatives. Finally, licence fees are charged for all fishing vessel licences issued to vessels that fish within Namibia's waters.

Subsidies

The Namibian fishing industry is not subsidised. Namibia is strongly opposed to the subsidy policies pursued by other nations due to a belief that subsidies cause over-capitalisation, distort trade unfairly and ultimately lead

to over-fishing and the encouragement of illegal, unreported and unregulated (IUU) fishing practices (Millazo, 1998; Munro and Sumaila, 2002). Namibia instead prefers a system of taxation, applied especially through the quota fees, and this was one of the main attractions for implementing a rights-based system. On the one hand, the application of a rights-based system has led to healthier stocks, improved compliance and an efficient industry that supports proper fisheries management and earns healthy profits. On the other hand, limiting access to the resource and fishing mortality for each participant has provided a basis for extracting some of the profits.

Giving effect to international fisheries agreements

For any fisheries or international agreements entered into by Namibia, the Minister is empowered to make regulations necessary to give effect to such agreements. Texts of all conservation and management measures adopted under any international agreement to which Namibia is a party are published in the national Gazette, and thus such measures are then deemed to be a regulation as prescribed under the Act.

Monitoring, control and surveillance

On the day in 1990 that Namibia's 200-mile EEZ was declared, more than 100 foreign vessels were fishing illegally in Namibian waters. When other small coastal states had found it impossible to effectively control such operations in their EEZs, they faced little real alternative to sanctioning continuation of the foreign operations through licensing arrangements that did not leave them in real control.

Namibia, however, decided to put in place measures to reap the gains from sustainable utilization of its fisheries. During 1990 and 1991, 11 Spanish trawlers and one Congolese trawler were arrested for illegal fishing and successfully prosecuted; most of them were forfeited to Namibia by the Namibian courts. These actions sent a clear message to the international fishing community that Namibia was serious about establishing sovereignty over its new EEZ. There were a few further incidents of poaching after this, but effective monitoring, control and surveillance (MCS) and enforcement deterred poachers and improved compliance by licensed vessels.

Namibia's MCS system has evolved over the years into what is today widely regarded by the international community as a very effective system (Bergh and Davies, this volume). A crucial element has been the financial, human and material support from the Namibian Government. The costs to government and industry of MCS and other management activities have been kept commensurate with the value of the sector. From 1994 to 1997, the full cost to the Namibian Government of fisheries management, including fisheries research and MCS, was about 6 per cent of landed value; that

fell to 4.9 per cent in 1998 and 3.6 per cent in 1999, due to the increasing value of landed catch. This cost is appropriate to the economic value of the fisheries sector and reasonable when compared with the cost of other comprehensive and effective fisheries management systems elsewhere in the world (Sutinen and Kuperan, 1994).

An integrated programme of inspection and patrols at sea, on land and in the air ensures continuing compliance with Namibia's fisheries laws. The major features of Namibia's MCS programme are described below.

On-board observer programme - Emplacement of fisheries observers on board larger vessels serves to ensure both compliance and the collection of scientific data. Coverage rates range from 70% to 100%, depending on the fishery in question. The establishment of the new Fisheries Observer Agency under the Marine Resources Act (2000) should improve current capacities in this regard.

Sea, air and shore patrols - Systematic sea patrols aim to ensure compliance with fishing conditions by licensed vessels through regular at-sea inspections. Air patrols detect and deter unlicensed fishing vessels and monitor the movement and operations of the licensed fleet. Shore patrols ensure compliance by both recreational and commercial fishers with conservation measures for inshore resources.

Monitoring of landings - Complete monitoring of all landings at the two commercial fishing ports, Walvis Bay and Lüderitz, by onshore inspectors ensures compliance with quota limits and fee payments. Transshipping fish at sea between catching vessels and carrier vessels is prohibited – all fish must be landed at a Namibian port. This helps to ensure comprehensive monitoring of catches. The absence of an artisanal fisheries sector also helps to simplify monitoring of landings.

Vessel reporting - All vessels are required to supply EEZ exit and entry reports, as well as daily catch and effort reports via radio and in the form of vessel log-sheets.

Vessel monitoring system - Namibia is well advanced in implementing a national satellite-based vessel monitoring system (VMS). Once fully operational, the system will benefit fisheries management in real-time monitoring of vessel movement and activities. The system that has been chosen is already in use in the United Kingdom, Germany, United States, Morocco, and, closer to home, South Africa and Mozambique. Namibia is fully supportive of collaborating in the development of a cost-effective, regional VMS.

SOCIO-ECONOMIC IMPORTANCE OF THE SECTOR

Namibia's policy to encourage on-shore processing has seen the number of whitefish processing plants increase from zero in 1991 to around 20 in 2003. Direct employment in the sector has expanded to around 13 500 people. Of the 5 575 employed onboard fishing vessels, 68% are Namibians. The 8 000 shore-based workers are nearly all Namibians. In addition, Namibians now enjoy real economic prosperity through participation in the marine resources sector. Of the 163 rights in 2003, all except one are majority controlled by Namibians. At Independence, Namibians controlled only 17% of the hake quota – today Namibian control is around 96%. In horse mackerel the story is similar, rising from less than 14% to around 92%. In some fisheries, such as the small pelagic fishery and rock lobster, all quotas are in Namibian hands. The proportion of Namibian vessels increased from 50% in 1991 to 71% in 2002. At the same time the sector continues to attract foreign capital, skills and market access necessary for further development.

Although the contribution of income from marine resources to GDP has fluctuated over the years, mainly due to the unpredictable nature of the resource, it has shown an overall increase from N\$288 million (4%) in 1991 to N\$2 016 million (6.6%) in 2002. The value of fisheries production has also increased substantially since 1991, mainly due to an increase in the prices obtained in the export markets as well as value addition. Landed value has

Table 5: Indicative investments and socio-economic contributions made by right holders since Independence.*

Sub-sector	Investments (N\$)	Socio-economic contributions (N\$)	Total (N\$)
Demersal	1 203 153 010	16 472 599	1 219 625 608
Monk	296 165 000	2 066 241	304 631 241
Midwater	141 700 000	6 264 000	142 164 000
Small pelagic	262 480 000	6 769 000	269 249 000
Large pelagic	146 000 000	1 196 000	147 196 000
Linefish	12 023 000	65 000	12 088 000
Crab	14 400 000	N/a	N/a
Rock lobster	6 395 772	828 862	7 224 634
Total	2 082 316 782	33 661 702	2 115 978 484

* The figures in this table indicate the minimum level of investments and social contributions.

increased four times from N\$520 million in 1991 to N\$2 596 million in 2002. Final value has increased more than four times from N\$644 million in 1991 to N\$3 395 million in 2002. Since an estimated 97% of total fish production is exported, the value of exports closely follows the same trend as final value and has also increased substantially from N\$631 million in 1991 to N\$3 311 million in 2002 (Lange, this volume).

The marine fisheries sector has consistently been the second largest sector in the Namibian economy behind mining in terms of export earnings. A major export for our fisheries and marine resource production is the EU. According to the EU Market Survey (2002) for Fishery Products, the EU imported 99 410 tonnes of fish and fish products worth ca €250 million from Namibia, making Namibia the fourth-largest developing country supplier of fish to the EU in 2000 after Argentina, China and Thailand. Namibia was the largest developing country supplier of hake at 82 251 tonnes, worth ca €180 million.

A worthy achievement of the sector that goes largely unnoticed is the generous and continuing contributions that our fishing companies have made to social development schemes throughout the country. On a continual basis, our fishing companies provide money and other forms of assistance for the construction of schools, clinics and other much-needed civic facilities. The contribution of our fishing industry to these worthy causes over the past 11 years runs in excess of N\$33 million. The newcomer companies deserve special recognition. Despite being 'new' to fishing, they have managed to contribute in excess of about N\$11 million to these worthy causes.

REGIONAL AND INTERNATIONAL COOPERATION

Regional cooperation in fisheries management is enhanced through a number of mechanisms. The Southern African Development Community (SADC) is implementing two regional programs of particular relevance: the Regional Fisheries Information System Program, which aims to capture and disseminate timely, relevant, accessible, useable and cost-effective information to improve the management of marine fisheries resources in the SADC region; and the Regional Fisheries MCS Program, which aims to improve national capacity for efficient, cost-effective and sustainable MCS and to enhance regional cooperation on MCS and fisheries management.

A recent initiative is the SADC Protocol on Fisheries, which aims to promote responsible and sustainable use of the living aquatic resources and aquatic ecosystems within the SADC region.

A convention to establish the South-East Atlantic Fisheries Organization (SEAFO) was signed by nine states in Namibia on 20 April 2001, the first

such convention to be signed following the establishment of the 1995 UN Fish Stocks Agreement. SEAFO establishes a management regime for conservation and sustainable utilisation of fish, molluscs, crustaceans and other sedentary species in the high-seas portion of what is essentially FAO Statistical Area 47. It excludes those sedentary species that are subject to the fishery jurisdiction of coastal states, and tuna and tuna-like species that fall under the jurisdiction of the International Commission for the Conservation of Atlantic Tunas (ICCAT). Namibia joined ICCAT in 1999 and abides by its comprehensive management tools to curb IUU fishing targeting tunas.

As a member of the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR), Namibia complies fully with the CCAMLR catch documentation scheme to reduce IUU fishing in Antarctic waters.

PROSPECTS AND CHALLENGES

The recovery of stocks from their over-fished pre-Independence state has been variable. Hake and horse mackerel continue to recover. The sardine stock biomass, however, has been adversely affected by environmental factors since 1994 and is currently at a low level. Other stocks are responding positively to conservation measures and are either stable or growing slowly. However, the marine environment will continue to strongly impact fish stocks in a largely unpredictable manner.

The long-term outlook for the trading environment for Namibian fishing companies is generally positive. The healthy state of the demersal stocks (hake, orange roughy and monkfish) is fortuitous at a time when stocks in the waters of many of Namibia's competitors in the global whitefish market are clearly suffering from over-fishing. As a result of restricted supply, market prices are buoyant for high-quality products. Increased consumer awareness of the benefit of eating fish is also contributing to increasing world demand. Continued growth of demersal stocks and increased market demand suggest a very positive outlook for the sector. The position is less clear for the two other major fisheries: the pelagic (sardine) and midwater trawl (horse mackerel) fisheries. The midwater trawl fishery enjoys sustained catches but is facing market constraints and is consequently looking for new marketing opportunities. The future of the pelagic sector depends entirely on recovery of the sardine stock. Namibia's marine fisheries sector was badly affected by the strength of the Namibian dollar during 2003, as were all export-orientated industries, resulting in reduced profitability.

Namibia's marine fisheries will, of course, continue to develop and evolve. Potential exists for expansion within several fields of the marine fishing industry, e.g. value-added fish products and new fishing opportunities in

foreign waters. There will continue to be room for new investment by both new foreign and new domestic investors, but competition is fierce from those already in the industry, including from the many new companies that have entered the sector since Independence. Investors who are interested in Namibia's fishing or processing industries need to be well prepared and highly capable if they hope to secure successful trade and investment opportunities. With the recent enactment of the Aquaculture Act, 2001, a number of right holders are investing in aquaculture (fish farming). Aquaculture in Namibia has considerable potential, especially for the commercial production of high-value marine species, in accordance with current policy.

For its part, the Ministry of Fisheries and Marine Resources will continue to apply a responsible approach to fisheries management, by which it is hoped that stocks will continue to grow and support increased sustainable yields. There are a number of challenges to be faced, however. Reduced catches in many other important fisheries of the world, combined with growing demand for high-quality fish products, is expected to increase the risk of IUU fishing. Consequently the MCS role of the Ministry will become even more demanding than it is today.

Quality control in food industries will become increasingly stringent. As consumer awareness regarding fish quality increases, it will be essential for Namibian fish products to continue to meet the highest international standards. Plentiful harvests of fish are worthless if no consumers are willing to buy. Namibia has a reputation of a clean and environmentally unspoilt country and that image must be maintained at all costs.

Perhaps the most daunting challenge is human resource development. Sustained development depends on an enlightened and well-educated work force. The Government, together with other stakeholders, will continue its good work in educating the people of Namibia and preparing them to work in all dimensions of the marine sector and aquaculture. Related to human resource development is the prevention and combating of the spread of HIV/AIDS. This is one of the greatest tasks facing southern Africa and a concerted effort is needed, not only at a national level, but also at the regional and international levels.

CONCLUSION

Namibia's policy and legal framework for the marine fisheries sector has allowed the application of management strategies that are appropriate to Namibia's specific circumstances. The result has been the development of a business environment that has facilitated the growth of a healthy fishing and

processing industry that pays a fair price for the privilege of utilising Namibia's marine resources.

The Ministry of Fisheries and Marine Resources will continue to ensure that the environment for fisheries-related business and aquaculture is conducive to continued healthy rewards for those willing to invest. Namibia is keen to capitalise on the gains made since Independence to the greater benefit of Namibia and its citizens. Care will be required to ensure that the level of fishing is commensurate with the size of the stocks. If the current system of responsible management is maintained, Namibia's marine resources may be expected to yield sustainable benefits in perpetuity.

REFERENCES

- Armstrong, C.W., Sumaila, U.R., Erasmus, A. and Msiska, O. (2004): Benefits and costs of the Nambianization policy. In: *Namibia's Fisheries: Ecological, Economic and Social Aspects* (U.R. Sumaila, D. Boyer, M. Skogen, and S.I. Steinshamn eds.), pp. 203-214. Eburon, Delft.
- Bergh, P.E. and Davies, S. (2004): Against all odds: Taking control of the Namibian Fisheries. In: *Namibia's Fisheries: Ecological, Economic and Social Aspects* (U.R. Sumaila, D. Boyer, M. Skogen and S.I. Steinshamn, eds.), pp. 289-318. Eburon, Delft.
- Bonfil R., Sumaila, U.R., Munro, G., Valtysson, H., Wright, M., Pitcher, T., Preikshot, D., Haggan, N. and Pauly, D. (1998): Impacts of distant water fleets: an ecological, economic and social assessment. In: *The Footprints of Distant Water Fleet on World Fisheries*. Endangered Seas Campaign, WWF International, Godalming, Surrey, 122 pages.
- EU Market Survey 2002: Fishery Products (volume II). Centre for the Promotion of Imports from Developing Countries (URL: www.cbi.nl)
- Lange, G.M. (2004): Economic value of fish stocks and the national wealth of Namibia. In: *Namibia's Fisheries: Ecological, Economic and Social Aspects* (U.R. Sumaila, D. Boyer, M. Skog and S.I. Steinshamn, eds.), pp. 187-202. Eburon, Delft.
- Milazzo, M.J. (1998): Subsidies in World Fisheries: A Re-examination. World Bank Technical Paper, No. 406, Fisheries Series, Washington.
- Munro, G. and Sumaila, U.R. (2002): The impact of subsidies upon fisheries management and sustainability: the case of the North Atlantic. *Fish and Fisheries* 3: 233-290.
- Sumaila, U.R. and Vasconcello, M. (2000): Simulation of ecological and economic impacts of distant water fleets on Namibian fisheries. *Ecological Economics* 32: 457-464.
- Sutinen, J. and Kuperan, K. (1994): A socioeconomic theory of regulatory compliance in economics and trade. In: *Proceedings of the VIIth conference of the international institute of fisheries economics and trade volume 1* (ed. D. Liao), 18-21 July, pp 189-203, Taipei, Taiwan. National Taiwan Ocean University Press.

ANNEX : SUMMARY OF MAJOR FISHERIES MANAGEMENT MEASURES

Sustainability Measures (for biological and economic sustainability):

- Limited Entry in all fisheries: no fish may be taken for commercial purposes without a right.
- Limits on catches: TACs/Quotas covering 90% of landings.
- Quotas are issued as Individual Quotas to right holders.
- Limits on fishing effort: in some fisheries, limits on the numbers and size of vessels.
- Closed seasons: to protect spawning fish.
- Closed areas: to protect juveniles; no trawling in depths less than 200 metres; lobster sanctuaries.
- Minimum sizes and bag limits of fish that may be kept in recreational (non-commercial) fisheries: also to protect juveniles.
- Gear restrictions: including mesh size limits to protect juveniles, no beam trawling; no driftnets; no formation trawling; selectivity grids are currently being introduced into the hake fishery.
- Levies on by-catches: to control targeting of by-catch species.
- No discarding is permitted: all edible, marketable fish caught must be landed.

Control Measures:

- No transshipment at sea: all fish landed in Walvis Bay or Lüderitz – facilitates monitoring of catches and calculation of levies payable by all right holders.
- 100% weighing of fish landed or transshipped.
- 70-100% observer coverage, depending on fleet. Administration of observer programme by autonomous Fisheries Observer Agency.
- EEZ entry and exit reporting required by all vessels.
- Catch and effort reporting by all vessels (logbooks, daily radio position and catch report).
- Satellite-based Vessel Monitoring System being implemented for major fisheries.
- Mandatory for any vessel wishing to fish outside Namibian EEZ.

Industry Development Measures:

- Rebate system for landings by Namibian vessels, Namibian crew, onshore processing (to enhance).
- Compulsory levels of onshore processing.
- Preference in allocation of rights and quotas for ventures beneficially owned by Namibians.
- Affirmative action applied to allocation of rights and quotas in support of Namibianisation and empowerment.