

# **Management of shared hake stocks in the Benguela Marine Ecosystem**

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by

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# 1. INTRODUCTION

The Benguela Current Large Marine Ecosystem (BCLME) can be loosely considered as covering the continental shelf between the Angola-Benguela frontal zone in Northern/Southern Angola and the Agulhas retroflexion area, typically between 36 and 37 degrees South (Shannon and O'Toole 1998). It therefore covers the west coast of South Africa, the entire Namibian coast, and Southern Angola depending on the position of the Angola-Benguela front, which moves seasonally between 14 and 17 degrees South (see Fig. 1). The BCLME is one of the world's major, productive eastern-boundary currents. It is rich in both pelagic and demersal fish population, supported by plankton production driven by intense coastal upwelling (see Boyer and Hampton, 2001; Sumaila and Vasconcellos, 2000).

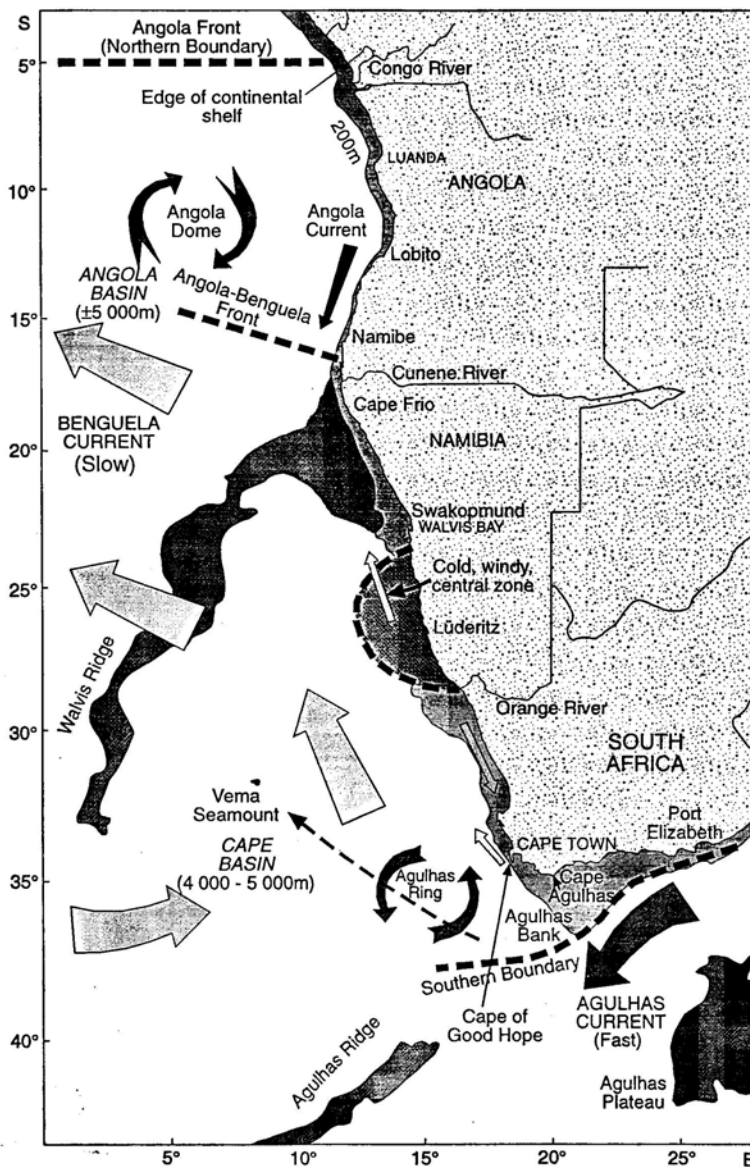


Figure 1: The Benguela Current Large Marine Ecosystem (BCLME)

A number of commercially important species in the Benguela Current Large Marine Ecosystem (BCLME) (e.g., hake, horse mackerel, deep sea crab, tuna, and to a lesser extent, sardine and anchovy) are distributed or move seasonally across national borders, and can therefore be classified as shared stocks. A fish stock is said to be shared if its populations extend across, or migrate across the Exclusive Economic Zones (EEZs) of adjacent countries, and the stock is fished by more than one of these countries. This case study focuses on the hake stocks in the ecosystem, which are shared principally by Namibia and South Africa, and to a lesser extent Angola.<sup>1</sup> This species has been classified by a recent review (RFIS, 2002) as a prime candidate for cooperative management in the South African Development Cooperation (SADC) region. In addition to its shared status, it is the most valuable commercial species exploited in the region.

## **2. FISHERIES IN NAMIBIA, SOUTH AFRICA AND ANGOLA**

Summary data on the economic value of Namibian and South African commercial fisheries in 1996 and 1997 respectively are set out in Table 1.

### **2.1 Namibia**

The fisheries sector is the third largest of the Namibian economy, behind agriculture and mining. The industrial fishery has generated more than 10% of the GDP in recent years, producing products to the value of N\$ 1 374 million in 1996. Exports were valued at N\$ 1 048 million in that year, making the sector the second-largest export earner behind mining. It is the second-fastest growing industry in the Namibian economy (behind tourism) with the value of production and exports now being some six times greater than at Independence.

The fisheries sector is extremely important in the social economy of Namibia, particularly in Walvis Bay, which is the major fishing port and where most of the processing plants are situated. Local employment in the sector grew rapidly after Independence, with an estimated 6 000 jobs having been created between 1991 and 1994. The integration of Walvis Bay into Namibia in 1994, and the removal of the uncertainty regarding the port's future, stimulated an influx of investment in the fishing industry and subsidiary service industries with a further growth in employment. The number of people directly employed in the fisheries sector since 1996 has been about 15 000, of which some 7 500 are fishermen. Of these 20% are foreigners, mainly employed in the horse mackerel and tuna fisheries, a proportion that has decreased from around 66% in 1993. It was projected that by the year 2 000, the total number of people employed in the fisheries sector would have risen to above 20 000. However, the almost total collapse of the Namibia pilchard fishery has limited employment opportunities in the catching and associated onshore canning industry (MFMR, 1994-2000).

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<sup>1</sup> Angola lands less than 0.5% of the total hake annual landings of *Merluccius capensis* and *Merluccius paradoxus*.

FISHERY	NAMIBIA (1996)		SOUTH AFRICA (1997)	
	Landed value (Million N\$)	Wholesale (processed) value (Million N\$)	Landed value (Million R)	Wholesale (processed) value (Million R)
Pelagic				
Canned fish			28.3	291.0
Fish meal & oil			45.8	66.6
Bait			3.4	8.4
Total	26.0	93.9	77.5	366.0
Demersal				
Bottom	593.3 *	718.1	406.1 **	1 000.5 **
Midwater	275.1	293.0		
Deep-water	94.2	171.1		
Longline			22.2	40.0
Total	962.6	1 182.2	428.3	1 040.5
Crustacean				
Rock lobster	13.0	20.2	50.9	102.2
Red crab	17.7	17.7		
Total	30.7	37.9	50.9	102.2
Line				
Tuna			10.3	12.9
Snoek			24.9	48.5
Other			32.7	44.7
Total	13.3	44.7	67.9	106.1
<b>Total</b>	<b>1 032.6</b>	<b>1 358.7</b>	<b>624.7</b>	<b>1 614.7</b>

**Table 1:** Value of major industrial fisheries in Namibia and South Africa in 1996 and 1997 respectively. Namibian data from MFMR. South African data from Stuttford (1998). Note: N\$1 = R1.  
\* Includes longline catches \*\* Includes midwater trawl catches.

In 2000 the Namibian fishery landed products valued at N\$ 2,159 million that after processing were valued at N\$ 2,852 (MFMR, 2000). The demersal fishery is the most valuable fishery in Namibia, representing 55-60% of these values. About 90% of the catch is either sea-frozen or wetfish hake. Monkfish make up most of the remainder, with the average landed value of the catch in recent years amounting to some N\$ 70 million per year (Olsen 1997). Almost the entire demersal catch is exported.

## **2.2 South Africa**

South Africa's living marine resources of the Benguela Current form the basis of a fishing industry which supports some 26 000 people (mostly in the Western Cape), and supplies food to the whole Southern African subregion. In 1998 the South African fishing industry caught a total of 678,125 tonnes of fish, shellfish and seaweed nationwide, of which more than 90% was taken from the Benguela. The wholesale value of the total processed output in this year was estimated at R 2,077 million, with an export value of R 1,350 million, which is less than the value of the Namibia fishery. Fishing is particularly important in the social economy of the Western Cape, where some entire coastal communities depend directly or indirectly on fishing for their livelihood. However, the fishing industry yields less than 1% of South Africa's GDP.

Economically, the trawl fishery is the most important sector of the South African fishing industry. Catches of hake, which amounted to 146 000 tonnes in 1998, usually contribute about 75% of the trawl catch and about 80% of its value. In 1998 the landed value of processed products from a total demersal trawl catch of 200 000 tonnes was R 473 million. The value of hake exports in 1998 exceeded R 880 million; some 43% of the total revenue from all South African fish and shellfish exports.

## **2.3 Angola**

The fisheries sector is very important in Angola, being the third-most important industry after oil and diamond mining. It provides nearly half of the animal protein of the country, and is an important source of employment and food to populations of the coastal regions, where it is often the only source of livelihood for the poorer population groups. Domestic consumption of fish, which was estimated at 11.1 kg per person per annum in 1994, is the highest in the region.

According to the results of a survey conducted in 1992, there were at that time around 30 000 workers directly involved in activities of the fisheries sector, of which some 18 000 were involved in artisanal fisheries. The remainder were involved in industrial fisheries and public administration. In addition, it was estimated that some 5 000 persons (mainly women) were involved in informal fish trade activities. A more recent report (Delgado and Kingombo 1998) puts the number of artisanal fishermen a few years later at over 23 000, and the number of people involved in informal fish trading at between 20 000 and 30 000. Current numbers directly involved in fishing (not including subsistence fishers) are estimated at 25,000 (Duarte, 2002 pers. comm.). Many artisanal fishers are not able to make a living solely from fishing, and supplement their incomes by, for example, agricultural and commercial activities.

At present, roughly half of the revenue from fish and fish products in Angola comes from exports, which varied in value between US\$ 27 million in 1993 and US\$ 46 million in 1995. Prawns are the most important product, making up 48% of the total revenue from the fishery sector in 1995, for example. The main export markets are Europe for prawns and demersal fish, African countries for small pelagic fish including horse mackerel, and Japan for tuna and crab.

In the following sections, the paper discusses the nature of the hake fisheries of the BCLME, explores the rationale for managing the hake stocks of the BCLME under cooperative agreement and describes some policy, institutional and research initiatives that are supporting the regional development of a shared management framework. One can use ecological, economic and legal arguments to make the case for the need for cooperative management of the hake stocks of the BCLME and these are briefly explored. Finally, a summary of problems and challenges that need to be resolved in order to put in place a mutually beneficial cooperative arrangement for the sustainable management of these valuable resources is given.

### 3. NATURE OF THE HAKE FISHERIES

Off Namibia and South Africa the Cape hakes *Merluccius capensis* and *M. paradoxus*, are mainly caught in bottom trawls, although important longline fisheries also exist in both countries and there is a developing small-scale hand line fishery off South Africa. Off Angola there is a relatively small bottom trawl fishery for Benguela hake *Merluccius polli* and *M. capensis* (in the extreme south), and more important ones in central and northern Angola for demersal species such as *Dentex spp.* and *Red pandora Pagellus belloti* and deepwater shrimp resources, that take by-catch of hake.

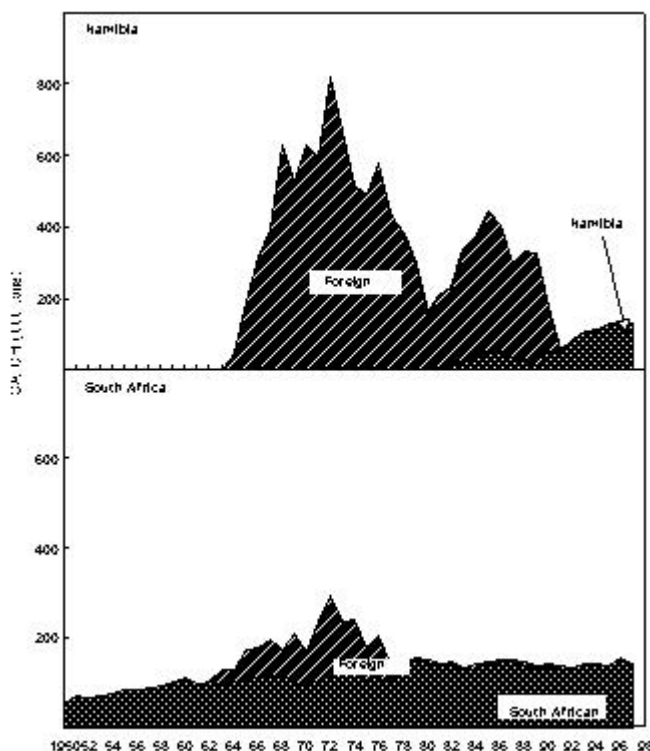


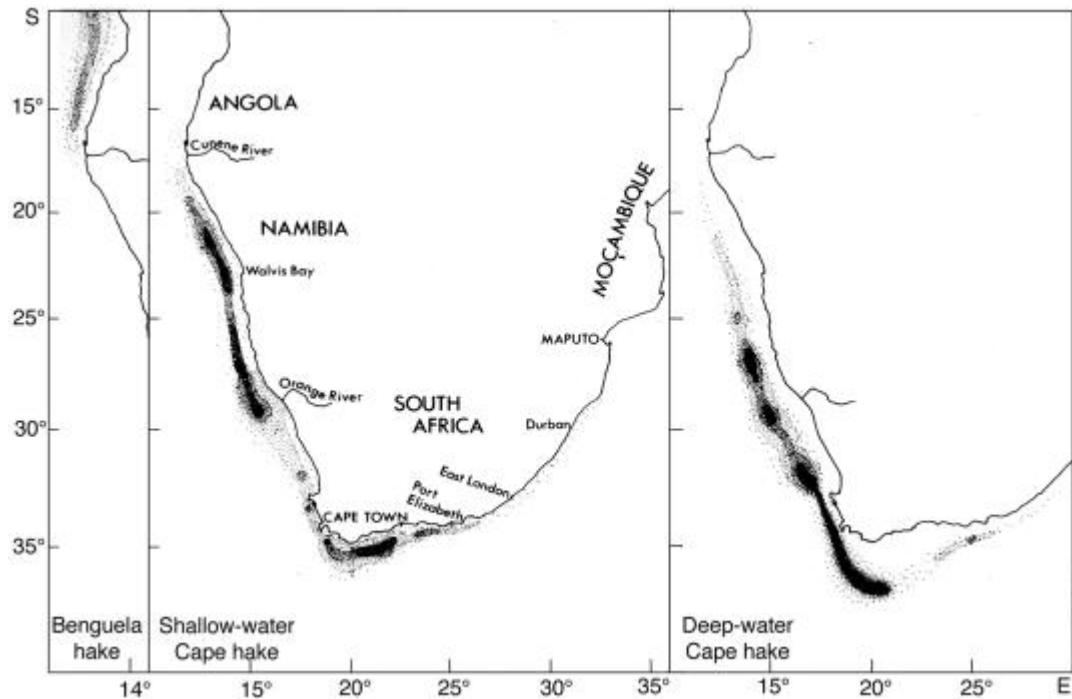
Figure 2: Catches of hakes off Namibia and South Africa by foreign and local fleets since 1950

Annual catches of Cape hakes (*M. capensis* and *M. paradoxus* combined) in Namibian and South African waters by local and foreign fleets since 1950 are shown in Fig. 2. Although the demersal fishery began around the turn of the century, catches prior to 1950 seldom exceeded 50 000 tonnes per annum, with most fishing effort being in South African waters. The Namibian fishery started in the late 1950s. In the early 1960s there was an explosive increase in effort and landings throughout the Benguela, with the arrival of foreign trawling fleets, and by 1972, the annual hake catch in the south-east Atlantic exceeded 1.1 million tonnes. Subsequently, catch rates and landings of hake declined sharply, and conservation measures were introduced, including the declaration of a 200-mile fishing zone by South Africa in 1977. Since then hake catches in South African waters have remained relatively stable at just over 140 000 tonnes per year. Off Namibia, hake catches between 1973 and Independence in 1990 averaged 500 – 600 000 tonnes annually, mainly taken by foreign fleets. At Independence, strict conservation measures were introduced, including the exclusion of foreign vessels. The hake catch is now taken exclusively by Namibian-registered vessels and the annual local catch has risen from 55 000 tonnes at Independence to around 200 000 tonnes over the period 1996 – 2002 (UNDP, undated.). Catches of *M. capensis* in Angola are of a lower order, amounting to less than 1 000 tonnes per year in recent years, catches of *M. polli* are higher, averaging between 20-40,000 tonnes.

### 3.1 Stock Distribution

The distributions of the three species of hake in the Benguela region are shown in Figure 3. *Merluccius polli* occurs predominantly in Angolan waters, and is caught on the shelf slope as a by-catch in the prawn fishery and by deep water trawlers in the south, where its distribution overlaps with that of the shallow-water Cape hake *M. capensis*. The two species of Cape hake are found throughout Namibian and South African waters. *M. paradoxus* (deep-water hake) occurs in deeper water than *M. capensis*, although the two species co-occur at intermediate depths (Payne 1989). Larger individuals of both species are found at greater depths than smaller fish, and there is little overlap in the distribution of mature fish. *M. capensis* is the more common species off Namibia, especially in the central region, although *M. paradoxus* has been increasingly abundant and more widely distributed there in recent years. *M. paradoxus* predominates off the west coast of South Africa. It is believed that this stock may be the origin of the Namibian *M. paradoxus* stock. A second population of *M. capensis*, which for management purposes is treated as a separate stock, exists in the extreme southern Benguela, chiefly over the Agulhas Bank.

Fig. 3 suggests that the West Coast stocks of both species are probably shared between Namibia and South Africa, although catch patterns between Lüderitz and the Orange River indicate that there may be a measure of separation between the Namibian and South African *M. capensis* stocks. In contrast, there is some evidence from surveys (e.g. Strømme 1996) and commercial catches that, since 1990, there has been a gradual migration or expansion of *M. paradoxus* into southern Namibia and farther north, probably from South African waters.



**Figure 3:** Distribution of the three hake species in the Benguela ecosystem (from Payne 1989).

### 3.2 Life History

Cape hakes spawn in midwater throughout the year, with a peak in early summer for both *M. capensis* and *M. paradoxus*, and a secondary peak in late summer for *M. paradoxus* in the southern Benguela. Most *M. paradoxus* spawning is thought to take place along the edge of the Agulhas Bank, but spawning also occurs over the shelf-break west of St Helena Bay and off central Namibia. In the latter region, *M. capensis* spawn most frequently between 160 and 250m depth, spawning starting earliest in the shallower waters. The eggs of both species are concentrated around the depth of the thermocline, and the dispersal of *M. paradoxus* eggs and larvae produced on the South Coast could be similar to that of the pelagic fish spawning there, resulting in young *M. paradoxus* being plentiful between Cape Columbine and the Orange River. To the north, 0-group *M. capensis* are particularly abundant off Walvis Bay, which appears to be a nursery area. Juveniles of this species are also plentiful off the Orange River and south to about Cape Columbine, sometimes co-occurring with pelagic fish recruits in winter, on which they feed (particularly on anchovy). As with the pelagic recruits, juvenile hake in the Orange River area move south as they grow older, but unlike them they tend to move offshore as they move south.

This section demonstrate the need for cooperation with regards to the hakes stocks because it clearly shows that the hakes caught in South Africa, Namibia and to a very small extent Angola, are essentially from the same pool, that is, they are shared.

### 3.3 Policy and Legal Background

There is a range of national, regional and international legal requirements that when instituted fully makes it virtually impossible for countries exploiting shared stocks to meet their obligations in this regard, without entering into some form of cooperative

agreements. The relevant legal frameworks and their reference to the countries bordering the BCLME are briefly explored below.

### *3.3.1 The National Framework*

In all three countries bordering the Benguela Current it is national policy to utilise living marine resources on a sustainable basis for the benefit of the nation, and to manage them according to scientific information and principles. Ultimate responsibility for control measures rests with the State in all three countries.

In Namibia, a 200 nautical mile Exclusive Economic Zone was declared at Independence in 1990, followed by the promulgation of a new Sea Fisheries Act in 1992, and the introduction of a new national policy on exploitation rights and quota allocation in 1993. A major emphasis has been placed on Namibianization of all sectors of the fishing industry and the building up of local research and management capacity. Namibia has established a Sector Coordinating Unit supported by the Ministry of Fisheries and Marine Resources to discharge her responsibility as the country responsible for coordinating marine fisheries activities for the SADC region.

In South Africa a new Act (the Marine Living Resources Act of 1998) has recently been promulgated. It includes in its objectives the achievement of broad and accountable participation in decision-making processes, and the restructuring of the fishing industry to redress historical imbalances and achieve equity within the industry. A Consultative Advisory Forum (CAF), is responsible for advising the Minister of Environmental Affairs and Tourism, on the management and development of the fishing industry (including the setting of TACs), research direction and allocation of a Marine Living Resources Fund. The Fund receives income from levies, licences, penalties and other sources, which permits its disbursement to spheres of fisheries management (e.g. administration, compliance) other than only research and development.

In Angola the nation's marine and inland fisheries are managed and developed in terms of the Fisheries Act, which was developed with the assistance of the FAO and promulgated in 1992. The Act covers such aspects as fisheries management (which is implemented through various Executive Decrees governing different sectors of the fishery), planning and licensing, the control of the quality and export of fish products, and surveillance and enforcement. In recent years, with the move to a market economy in Angola, and the privatisation of large State-owned companies, the State has limited its activities to the management of the resources, surveillance, support of development and the creation of infrastructure.

### *3.3.2 Regional Initiatives Supporting the Management of Shared Stocks*

Of particular interest to the management of shared stocks are a number of initiatives that have been supported and developed within the framework of the Southern African Development Community (SADC). These initiatives are briefly explored below with particular relevance to their impact on the:-

- knowledge about resource distribution and movement;
- mandate for management

- political will to promote cooperative management
- institutional arrangements;
- decision criteria for the allocation of shared resources;
- access provision for new entrants and membership and participation rights; and,
- sharing fisheries management functions and responsibilities.

*The Southern African Development Community (SADC)*

SADC was established to facilitate cooperation amongst its 14 Member States in all areas necessary to further regional development and integration, including fisheries (SADC Treaty, 1992). To coordinate sectoral activities 21 Sector Coordinating Units (SCU) were established and responsibility for marine fisheries was delegated to Namibia. Currently, a total of eight coastal Southern African and Indian Ocean Island states are members of SADC, thereby putting the entire coastline of both sides of the Southern African subcontinent under the auspices of SADC. Such geographical coverage gives the SCU an important role in facilitating the development of transboundary management of the region's shared stocks. Since its establishment the SCU has had responsibility for coordinating the development and implementation of a Programme of Action (POA). The POA contains a number of projects that directly support the development of future management of shared stocks within the region. In fact, all of these projects specifically recognise the importance of shared stocks management and all have a mandate to address particular aspects of the required transboundary management framework. The POA includes the: -

- (i) Regional Fisheries Information Systems Project (RFIS);
- (ii) Monitoring, Control and Surveillance of Fishing Activities Project (MCS);
- (iii) The Policy Harmonisation Project;
- (iv) BENEFIT Programme; and,
- (v) The Assessment of Marine Fisheries Resources of the SADC Region (which is being implemented through the recently initiated Benguela Current Large Marine Ecosystem Project and the Agulhas and Somali Current Large Marine Ecosystem Project – which is currently being developed).

As its name would suggest RFIS is seeking to improve the management of the regions fisheries by improving the effective use of information. Two areas of the project's work are particularly relevant here. The project supports an information management specialist within the BENEFIT Secretariat (which directly covers the geographic area of the Benguela Current region) and has commissioned a review of information available that would underpin the wider recognition of the need for transboundary management within the region. The review aims to provide background information on the state of shared stocks in the SADC region, which will form the basis for a regional workshop. The aim of this workshop (which will be supported and involve contributions from all of the regional projects) will help set priorities for future actions with regard to the development of appropriate and effective shared stocks management framework within the SADC region.

The MCS project is seeking to not only develop national capacity in all aspects of MCS but is specifically seeking to provide solutions for transboundary management issues. Project activities will include developing a regional vessel registry, improving

planning capacity to address regional deployment of MCS assets and providing legal support to address transboundary legal issues such as hot pursuit, long-arm jurisdiction and grey zones.

A recent product of the Policy Harmonisation project is a comparative analysis of legal frameworks of SADC coastal states (see Kuemlangan 2001). The objective of this study is to facilitate the harmonisation of marine fisheries laws between SADC member states, in particular, regarding management of shared stocks.

The BENguela Environment Fisheries Interaction and Training (BENEFIT) Programme is a regional marine research and training programme involving Angola, Namibia and South Africa. The Programme is aimed at improving knowledge and understanding of the dynamics of key commercial stocks in the Benguela (primarily hakes, horse mackerels, small pelagic fish and crustaceans) and of linkages between environmental processes and stock dynamics, with the broad objective of improving management of these resources. BENEFIT has the full support of the Angolan, Namibian and South African governments, and of SADC, all of which are represented on a Policy Committee, which guides the Programme through a network of Committees and Working Groups, on each of which all three countries are represented. International scientific guidance is provided by a Scientific Advisory Panel, on which France, Germany, Norway, South Africa, USA and the United Kingdom are represented. All the projects and training undertaken through BENEFIT are regional and will directly support either an improved information base or capacity development that will in turn underpin transboundary management (UNDP, undated).

The Benguela Large Marine Ecosystem Project is an initiative supported through the Global Environmental Facility (GEF) and will strive to foster holistic approaches to ecosystem management. Key areas being addressed include living marine resources, environmental processes, pollution and biodiversity. The project is seeking to address not only problems that have an ecosystem impact but also problems that arise because of their transboundary nature (e.g. such as shared stocks). It is envisaged that there will be close links between the BENEFIT and BCLME Programmes, which although differing in emphasis and scope, will be mutually complementary. An important goal of the BCLME project is to facilitate the establishment of a Benguela Current Commission, which would provide for the institutional basis for future transboundary management (UNDP, undated).

#### *The SADC Protocol on Fisheries*

Underpinning SADC's sectoral approach is an obligation to develop binding regional policy frameworks. One of the recent (2002) key outputs from the sector that has been facilitated by the SCU has been the SADC Protocol on Fisheries. All 14 Member States are signatories to this Protocol and states are seeking to incorporate the provisions into national legislation and activities, with three already ratifying the Protocol. The Protocol invokes all recent international legislation, agreements and codes and contains a number of provisions, which explicitly refers to cooperative management of shared stocks by countries in the region. The objective of this Protocol is to promote responsible and sustainable use of the living aquatic resources and aquatic ecosystems of interest to State Parties. Article 4 of the Protocol goes on to state that Subject to Article 5, responsibility for the implementation of the SADC

Protocol is primarily national, but in the case of shared resources, State Parties shall co-operate with one another to ensure that the objective of this Protocol is achieved. Article 5 states that State Parties shall take measures, at national and international levels, suitable for the harmonisation of laws, policies, plans and programmes on fisheries aimed at promoting the objective of the Protocol. Article 7 of the Protocol is specifically on the management of shared stocks. Finally, Article 18 relates to the requirements of collecting and sharing information necessary to promote transboundary management.

The Protocol provides for a binding policy framework, which accommodates all recent international provisions seeking to improve natural resource and ecosystem management. It therefore sets out a binding and fundamental commitment to shared stocks management and will provide a framework against which individual and collective action by Member States can be monitored.

### *3.3.3 The International Framework*

Angola and Namibia are signatories to the FAO Code of Conduct for Responsible Fishing. South Africa is yet to sign, but has agreed in the interim to abide by its provisions.

Angola, Namibia and South Africa have all ratified UNCLOS and have voted in favour of its Convention on Transboundary and Highly Migratory Stocks, and the United Nations Implementing Agreement (UIA). Subject to that Agreement, Angola, Namibia and South Africa, along with the United Kingdom (acting on behalf of its Overseas Territory St Helena and its island dependencies of Ascension and Tristan da Cunha), have formulated the South East Atlantic Fisheries Organisation (SEAFO) for the conservation and management of straddling and High Seas stocks in the South-east Atlantic. Other parties to SEAFO include the European Union, Japan, Norway, Russia, Ukraine and the USA. The Agreement has been signed and is the first Agreement concluded under the UIA.

Angola and South Africa are both long-standing members of the International Commission for the Conservation of Atlantic tunas (ICCAT) and Namibia is about to join the organisation.

Namibia and South Africa are both members of the Convention for the Conservation of Antarctic Living Marine Resources (CCAMLR).

### *3.3.4 Summary*

The common stated objective of all the relevant international regional and national legislation and policy frameworks is to promote the 'responsible and sustainable' use of marine resources. This can only be attained in the case of shared stocks through negotiated, cooperative agreements between the relevant participating countries.

Given the regional importance of the hake fishery, particularly for Namibia and South Africa, considerable social and economic benefits will be lost to the citizens of each country if they continue to manage the resource independently.

#### 4. ECONOMIC RATIONALE FOR SHARED MANAGEMENT OF HAKE

From the discussion in section 2, it can be seen that the fisheries sector ranks high in national importance in Namibia. For instance, fish products can account for up to a quarter of all exports (second only to diamonds), and 5.2-7.9% of GDP (Tapscott, 2001 and MFMR, 1996-2000). Even though the same cannot be said in the case of South Africa (only about 0.5% of GDP is contributed by the fisheries sector), and exports are smaller than those of Namibia. The industry is however an important source of revenue and food in coastal areas, especially in the Western Cape Province, where about 90% of all South African hake are landed. The fishing sector is an influential source of employment in Namibia, although, in this regard, the fishing sector makes a much smaller contribution to the South Africa nationally. Fishing in Angola is less important in terms of formal economic activity but is essential to the social fabric of the country in terms of employment and food security. All in all, the fishing sectors in Namibia, South Africa and Angola are economically and socially important. Even in South Africa, where the economy is much more diverse, the socio-economic incentives of optimising resource rent from the hake fishery are significant.

Many *economic* studies have demonstrated that the outcome to fishing nations of non-cooperation is of unquestionable undesirability when they exploit stocks that may be considered shared. Munro (1979) demonstrated the gains that can result from cooperative management when two countries (i) with different harvesting cost, (ii) face different selling prices for fish caught, and (iii) have different discount rates, exploit a shared stock. Fisher and Mirman (1996) show how natural interaction between fish species (e.g., predator-prey, relationships) can lead to heavy losses if such species are managed non-cooperatively. Even when a given fish remains within the national borders of a country, there are gains to be made from cooperative agreement if different groups of fishers operate in the fishery. For instance, Sumaila (1995) showed that when two different types of vessel gears with different selectivity patterns are employed to exploit the same stock of fish, cooperative management yields some significant gains. With respect to the shared hake stocks of the BCLME, preliminary work by Armstrong and Sumaila indicate that the potential cost of non-cooperative management of the hake stocks of the BCMLE is significant; probably amounting to about 25% of (????) the discounted rent that is currently being obtained by Namibia and South Africa (Armstrong and Sumaila, *in press*).

## **5. LESSONS LEARNED: SUCCESS, PROBLEMS AND POTENTIAL SOLUTIONS**

### 5.1 Knowledge about resource distribution and movement

Knowledge about resource ecology is the basic building blocks needed for developing a meaningful cooperative agreement for the management of the hake stocks. One reason for the lack of agreements for cooperative management of shared stocks in the SADC region to date is the lack of adequate knowledge about the distribution and movement of the fish stocks found in the regions waters.

A number of gaps in scientific understanding of the dynamics of the Benguela Current's marine resources have been reported (UNDP, undated). Briefly, they can be summarised as:

- Inadequate definition of stocks and understanding of factors affecting the separation and/or interchange between them, especially for stocks which are shared between countries or move between them, such as hake. Lack of this information makes it difficult to manage these resources on a national basis and is likely to complicate any attempts at regional management.
- Inaccurate or non-existent information on basic biological characteristics such as growth and natural mortality rates, reproductive characteristics, recruitment variability and population age structure for most of the harvested species. These are important input parameters for population dynamics models used in the region (which are themselves often inadequate). A particular problem for most species is the inadequacy and lack of validation of ageing techniques.
- Inadequate absolute estimates of population size and questionable indices of population trends for hake, due to deficiencies in the methods used to obtain these estimates. Furthermore, few attempts have been made to assess the accuracy or precision of the estimates, making it difficult to assess their value.
- The lack of Operational Management Procedures based on population models is seen locally as a serious problem, precluding any meaningful form of risk analysis or quantitative evaluation of harvesting strategies for these resources. This is a particular problem in Angola, and to a lesser extent, Namibia.
- Inability to predict the effect of environmental perturbations on resource dynamics for any species with sufficient confidence for the predictions to be used quantitatively in resource management.

Those of the above which are transboundary problems for hake management are summarised in Table 2. Included in the Table is an indication of the immediate and root cause of each of the problems listed.

Issue	Problem	Immediate cause	Root cause
Management of hakes (South Africa/ Namibia)	Inadequate information on identity of <i>M. capensis</i> and <i>M. paradoxus</i> stocks in southern Benguela	Lack of transboundary surveys	Lack of regional agreement(s) and structures under which transboundary surveys could be organised. Shortage of funds and manpower for surveys
	Inadequate understanding of life history (spawning areas, larval dispersal patterns, migration of juveniles and adults etc.)	Lack of ichthyoplankton surveys and migration studies in both Namibia and South Africa	Shortage of funds and manpower for surveys and data analysis. Low priority given to ichthyoplankton work. Lack of structures for organising transboundary surveys and collaborative migration studies
	Questionable comparability of stock estimates in Namibia and South Africa	Different survey techniques, sampling gear and ageing methods. Different interpretations of commercial catch data	Inadequate intercalibration and comparison of techniques. Lack of regional structures for standardising methods
	No unified Operational Management Procedure  or common exploitation control methods	Different approaches to management and exploitation control in the two countries, and different level of modelling skills	Different national exploitation policies and constraints. Lack of structures for regional resource management. Shortage of modellers, particularly within NatMIRC
Inadequate understanding of effects of transboundary environmental perturbations on abundance, distribution, behaviour and production	Lack of studies on interaction between hake and their environment on appropriate scales	Shortage of funds, vessels and staff for appropriate monitoring and dedicated behavioural studies	

**Table 2.** Immediate and root causes of major transboundary problems in the management of the region's hake resources.

Without the above knowledge and information, it becomes difficult to act. Fortunately, current efforts coordinated through the SCU's POA are attempts to provide the relevant information needed (See the section above and RFIS, 2002).

## 5.2 Mandate for management.

Although there is currently no transboundary management of shared stocks in the Southern African region (RFIS, 2002), a mandate for the development of such measures clearly exists. Not only is this mandate enshrined in the national legislation of South Africa, Namibia and Angola there is also an international obligation arising from the various international instruments they are party to. More fundamentally, a clear mandate is also enshrined within the Protocol on Fisheries, which explicitly commits all SADC states to transboundary management.

## 5.3 Political will to promote cooperative management.

Given the current level of activity on the development of management frameworks for shared stocks in the SADC, including the recently signed Protocol on Fisheries, there is clear political will to address the issue. In the particular case of hake, the fundamental importance of these stocks in Namibia and South Africa both economically and socially would suggest that this political momentum should support the implementation of transboundary management.

From our understanding of the economic and social importance of the fishing sectors in the two countries, it would seem that Namibia is likely to have strong political interest in the cooperative management of the hake stocks of the Benguela Current Ecosystem. In South Africa, even though the national contribution of the sector economically and socially is relatively smaller, the concentration of the hake sector in Western Cape will raise its political profile in that region. The South African and Namibian fishing industries have also attracted a good deal of political attention as an industry with potential to provide employment and income to groups previously disadvantaged through apartheid policies.

## 5.4 Institutional arrangements

There are currently no formal institutional arrangements specifically in place for the cooperative management of hake by South Africa and Namibia. However, there are a number of national, regional and international arrangements that can serve an interim function in this regard, while more specific arrangements are made. The government institutions are charged with the responsibility to manage the fisheries resources in a 'responsible and sustainable' manner. This implies in the case of shared stocks that these institutions have to work to ensure the cooperative management of these resources. Indeed, South Africa and Namibia already carry out regular management liaison meetings on species of common interest, including hake. These meetings could easily contribute to the basis for future shared management agreements between the two countries. The cooperative involvement of South Africa, Namibia and Angola in the development and implementation of the BENEFIT Programme and the development of the BCLME project are also useful signs that joint decision making is well established. At a regional level it is proposed that a Benguela Current Commission be established to take on the mantle of managing transboundary issues

within the BCLME. This regional commitment has also been manifest at the international level, the Southeast Atlantic Fisheries Organization (SEAFO) has recently been created to deal with the joint management of transboundary and high seas fishery resources in the region. A fundamental basis for the successful and speedy formation of this Organisation was the commitment of the four coastal states involved to the principles and process of collaborative management.

#### 5.5 Decision criteria for the allocation of shared resources.

Because there are currently no formal cooperative management arrangements for hake, there are no decision criteria for sharing the benefits of cooperation. While there are undoubtedly many useful experiences to be drawn upon from past and current regional initiatives this area probably represents the most pressing gap to be addressed. Determining the allocation criteria and procedures for their implementation is probably the most difficult task to undertake regarding shared stocks management. In essence this will also determine the shape and content of the management framework that will be acceptable and will have implications for almost all of the related management processes, including those concerned with institutional structures and research.

In many instances the scope and depth of the decision making criteria that will be acceptable to the states will determine the requirement for supporting information systems, particularly those that might be driven by the need for long-term research.

In order to be able to understand the implications of one set of decision criteria over another the up and downstream costs and benefits must be clearly understood. To lay the foundations for this, some initial economic research will be essential to assess these (e.g. see Nash 1953 and Munro, 1979).

#### 5.6 Access provision for new entrants and membership and participation rights

In the case of hake, this point does not seem to be initially very relevant. This is because hakes are essentially transboundary and are not caught by high seas fisheries. The key point here, in our opinion, is how an agreement between Namibia and South Africa, the principal exploiters of the resource, should be designed to make room for Angola, a relatively minor participant currently. Such provisions are of some relevance within the Benguela Current as environmental variability can significantly affect the distribution patterns of the exploited resources. The changes in the distribution of *M. paradoxus* which has increased the Namibian fisheries dependence on recruitment derived from South Africa has already been noted. Further environmentally driven events may result in continued changes to the distribution patterns of the Cape Hakes and an increasing abundance off Angola. There are lessons to be learnt from the agreement between Norway and Russia on the management of the shared Northeast Atlantic cod stocks. In that case, the two principal countries exploiting the resource, namely, Norway and Russia, determine the allocation of the TAC to both themselves and third countries - mainly EU member countries who are 'minor' exploiters of the resource (see Armstrong and Sumaila, 2001).

### 5.7 Sharing fisheries management functions and responsibilities

This is an important issue that needs to be adequately addressed to ensure that any cooperative arrangement will be successful. The activities of the previously noted regional projects, particularly those that involve the development and deployment of shared resources, will contribute to finding solutions to this issue.

## 6. CONCLUDING REMARKS

This paper has discussed the need to management the shared hake stocks of the Benguela current ecosystem from ecological, economic and legal points of view. The paper also shows that even though there are currently no formal agreements for managing the hake stocks, the basic foundation for the development of such agreements has already been laid. The contribution then proceeds to discuss a number of issues related to the success, problems and challenges that need to be resolved in order to bring into being cooperative management of this important fish stocks of the Southern African region.

A number of priority areas for actions are suggested below: -

- Initiate discussions on the institutional structures and arrangements that will be responsible for shared stock management in the Benguela Current;
- Undertake economic research that will underpin the selection of decision making criteria for the hake fishery, including the cost-benefits of the supporting information systems and monitoring, control and surveillance operations that particular management frameworks will require;
- Ensure that current research is prioritised to addressing gaps that limit the development of shared stock management frameworks; and,
- Develop and put in place a unified operational management procedure for hake.

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