II-4 Agulhas Current: LME #30

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The Agulhas Current LME is located in the southwestern Indian Ocean, encompassing the continental shelves and coastal waters of mainland states Mozambique and eastern South Africa, as well as the archipelagos of the Comoros, the Seychelles, Mauritius and La Reunion (France). At the centre of the LME is Madagascar, the world's fourth largest island, with an extensive coastline of more than 5000km (McKenna and Allen 2005). The dominant large-scale oceanographic feature of the LME is the Agulhas Current, a swift, warm western boundary current that forms part of the anticyclonic gyre of the South Indian Ocean (Lutjeharms 2006a). This LME is influenced by mixed climate conditions, with the upper layers being composed of both tropical and sub-tropical surface waters (Beckley 1998). Large parts of the system are characterised by high levels of mesoscale variability, particularly in the Mozambique Channel and south of Madagascar. About 1.5% and 0.3% of the world's coral reefs and sea mounts, respectively, occur in this LME, which covers an area of about 2.6 million km², 0.64% of which is protected (Sea Around Us 2007). The coastal zones of both mainland and island states are characterised by a high faunal and floral diversity. At least 12 of the 38 marine and coastal habitats recognised as distinct by UNEP are found in every country of the LME, with Mozambique having 87% of habitat types (Kamukala and Payet 2001). Most of the Western Indian Ocean Islands exhibit a high level of endemism, with Madagascar classified as the country having the most endemic species in Africa, and the 6th most endemic species for a country, worldwide (UNEP 1999). The major mainland estuaries and river systems in this LME include the Mangoki and Zambezi, and provide considerable freshwater and sediment input into the coastal zones, particularly during seasonal tropical cyclone events..

I. Productivity

Lutjeharms (2006b) has provided descriptions of the oceanography and hydrology of the coastal oceans off southeastern Africa and their influence on biological productivity and biota.

The Agulhas Current LME is a moderately productive ecosystem (150-300 gCm^{-2}year^{-1}). It is a dynamic region of nutrient cycling, localised upwelling and associated fisheries potential (Bakun *et al*. 1998, Lutjeharms 2006b). For instance, the region directly to the east of Madagascar has been shown to have a seasonal, deep-sea phytoplankton bloom (Longhurst, 2001) for which the causes are still being debated. Furthermore, episodic upwelling of colder water on the shoreward edge of the Agulhas Current has been shown to create a favourable environment for pelagic clupeoid fishes (Beckley 1998). Such localised, intermittent upwelling has also been observed at specific offsets in the coastline in the Mozambique Channel and at the southeastern tip of Madagascar (Lutjeharms 2006a). An upwelling cell observed at Angoche in Mozambique had the highest chlorophyll density in the Mozambique Channel; off Madagascar the chlorophyll is concentrated in a subsurface maximum. The ecosystem impact of these marked upwelling cells remains unknown due to very few observations. The Agulhas Current furthermore plays an important role in the southward dispersal of early life history stages of tropical fish species.

The movement of water in the Mozambique Channel is, by contrast, dominated by eddies. Intense anticyclonic eddies are formed at the narrows of the Channel and move steadily southward. Cyclonic eddies are formed south of Madagascar and may in turn move equatorward on the eastern side of the Mozambique Channel. These eddies seem to have disparate effects on the local ecosystems. It has been noted (Weimerskirch, 2004) that top marine predators feed preferentially at the edges of the anticyclones. It has also been noted in satellite remote sensing of ocean colour (e.g. Quartly and Srokosz 2004) that passing eddies may draw out more productive water from adjacent shelf regions into the deep ocean. The contribution these different processes make to the general productivity of the region is as yet not known. The primary flow of near-bottom water in the western Indian Ocean is South-East through the discordance zone in the Southwest Indian Ridge, via the Crozet Basin, northwards into the Madagascar basin, then into the shallower Mascarene basin, through the Amirante trench to the Somali basin (Schmitz 1996).

The LME is considered a distinct biogeographic province of the Indo-West Pacific, with high levels of biodiversity and regional endemism in coastal habitats. Inhabiting the LME are at least 20 species of cetaceans, five species of marine turtles, numerous seabirds, as well as an important remnant population of the threatened dugong. The LME is also home to the CITES-listed coelacanth (*Latimeria chalumnae*), which belongs to a group of primitive fish earlier believed to be extinct.

Ocean currents: The greater Agulhas Current system may be considered to consist of five generic parts: a source region, the northern Agulhas Current, the southern Agulhas Current, the Agulhas retroflection and the Agulhas Return Current, each of which has a different influence on the marine ecosystem (Figure II-4.1).

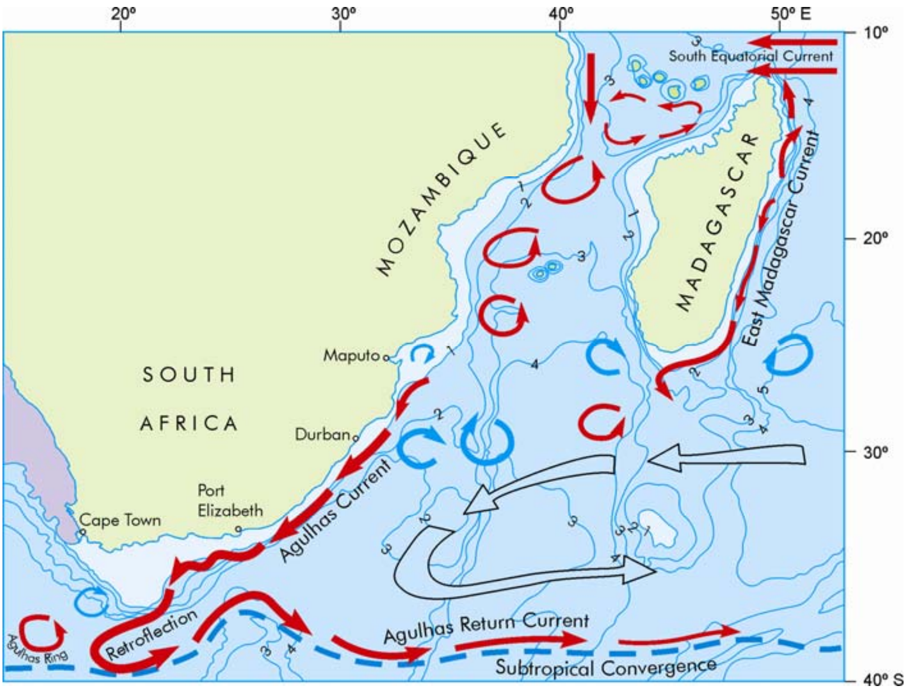

Figure II-4.1a. A simplified depiction of the circulation and currents of the greater Agulhas system. Red arrows denote anticyclonic motion; blue arrows cyclonic motion or eddies, and a broken, blue line gives the average location of the Subtropical Convergence. Open arrows denote inferred general motion of the Southwest Indian subgyre. Depth is given in kilometre. All the generic components of the current system are shown, including the source currents of the Agulhas Current, its outflows as well as the northern and southern Agulhas Current themselves, located to either side of Port Elizabeth (after Ansorge and Lutjeharms 2007).

The Agulhas Current has three recognised sources, in order of volume flux: recirculation in a Southwest Indian Ocean subgyre, contributions by the southern branch of the East Madagascar Current and the flow through the Mozambique Channel (Stramma and Lutjeharms 1997). The recirculation gyre is found west of 70º E. Its waters are largely oligotrophic, but its circulation may play a decisive role in the lifecycle of leatherback sea turtles. The second source from the east of Madagascar is usually in the form of eddies consisting of warm tropical surface water. These eddies are formed at the southern termination of the East Madagascar Current and can be both cyclonic and anticyclonic. The smallest contribution to the flux of the Agulhas Current comes from the Mozambique Channel by the aforementioned eddies. The contribution to the volume flux of the Current by these eddies may be small, but their impact on downstream behaviour is substantial.

The northern Agulhas Current flows along the east coast of South Africa following the shelf edge very closely. At irregular occasions this stability is interrupted by a single meander, the Natal Pulse, that is believed to be triggered by the impact of a Mozambique eddy (Schouten et al. 2002). The downstream passing of this meander causes a reversal in the shelf currents and may contribute to the upstream dispersal of biota. At two locations the Current passes form a narrow shelf to a wider shelf: at Cape St Lucia just upstream of Durban and at the eastern edge of the Agulhas Bank (vide Figure II-4.2). At both these locations there is a distinct upwelling cell with enhanced primary productivity. These cells may have a decisive influence on the ecosystems of the shelf segments of which they form part.

The southern Agulhas Current has very different flow behaviour. When the Agulhas Current moves past the eastern side of the wider Agulhas Bank, it starts meandering quite extensively to either side (Lutjeharms 2006a). In this process shear edge eddies and warm plumes are formed on its shoreward side. On passing the southern tip of the Bank such warm plumes may move equatorward along the eastern edge of the Bank or may be turned back by lee eddies formed here (Lutjeharms et al. 2007, vide Figure II-4.1). This motion is crucial to the fisheries in the BCLME since the larvae of pelagic fish that spawn on the Bank may be carried to the west coast upwelling region or be removed to the deep sea, depending on the direction of the flow at its western edge.

Having passed the most southern tip of Africa, the Agulhas Current retroflects. The Agulhas Current Retroflection is very unstable and the retroflection loop occludes at irregular intervals, creating large Agulhas Rings that drift off into the South Atlantic Ocean carrying with them Indo-Pacific species. The major part of the volume flux from the Retroflection is however eastward in the Agulhas Return Current. This current is either juxtapositioned or flows parallel to the Subtropical Convergence that is recognised for its high levels of primary production (e.g. Allanson *et al.* 1981). This primary production takes place as intermittent events of limited duration (Llido *et al.* 2005), an unusual behaviour to which the local, endemic biota have to be adjusted. Although this frontal system is one of the most intense in the world ocean, the currents mentioned above generate their own fronts.

Oceanic fronts (Belkin 2009): The Agulhas Current Front (ACF) for instance is the inshore boundary of the Agulhas Current (Figure II-4.1). This front is very deep and is observed year-round. Also included in this LME are average fronts related to the movement of the abovementioned Mozambique eddies. The East Madagascar Current Front (EMCF) is most clearly observed off southeastern Madagascar, and off the northern tip of Madagascar, where the Glorioso Islands Front (GIF) protrudes northwestward from the Glorioso Islands at 11°30’S, 47°20’E. The latter was only described in the literature with the advent of satellite remote sensing, and was discovered during a global survey of oceanic fronts (Belkin *et al*. 2008). However, these fronts are based on the mean circulation and some may be very intermittent or ephemeral.

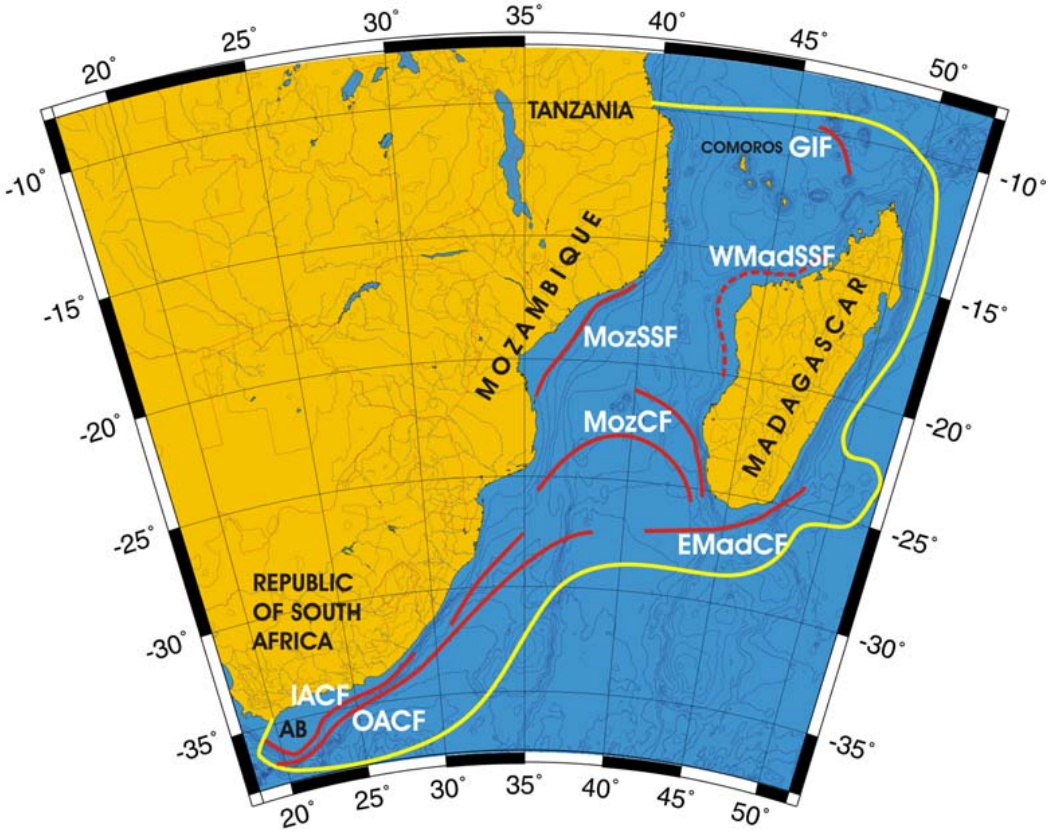

Figure II-4.1b. Fronts of the Agulhas Current LME. AB, Agulhas Bank; ACF, Agulhas Current Front; EMadCF, East Madagascar Current Front; GIF, Glorioso Islands Front; IACF, Inshore Agulhas Current Front; MozCF, Mozambique Channel fronts; MozSSF, Mozambique Shelf-Slope Front; OACF, Offshore Agulhas Current Front; WMadSSF, West Madagascar Shelf-Slope Front (most probable location). Yellow line, LME boundary. After Belkin (2009).

Agulhas Current SST (after Belkin 2009)
Linear SST trend since 1957: 0.68°C
Linear SST trend since 1982: 0.20°C

Over the past decades the sea surface temperatures (SST) of the Agulhas Current LME have undergone some significant changes. A linear SST trend since 1957 has been an increase of 0.68°C and 0.20°C since 1982 (Figure II-4.2). The Agulhas Current's long-term warming was punctuated by relatively small-scale cold/warm events with a magnitude of about 0.5°C. A substantial synchronism between increases in SST in the Somali and Agulhas LMEs has been observed. For example, the all-time minima of 1964-1965 occurred during the same years in the Somali and Agulhas LMEs, as well as the all-time maximum of 1983 in the Agulhas Current and the near-all-time maximum in 1983 in the Somali Current. The post-1982 warming of the Agulhas Current was spatially non-uniform: the Agulhas Current Retroflection SST increased by up to 1.0°C, while SST in some inshore shelf areas of the Agulhas Bank decreased (Fidel and O'Toole 2007, after Pierre Florenchie, University of Cape Town, personal communication).

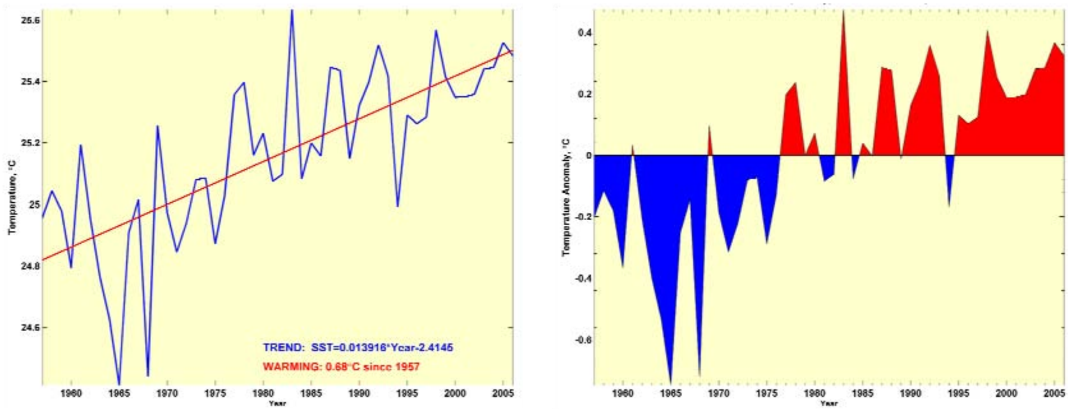

Figure II-4.2 Agulhas Current LME mean annual SST (left) and SST anomalies (right), 1957-2006. After Belkin (2009).

Agulhas Current LME Trends in Chlorophyll and Primary Productivity: The Agulhas Current LME is a moderately productive ecosystem (150-300 $gCm^{-2}year^{-1}$).

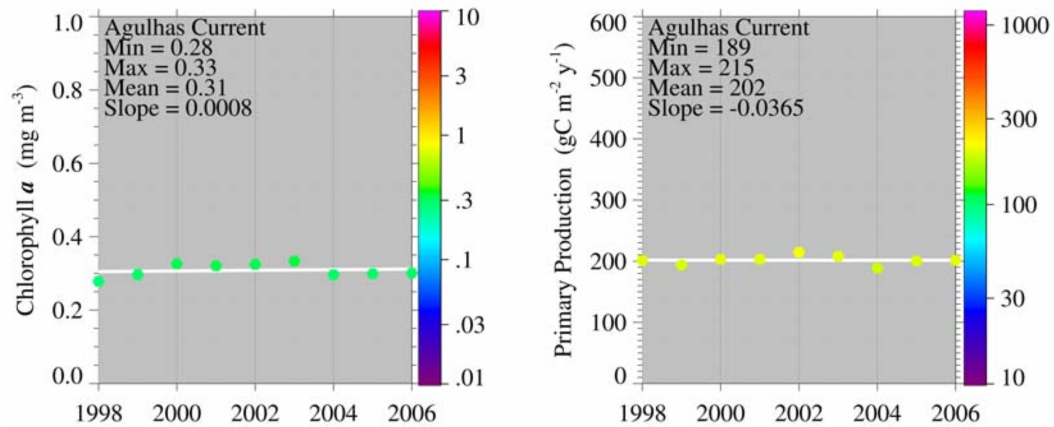

Figure II-4.3. Agulhas Current LME trends in chlorophyll a (left) and primary productivity (right) 1998-2006. Values are colour coded to the right hand ordinate. Figure courtesy of J. O'Reilly and K. Hyde. Sources discussed p. 15 this volume.

II. Fish and Fisheries

Total reported landings in this LME peaked at just under 600,000 tonnes in 1974 with a record landings of Cape anchovy and South American pilchard (Figure II-4.4). However, with the collapse of these fisheries in the mid 1970s, the reported landings were diminished down to 180,000 tonnes and have remained at this low level for some time, Some signs of growth can be seen in recent years, particularly in the landings of South American pilchard, and total landings have reached 270,000 tonnes in 2004. The trend in the value of the reported landings has mirrored that of the tonnage, and as shown in Figure II-4.5, it peaked at just over 700 million US$ (in 2000 real US$) in 1973 (Sea around us 2007).

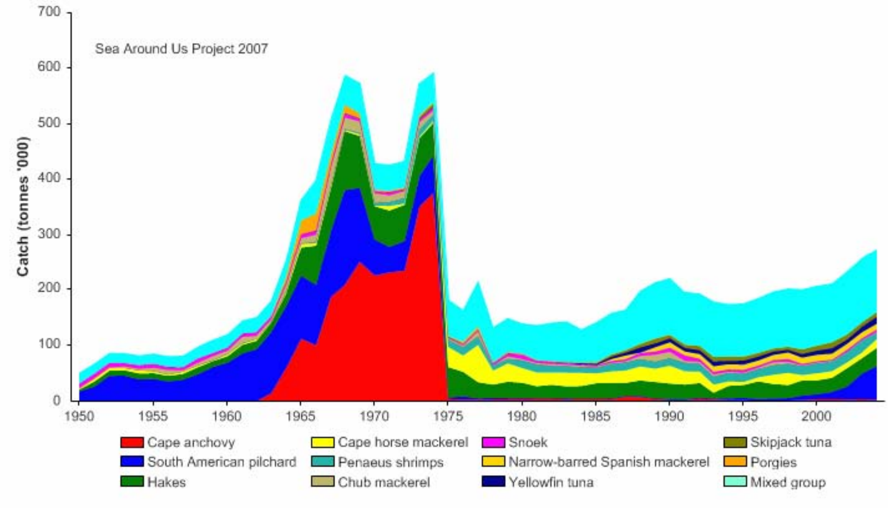

Figure II-4.4. Total reported landings in the Agulhas Current LME by species (Sea Around us 2007).

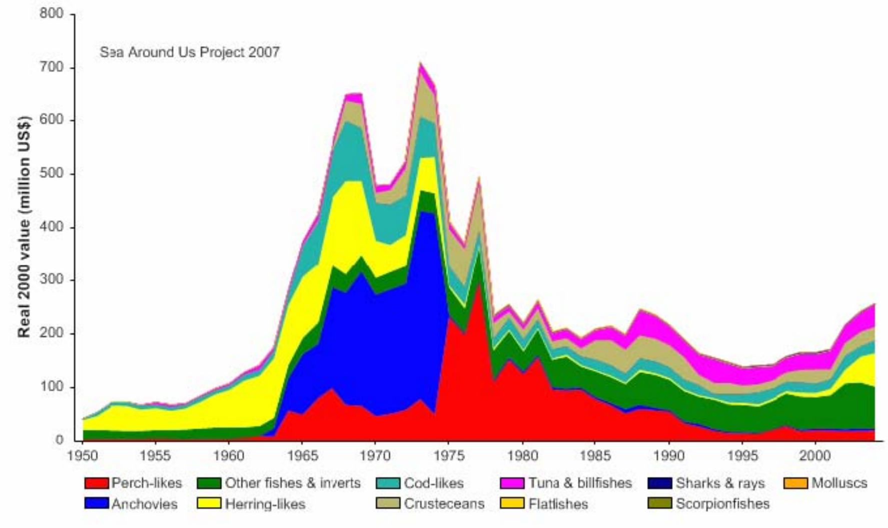

Figure II-4.5. Value of reported landings in the Agulhas Current LME by commercial groups (Sea Around Us 2007).

The primary production required (PPR, Pauly & Christensen 1995) to sustain the reported landings in the LME reached close to 8% of the observed primary production in 1968, when the highest level of reported landings was recorded (Figure II-4.6). With the collapse of the Cape anchovy and South American pilchard fisheries in the mid 1970s, the PPR declined to around 2%. In the 1980s, however, it returned to about 5% (Sea Around Us 2007). South Africa and Madagascar account for the largest ecological footprints in the LME, though in the 1960s and the early 1970s, foreign fleets accounted for the majority of the footprint.

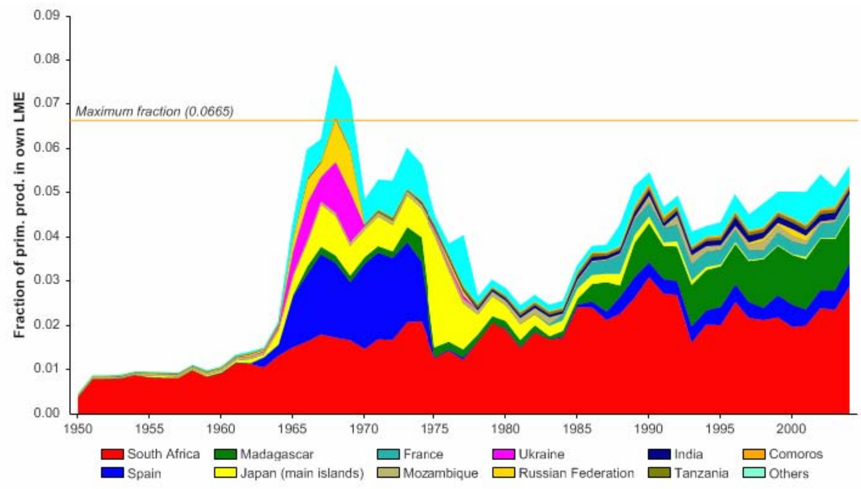

Figure II-4.6. Primary production required to support reported landings (i.e., ecological footprint) as fraction of the observed primary production in the Agulhas Current LME (Sea Around Us 2007). The 'Maximum fraction' denotes the mean of the 5 highest values.

The sharp increase in the mean trophic level of the fisheries catch (i.e., the MTI; Pauly & Watson 2005) observed in the mid-1970s reflects the collapse of the pilchard and anchovy fisheries, two species with low trophic levels (Figure II-4.7 top).

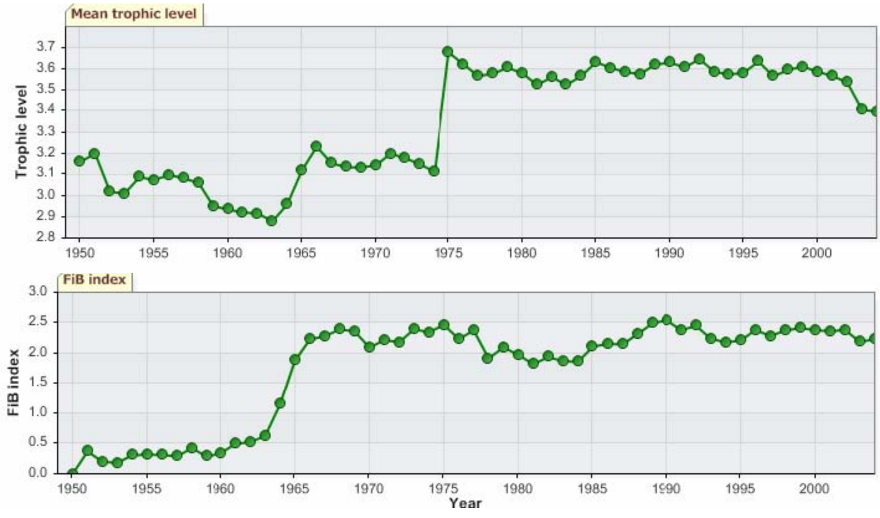

Figure II-4.7. Marine trophic level (i.e., Marine Trophic Index) (top) and Fishing-in-Balance Index (bottom) in the Agulhas Current LME (Sea Around Us 2007).

Although the MTI has declined over the last few years, likely due to the increased pilchard landings, there is no observable decline indicative of a 'fishing down' of the food web (Pauly *et al*. 1998) in the LME. Over the same period, the FiB index showed at best a minor decline (Figure II-4.7 bottom), suggesting that the increasing catches over this period may not sufficiently compensate for the decline in the MTI (Pauly & Watson 2005).

The Stock-Catch Status Plots show that the number of collapsed stocks is higher than that of overexploited or fully exploited stocks (Figure II-4.8, top), while the three groups contribute equally to the catch biomass (Figure II-4.8, bottom).

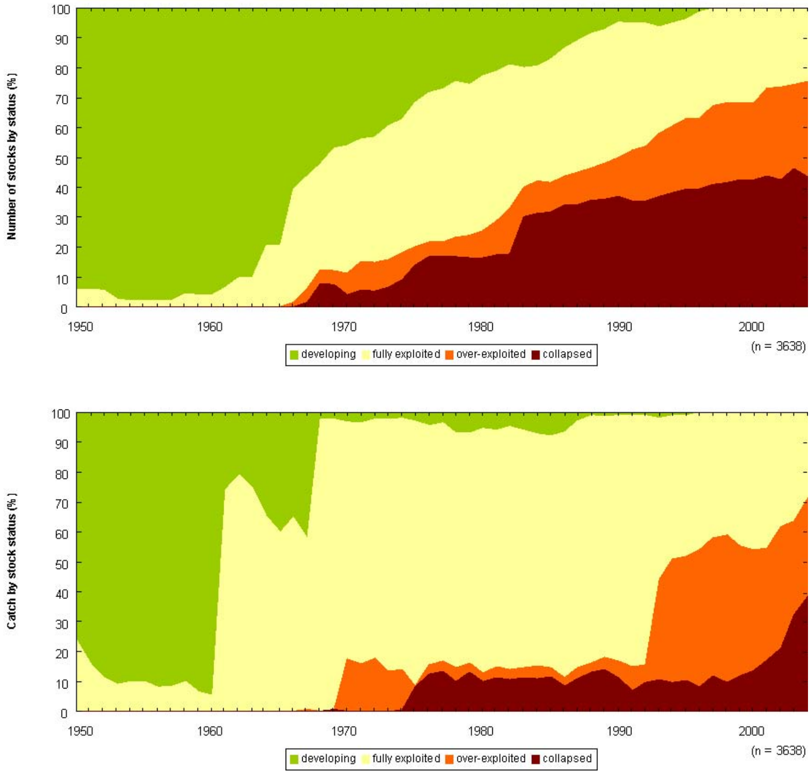

Figure II-4.8. Stock-Catch Status Plot for the Agulhas Current LME, showing the proportion of developing (green), fully exploited (yellow), overexploited (orange) and collapsed (purple) fisheries by number of stocks (top) and by catch biomass (bottom) from 1950 to 2004. Note that (n), the number of 'stocks', i.e., individual landings time series, only include taxonomic entities at species, genus or family level, i.e., higher and pooled groups have been excluded (see Pauly *et al*, this vol. for definitions).

Although some marine fisheries resources in the region have been sustainably fished (Pauly 1992; Cochrane *et al*. 1997), most show signs of overexploitation. Invertebrate resources such as shellfish have been severely impacted by subsistence fishing (Griffiths & Branch 1997, Barnes *et al*. 1998). Overexploitation of many reef fishes in the region is also prevalent. For example, recent stock assessments indicate that spawning stock levels of some species of the seabreams (Sparidae) and kobs (Sciaenidae) have been reduced to less than 25% of their pre-exploitation levels in South Africa (Mann 2000). Fish and shellfish stocks in Madagascar and the Seychelles are also believed to be fully fished or overexploited (UNEP 1999). As a consequence of the depletion of inshore stocks, fleets have had to seek new fishing grounds or move further out to sea (PRE/COI 1998). Valuable tuna stocks in the Agulhas Current LME, which are heavily exploited by foreign vessels, also show signs of overexploitation. Following a record tuna catch in the Indian Ocean in 2003 (about 100,000 tonnes greater than the sustainable limit), the Indian Ocean Tuna Commission expressed concern about depletion of tuna stocks in this region.

Highly efficient, non-selective fishing methods being used in the region have resulted in greater numbers and variety of fish being caught. Trawling is becoming increasingly common, with resulting destruction of benthic habitats and increased mortality rates for juvenile fish. This is of particular concern in the shrimp fishing grounds such as Sofala and Tugela Banks which are subjected to intensive trawling.

Other destructive fishing practices include the use of dynamite, poisons and purse-seines, which are of concern especially around island areas. As a consequence of these destructive methods, fish stocks and biodiversity are declining in the LME, with several species now facing potential economic extinction. Reduced catch rates and decrease in mean sizes of fish caught are evident in the landings (UNEP 2002). In addition, catching of non-target endangered marine species, such as turtles, dolphins and dugongs are also cause for great concern. Fisheries bycatch is severe in both Mozambique and South African fisheries.

Overall, overexploitation, excessive bycatch and discards, and destructive fishing practices appear to be severe in the Agulhas Current LME (UNEP 2006). This will continue to threaten fisheries sustainability and food security of the bordering countries. The situation, however, is expected to improve with the implementation of new approaches to the management of the LME's fisheries resources (see Governance).

III. Pollution and Ecosystem Health

Pollution: While pollution in the Agulhas Current LME was found to be moderate and not to pose a regional threat, the inadequate treatment of wastes results in severe localised problems near cities and industrialised areas in all the countries. Marine pollution originates from both land- and sea-based sources and activities (Nguta 1998, Ruwa 2006). Among them are growing coastal populations and increasing tourism, for which sewage treatment facilities are inadequate. As a result, raw sewage is often discharged directly into rivers or the sea, leading to eutrophication in localised areas. In addition, untreated effluents from fish processing plants, abattoirs and chemical and manufacturing industries are frequently discharged into the sea, causing varying degrees of pollution in some localities.

Severe localised pollution is caused by dumping of domestic and industrial solid wastes in government-approved sites on the coast, but with little or no environmental regulation in place. Leachates from dump sites flow into coastal areas, especially during the rainy season, further degrading coastal habitats. Plastics constitute an increasing proportion of coastal and marine litter, and pose a serious threat to protected species such as marine turtles, dugongs, whales and dolphins (UNEP 2002).

The intensive use of agro-chemicals such as dichlorodiphenyltrichloroethane (DDT), dieldrin and toxophene is common throughout the region, with potential transboundary consequences. Use of fertilisers is also common and has caused localised occurrences of eutrophication and HABs (PRE/COI 1998). Poor farming practices and deforestation in the coastal and hinterland areas result in excessive siltation in the coastal and marine environments, smothering seagrass beds and coral reefs.

Marine-based pollution in this LME stems from oil tanker traffic, exploitation of the seabed, construction, dredging and ocean dumping (Nguta 1998). Oil pollution caused by oil tanker traffic, discharge of waste oil in rivers, frequent oil spills in harbours and other maritime activities, is a major problem in some coastal areas. About 450 million tonnes of hydrocarbon products are transported annually through the Mozambique Channel, posing a high potential risk of oil spills (Salm 1996). The prevailing southeasterly Trade Winds make the Mozambican coast most vulnerable, as demonstrated by the Katina-P oil spill in 1992 near Maputo Bay (Massinga & Hutton 1997).

Pollution of the coastal zone poses a direct threat to human health through the consumption of contaminated seafood or swimming in contaminated waters. Throughout the region, pollution has impacted the ecosystem in far less obvious but more significant ways by reducing the abundance and variety of fish available for local consumption, indirectly leading to overexploitation of the remaining stocks of certain species and subsequent collapse of coral reef ecosystems (UNEP 1999). Polluted coastal areas and loss of charismatic species such as whales also reduce revenues from tourism.

Habitat and community modification: The productivity of coastal waters is highly dependent on the health of mangroves, coral reefs, estuaries and seagrass beds, as well as the quality of run-off from land. Estuaries play a significant role in providing food and shelter for juvenile organisms in the high energy marine environment of the LME. Some of these organisms, particularly shared and migratory fish stocks, are of transboundary importance. Modification of coastal habitats such as mangroves, coral reefs and seagrass beds is moderate but widespread and is a major threat to sustainable use of resources and development in the coastal zone. Coral reefs are under increasing pressure from urbanisation, tourism, dredging and extraction of coral and shells, limestone mining and destructive fishing methods including dynamite fishing. These activities are also depleting the buffer zone provided by coral reefs, making the shores more exposed to wave action, storm surges and inundation (UNEP 2002). The coral reefs of the islands have been severely degraded or even lost in several areas (Bryant *et al*. 1998, PRE/COI 1998). Some coral reefs of Seychelles have been classified as being under the highest threat and risk of degradation (Bryant *et al*. 1998).

The most important immediate cause of mangrove loss is unsustainable harvesting, particularly for firewood, construction, and production of charcoal around the main cities. Other causes of mangrove loss include the clearing of mangrove for salt production, human settlements, urban development, mariculture ponds and sand mining.

There has been considerable modification of coastal habitats by beach erosion as a result of coastal construction, beach replenishment schemes, coastal mining and dredging in harbours. Poor management of catchment basins has led to reduced freshwater inflow and degradation of estuaries, which are also under threat from excessive siltation and other anthropogenic factors. The water quality in about 20% of South Africa's estuaries in this LME has been described as poor or very poor (Harrison *et al*. 2000). Seagrass beds have also been smothered by sediments, resulting in loss of shelter, food and nursery grounds for valuable fish, shellfish, dugong and turtles (UNEP 1999). Mining of titanium and zirconium, as well as other mining-related activities, have adverse environmental impacts on sand dune systems, wetlands and estuaries. As already discussed, pollution in the coastal zone has severe localised impacts and also contributes to habitat degradation and loss.

Global climate change is expected to have grave impacts on the marine and coastal environments of the Agulhas Current LME and their living resources. The most notable impact of climate change has been widespread bleaching of corals in the Indian Ocean Islands. In 1998, a 1°C temperature rise, induced by El Niño, caused the bleaching and death of up to 90% of the region's corals (Obura *et al*. 2000); in many instances, this loss was irreversible.

Increasing economic development, growing urbanisation, and unsustainable use of the natural resources in the coastal areas will continue to threaten the health of the LME. Furthermore, the impacts of habitat modification and loss on the economy and people of the coastal areas will be magnified by global climate change. Appropriate measures based on sound scientific knowledge are urgently required to address the deterioration in ecosystem health which will otherwise severely undermine the economic stability of the region (Kamukala and Payet 2001) .

IV. Socioeconomic Conditions

Coastal cities, commercial ports and industrial centres are rapidly developing in the Agulhas Current LME. The coastal population of Mozambique has been estimated at about 6.5 million (about 40% of the total population), while the coastal population of eastern South Africa is estimated at about 7 million. The total population of the Western Indian Ocean islands was about 17 million in 1998 and is expected to exceed 43 million by 2050 (UN Population Division 1998).

The economy of the bordering countries is reliant on agriculture, forestry, wildlife, fisheries, tourism and exploitation of minerals. Island states share the characteristics of economies dependent on imports and high levels of unemployment (Gossling, 2006).

International tourism makes a significant contribution to GDP, especially in South Africa and the Indian Ocean islands. For example, in the Seychelles, tourism contributes 15% to GDP, up to 75% of foreign exchange earnings and employs 20% of the labour force (Republic of Seychelles 1997, UNDP 1997). Tourism has grown exponentially in the past 15 years, in some countries by an order of magnitude. While providing some clear economic benefit through employment generation, foreign exchange earnings, the promotion of the development of infrastructure and the protection of cultural heritage, a lack of integrated planning has exacerbated negative impacts. These include the overuse of fresh water, overfishing, damage to coral reefs, land use transformation, clearing of mangroves, increased pollution and lack of benefit to local communities (Gossling 2006).

Marine fisheries are a significant source of foreign exchange, employment, and protein in most countries. In Mozambique, the industrial and semi-industrial fleets generate about 40% of foreign currency income (Schleyer *et al*. 1999). In the Seychelles, fish and fish products account for 95% of domestic exports and are the second highest foreign exchange earner after tourism (UNDP 1997). In some of the countries, fish often represents the primary source of animal protein available to the local populations.

The socioeconomic impacts of habitat modification are significant, considering that a large number of people are dependent on these resources and that they make a valuable contribution to the economies of the countries adjacent to the LME (Massinga & Hutton 1997, UNEP 1999, 2002). Destruction of these critical habitats results in loss of shelter, food and nursery grounds for commercially important fish, shellfish, turtle and dugong (UNEP 1999). The subsequent reduction in recruitment of shrimp and fish as well as reduced catches in subsistence and industrial fisheries will threaten food security, employment and national income.

Sea level rise and associated impacts such as flooding and erosion will result in disruption of infrastructure and economic activities including loss of employment, income and food source. Other economic costs of sea level rise are associated with beach replenishment schemes, dredging and coastal protection to prevent beach erosion. The islands in particular will suffer significant economic losses in the tourist industry due to loss of beach and reef-based activities (IPCC 1995).

V. Governance

The lack of knowledge on the environment is a severe limiting factor for environmental governance in the Agulhas Current region. An exhaustive review by Lutjeharms (2006a) shows that we have a dearth of information and data, compared to that available for other similar regions. The gaps in knowledge must be addressed in order to identify critical concerns about fisheries, productivity and ecosystem health, as well as developing ameliorating measures. Governance in the Agulhas Current region is also constrained by regionally incompatible laws and a paucity of environmental regulations.

This LME is located within the UNEP Eastern Africa Regional Seas. All the countries have ratified the Convention for the Protection, Management and Development of the Marine and Coastal Environment of the Eastern African Region (Nairobi Convention) with its Protocols on Protected Areas and Wild Fauna and Flora, and on Co-operation in Combating Marine Pollution in cases of Emergency. Regional organisations involved in the management of coastal and marine resources in the West Indian Ocean are the Western Indian Ocean Fishery Sub-Commission, the Inter-governmental Oceanographic Commission's Regional Committee for the Cooperative Investigation of the North and Central Western Indian Ocean and the Indian Ocean Commission.

The GEF supported Agulhas and Somali Current Large Marine Ecosystems (ASCLME) Project is part of a multi-project, multi-agency Programme to institutionalize cooperative and adaptive management of the Agulhas and Somali LMEs. A phased approach is planned that progressively builds the knowledge base and strengthens technical and management capabilities at the regional scale to address transboundary environmental concerns within the LMEs, builds political will to undertake threat abatement activities and leverages finances proportionate to management needs. In addition to the ASCLME Project, the Programme includes two parallel projects, one that addresses land-based sources of pollution and coastal degradation (WIO-LaB, implemented by UNEP); and one that builds knowledge for the purposes of managing industrial fisheries (SWIOFP, implemented by the World Bank).

The activities within the ASCLMEs Project are focused on filling the significant coastal and offshore data and information gaps for these LMEs by capturing essential information relating to the dynamic ocean-atmosphere interface and other interactions that define the LMEs, along with critical data on artisanal fisheries, larval transport and nursery areas along the coast. The overall objective of this excercise will be to deliver two Transboundary Diagnostic Analyses (TDAs), and two Strategic Action Programmes (SAPs); one for the Agulhas Current LME, and the other for the Somali Current LME. The parallel UNEP and World Bank Projects will also feed pertinent information into the TDAs/SAPs formulation process, and identify policy, legal and institutional reforms and needed investments to address transboundary priorities. Collectively, the projects build foundational capacities at regional scale for management of the LMEs.

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