

SOUTH AFRICA ANNEX IV. AREAS OF CONCERN

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2. BIOPHYSICAL ENVIRONMENT

2.4 Freshwater resources and drainage, including estuaries

Rapid industrialisation and a burgeoning population have caused a related increase in the demand for fresh water and have altered the flow regime of many of South Africa's rivers. Estuaries are also at the receiving end of bad catchments practices, such as pollution, erosion, excessive water abstraction and impoundments. Furthermore, South Africa's coastline is very rugged, with few sheltered embayments and dominated by high wave conditions and strong winds for most of the year. The sheltered nature of estuaries also led to them becoming the focus of coastal development (Morant & Quinn 1999). Poorly regulated activities have destroyed many estuarine habitats by infra-structural development such as mouth stabilisation, low lying developments, canalisation, land reclamation, harbour development, pollution and dredging (RSA DEAT 2008).

The most recent assessment of the health status of South African estuaries was that done as part of the National Spatial Biodiversity Assessment (Turpie 2004)). In terms of assessing the health of South Africa's estuaries, a comparison between the health status of 27 estuaries assessed in the 1990s (Whitfield 1995 & 2000) and more recently (Turpie 2004) showed a decline in the health of six of the 27 estuaries evaluated. Turpie (2004) did, however, conclude that many of South Africa's estuaries are still considered to be in a relatively good state:

- Excellent condition (28%);
- Good condition (31%);
- Fair condition (25%); and
- Poor condition (15%).

The distribution of South Africa's estuaries in terms of their health status is illustrated in Figure 3.

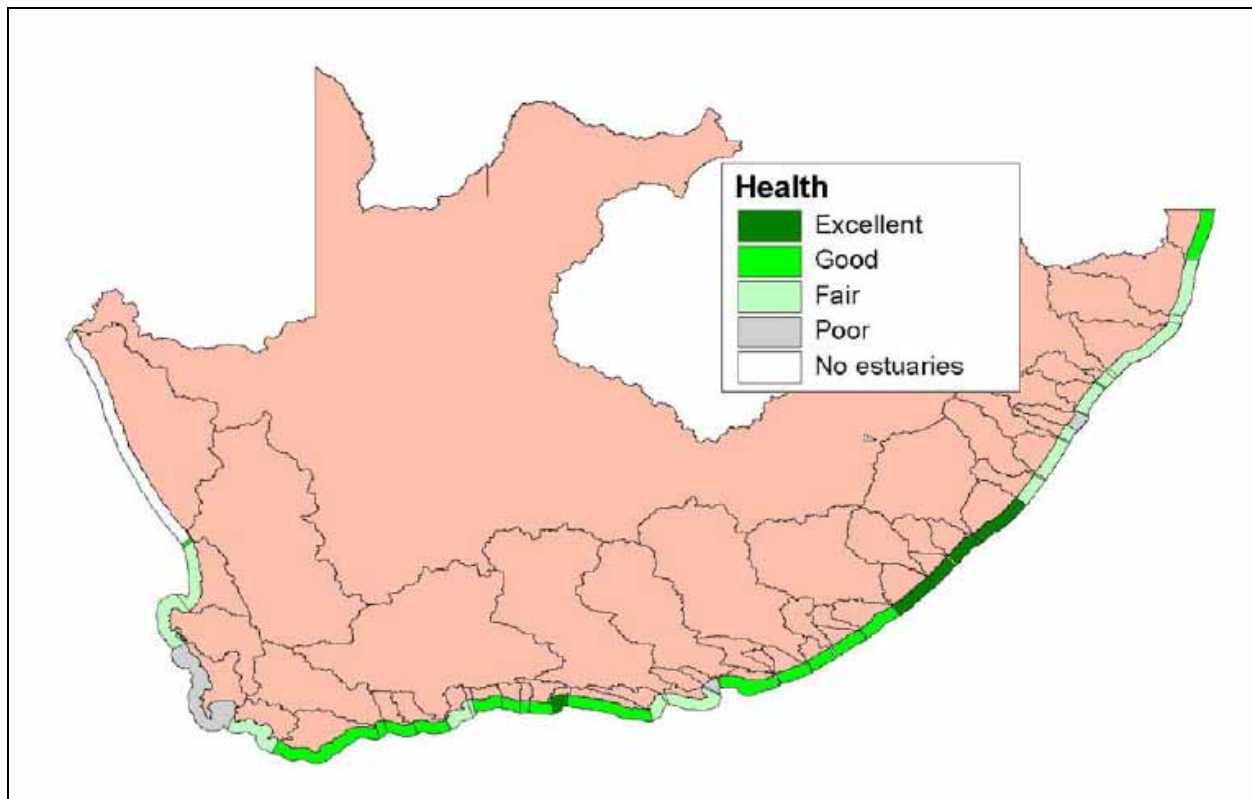


Figure 3: The health status of South African estuaries (Turpie 2004)

The deterioration in the health of estuaries in urban areas is mostly related to overexploitation of living resources, pollution and habitat destruction, while the deterioration in health of the more rural estuaries is mainly the result of reduction in freshwater inflow, although pollution from agriculture activities cannot be excluded. Estuaries act as purifying systems where nutrients from the catchment are absorbed, resulting in cleaner water entering the sea. This nutrient removal function is manifested in excessive weed growth or phytoplankton blooms in estuaries, rather than in the adjacent marine environment. This is particularly evident during low flow periods (dry seasons) when the river flow entering the estuaries may contain high concentrations of nutrients (for example, due to agricultural irrigation return flows) as well as the water having longer residence times within the estuaries (Turpie 2004).

The degradation of intertidal estuarine habitats that are particularly important for over-wintering Palaearctic migrant bird species is a cause for concern. Should these habitats be severely degraded or destroyed, a drastic reduction in the numbers and even extinction of these bird species could occur. In the longer term, sea level rise as a consequence of global warming could result in the elimination of many intertidal areas, particularly estuarine habitats as these become constricted between the rising water level and existing developments and structures (Clark *et al.* 2002).

The South Africa Outlook 2006 (DEAT 2006) reported that there is little information on the status of estuarine species, a serious gap in the overall conservation database. Because of habitat degradation and increasing human pressures on estuaries, four fish species occurring in South African estuaries are listed on the IUCN Red Data List as critically endangered: Knysna seahorse (*Hippocampus capensis*), St Lucia mullet (*Liza luciae*), and estuarine pipefish (*Syngnathus watermeyeri*).

Of note is sand-mining in estuaries, which not only causes direct impacts resulting in loss of aesthetic value and ecosystem degradation, but also secondary threats to the long-term sustainability of the coastal sand resource and stability, especially in view of, for example, the large scale coastal erosion that occurred along the Kwazulu Natal (KZN) coast during 2006 and 2007. A recent inventory of the sand-mining operations in KZN estuaries from the Thukela to the Mtamvuna estuaries showed that 18 out of 64 systems along this coastline supported sand-winning operations (WESSA-KZN 2007). These activities modify flows, produce high suspended solids loading and destruct riparian and instream habitat.

In the future, impacts on estuaries are likely to be particularly severe in the south and western Cape, where demands on water supplies are immense; similarly along the KZN coast the impacts of development and the demand for water are going to place the estuaries under great pressure (Turpie 2004).

International experience indicates that the most fundamental pitfall in managing human activities and developments impacting on estuaries, and in doing so achieving protection of estuaries, is the fragmentation of estuarine management among the different national, provincial and local-government agencies.

There are also a number of ongoing long-term monitoring and research project on various estuaries along the South African coast, e.g. St Lucia, Swartvlei, Wilderness and Great Brak estuaries. For more detail on these projects refer to Taljaard *et al.* (2003).

Many Universities, Science Councils and environmental consultants also have physical, chemical and biological data available on estuaries, collected as part of research projects and commercial contract. Some of these institutions have their own databases, while in others data resides with individuals.

2.5 Physical Oceanography

2.5.2 Tides and extreme water levels

Climate change is expected to lead to an acceleration in the present modest rates of sea level rise, and to an intensification of storms approaching the coasts of the world. These two effects of climate change will combine, in the future, to provide more frequent and more intense extreme sea level events along the coast, with increased possibility of coastal erosion and flooding from the sea (Theron 2007). Natural coastal systems will be placed under threat, with dune systems under attack and wetlands overwhelmed. Recent storms that resulted in the loss of coastal property and protective dunes along the south and east coast has highlighted the risks associated with climate change.

As more and more people migrate into urban centres along the coast, there is increasing pressure for the housing, infrastructure and services that constitute an acceptable living environment. Where these are located in what will become high risk areas, there will be increased economic vulnerability for the community. Proper cognizance of these concerns needs to be taken in coastal zone planning, so as to be able to cope with the threats from climate change.

2.5.3 Sea level change

Climate change is expected to lead to an acceleration in the present modest rates of sea level rise. In fact, it has been found that sea level has been rising, at different rates, for at least the last 20,000

years, but that anthropogenic influences since the end of the 18th century are suspected to be causing the sea level rise rate to accelerate. The rate of global sea level rise has doubled in the past fifteen years, though it remains modest. There is general agreement that the primary role played by the melting glaciers and ice sheets (47%) as opposed to thermal expansion due to increasing heat content (25%), will be enhanced in the future. Of concern is that polar ice sheets contain large amounts of water which if released will contribute substantially to global sea level (7m from the Greenland ice sheet and 5m from the West Antarctic ice sheet), though no time frame is known for this.

Coastal environments and habitats are vulnerable to sea level rise and variability and efforts are needed to identify these vulnerable localities and to forecast the effect of sea level rise. Low lying coastal areas are particularly vulnerable. Soft coasts will be increasingly eroded and wetlands flooded, while urban infrastructure and services will be placed at risk. Coastal defences will need to be strengthened and planning measures put in place in order to discourage migration and investment in high risk areas. Unfortunately it has been argued that the socio-economic status of a country, rather than the magnitude of sea level rise, will determine how vulnerable the country is to sea level rise. For South Africa, this may mean that the cost of adapting to sea level rise may put unacceptable pressures on economic growth.

2.5.6 Ocean-Atmosphere Interactions

Climate change is expected to lead to a shift in the timing and intensity of synoptic weather systems. This may have a profound effect on the regional winds and on the distribution of rainfall over the continent, with considerable impact on rain-fed agriculture.

Wind strength and persistence are fundamental drivers of the dynamics of both the Benguela Upwelling System and the Agulhas Current and their biogeochemistry. Over the recent past, stronger upwelling favourable winds have led to enhanced productivity in the Benguela Ecosystem, with greater nutrient enrichment, but this in turn has led to a greater volume of low oxygen water subsurface.

There has also been a warming of the Agulhas Retroflexion area to the south of South Africa, possibly due to a poleward migration of the oceanic westerly winds, with an increase of the leakage of Indian Ocean waters into the South Atlantic and beyond (Bjastoch *et al.* 2009). This will have potential consequences for the global thermohaline overturning circulation.

2.6 Chemical and Biological Oceanography

2.6.1 Nutrients

- Nutrient samples are collected at each standard depth during the Pelagic pre-recruitment survey in March, April-May South Coast Hake Biomass, May-June Pelagic recruitment and October-November Pelagic Spawner Biomass. The data covers the area between Hondeklip Bay and Port St. Johns. However, nutrient concentrations measured in the water column are of limited use, as they only reflect levels at the time of sampling. The dynamics of nutrient uptake or release are infrequently measured, yet much nitrate is taken up in the thermocline region of the Agulhas Bank, at rates commensurate with the diffusion of nutrients across the thermal gradient. This supports sustained phytoplankton productivity over summer with no measurable change in nutrients above and below the thermocline.

- Changes in nutrient concentrations in source waters for upwelling may be altering, but few measurements are available in ocean areas away from the coast.

2.6.2 Persistent organic and inorganic pollutants

Many persistent organic pollutants have a high bioaccumulation and endocrine disruption potential. The almost complete lack of data on persistent organic pollutant concentrations in water, sediment and biological tissue from the South African coastline makes it impossible to determine whether these pose a risk to ecological and human receptors. This lack of data also prohibits the identification of pollution hotspots and the tracking of temporal trends.

The most significant source of persistent organic and inorganic pollutants to South African coastal waters is almost certainly land-based activities. Of the many potential land-based sources of persistent organic pollutants, effluent and stormwater discharge appear to be the most significant, yet little to nothing is known about the types and loads contributed by these sources. The significance of stormwater discharges is that these discharge into the surf zone. Shoreline discharges are often trapped within the surf zone and dilution is less pronounced compared to offshore discharges. This leads to the exposure of shoreline fauna to contaminants for prolonged periods, increasing the potential for uptake and accumulation. As stated above, there is evidence that concentrations of persistent organic pollutants in the tissue of mussels near stormwater discharges in some areas pose potential human health risks.

2.7 Coastal zone and continental shelf

2.7.1 Description and extent of coastal and marine habitats

Marine

This section is extracted directly from Sink *et al.* (2004), which formed an Appendix to the NSBA 2004 Marine Component.

Some fisheries are known to alter the benthic environment physically. One of the key problems in assessing trawl impacts worldwide is the lack of adequate control areas – for example, pristine soft-bottom habitat in which to measure the normal abundance of biogenic habitat in soft sediments. Trawling on the shelf slope is a concern as it could result in landslides or slope collapse, which could have a significant impact on the diversity of this poorly known habitat. In South Africa, there is concern that all trawlable grounds on the west and south coast have already been damaged. On the east coast, there are only three main areas that provide significant habitat for prawns in South Africa: the Tugela Bank, and specific areas off Richards Bay and St Lucia. All of these have been trawled (Sink *et al.* 2004).

Five types of mining are currently considered to threaten marine biodiversity in South Africa: sand-winning; mining for titanium; diamonds; fossil fuels; and phosphate. Sand-winning, particularly in estuarine habitats, can have a large knock-on effect disrupting downstream or nearshore sediment processes. Strip-mining for titanium or other heavy minerals transforms dune communities in KwaZulu-Natal, but this impact is offset to some extent by rehabilitation programs (Sink *et al.* 2004). More recently, mining rights have been granted to Transworld Energy Minerals to strip-mine titanium and other heavy minerals from a 22 km coastal strip at Xolobeni on the Wild Coast (Legal Resources Centre, press release).

Coastal development includes development activities such as infrastructure (harbours and launch sites, cities, towns, housing, roads and tourism), as well as dredging activities and the disposal of

sediments. Coastal developments and their associated impacts need to be very strictly controlled. These developments pose a major threat to many components of the marine environment, owing to their cumulative effects, which are often not taken into account by impact assessments. These effects include organic pollution of runoff and sewerage, transformation of the supratidal environment, alteration of dune movement, increased access to the coast and sea, and the negative impacts on estuaries (Sink *et al.* 2004).

Terrestrial

A gap analysis conducted as part of the NSBA 2004 Terrestrial Component revealed that most South African ecosystems are not adequately conserved within the 6% of land that is protected. Protection status was defined as the percentage of the biodiversity target met in Type 1 protected areas, which includes National Parks, Provincial Nature Reserves, Local Authority Nature Reserves and DWAF Forest Nature Reserves (Figure 22) (Rouget *et al.* 2004).

It is evident that much of the east coast of South Africa's ASCLME region is poorly protected, although a new national park is planned on the Wild Coast to protect the Pondoland Centre of biological diversity and endemism.

Coastal habitats are vulnerable to the increasing pressure of increased population density and the associated development, mining, agriculture and afforestation, habitat fragmentation and alien plant invasion.

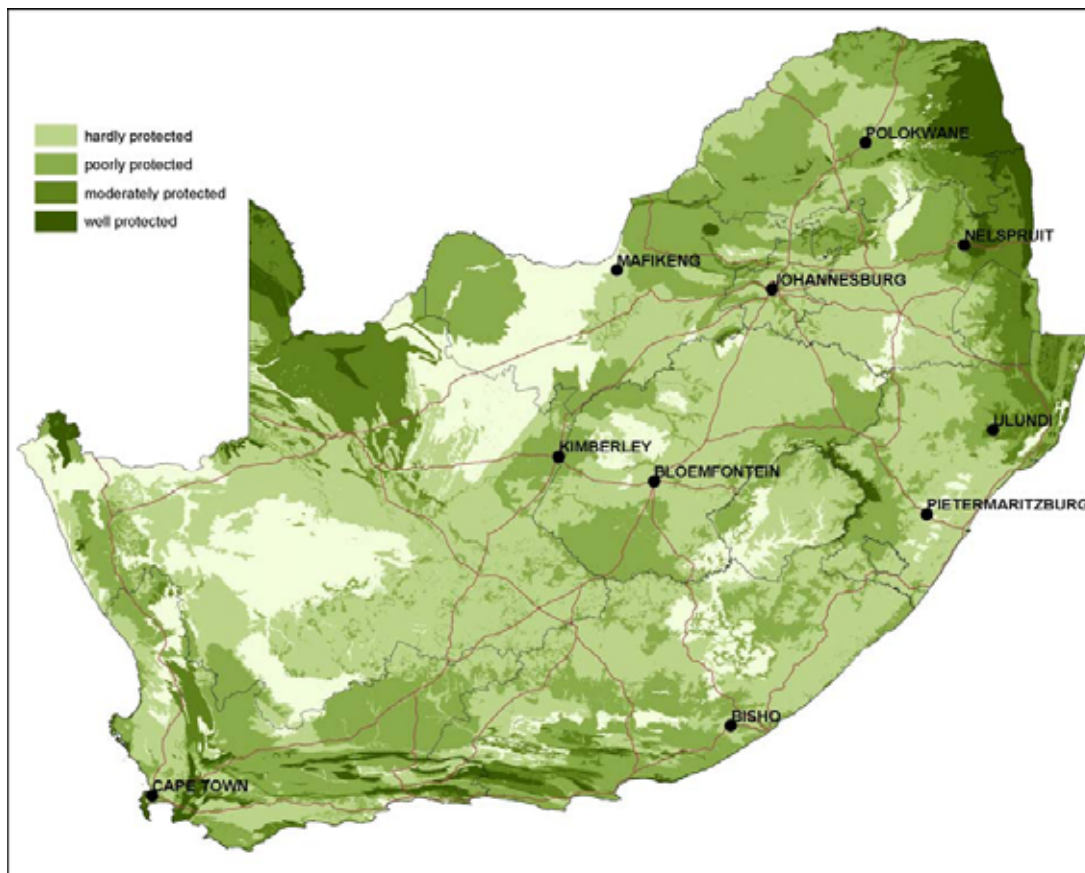


Figure 22: Protection status of South African vegetation types based on the percentage target met in type 1 protected area (Rouget *et al.* 2004)

2.7.2 Productivity of the coastal zone

Climate change is expected to have a negative impact on coastal wetlands such as saltmarshes and mangroves as a result of sea level rise, since these communities depend on a tidal cycle of inundation and exposure, and may not be able to retreat upshore. Warmer air and water temperatures may also impact their distribution and productivity. Offshore, coral reefs could be affected by both ocean acidification and coral bleaching (the loss of symbiotic zooxanthellae from the tissue of host corals). In 2000 and 2001, monitoring studies at Sodwana Bay showed that bleaching had increased from <1% in 1998 to 5-10% in 2002, although it was less than that experienced by reefs elsewhere in the Indian Ocean (Sink *et al.* 2004).

White, red and black mangrove trees are harvested for their wood, which is very durable. At Kosi Bay mangroves are harvested for building materials and for construction of fish traps, and there is some harvesting in Richards Bay. Extensive mangrove cutting is considered a problem in many of the Wild Coast estuaries, particularly the Mngazana, Mtata, Xora and Mntafufu (Sink *et al.* 2004).

Over-abstraction of water from rivers, impoundments, and afforestation and alien plant invasion in the catchment all result in modified river flows, and hence changes in estuarine mouth dynamics, with negative consequences for mangroves and saltmarshes. Poor catchment management may also increase siltation, causing smothering of benthic algal communities and coral reefs (Sink *et al.* 2004).

2.8 Marine and estuarine meiofauna

Gage (1996) postulated that meiofaunal communities attain the greatest biomass and/or abundance in shallow water environments. Local diversity is continuously affected by disturbances such as chemical pollution, dredging, landscape alterations resulting in changes in diversity patterns often accompanied by changes in abundance and biomass. This problem is compounded by the lack of information on the meiofauna of the shallow water and offshore environments. This concern has become increasingly relevant in light of the proposed sand dune mining along the east coast of South Africa.

The study of meiofauna in South Africa is further hampered by the lack of experts in the field in South Africa. The very few researchers studying meiofauna are mainly generalists and generally don't investigate meiofaunal communities beyond the major faunal groups comprising the meiofauna. Nematology expertise, for example, are seriously lacking since the retirement of all active nematologists in the last decade. Students in the field of nematology and meiofauna have, however, recently received guidance from experts through exchange programmes between selected South African universities and the University of Ghent, Belgium, and British Natural History Museum. Further capacity building in the field of meiobenthology and funding for research projects is urgently required. Realising the lack of expertise in South Africa, Gibbons *et al.* (1999) has lamented the lack of trained taxonomists, especially those that work with meiofauna, and this compromises our ability to move the field of meiobenthology forward.

The study of meiofauna is further hindered by a lack of readily available identification literature. The likelihood of discovering new species of meiofauna, especially new nematode species, along the poorly surveyed east coast of South Africa is very high. Several new nematode species has been discovered in South Africa (Inglis 1961, 1963, 1966, Furstenberg & Vincx 1988a, b, 1989, 1992, 1993, Heyns and Furstenburg 1987, Vincx and Furstenberg 1988a, b, 1989), and further north along the African east coast (Muthumbi and Vincx 1996, 1997, 1998, 1999, Muthumbi *et al.* 1997, Muthumbi *et al.* 1995, Verschelde and Vincx 1992, 1993, 1995), in the last three decades. Often identification literature can only be found internationally in hard copy making it difficult to obtain. The only comprehensive identification literature for nematodes, for example, is the illustrated identification

guide, *Free-living marine nematodes*, which has been published in three volumes: Part I British Enoplids (Platt and Warwick 1983 - currently out of print), Part II British Chromadorids (Platt and Warwick 1988) and Part III Monhysterids (Warwick *et al.* 1998). These identification guides employ pictorial keys for identification to genus level, together with identification notes on the most common British species. It has subsequently been found that meiobenthologists from the southern hemisphere have erroneously identified typical British nematode species due to the lack of expertise, experience and identification literature.

2.9 Macrofauna

2.9.1 Invertebrates

The east and south coasts of South Africa have high coastal population density relative to the west coast, resulting in intense exploitation of inshore resources by recreational and subsistence sectors. As a result many coastal fish and invertebrate stocks are overexploited, with significant impacts on both target and non-target species having been recorded (Siegfried *et al.* 1985; Hockey and Bosman 1986; Lasiak and Dye 1989; Lasiak 1991). This has translated into dramatic changes in the structure of exploited communities (Hockey and Bosman 1986; Lasiak and Dye 1989).

Alien species pose a major threat to biodiversity on a global scale. The most recent assessment of this problem along the South African coast has led to the recognition of more than 85 alien species (Mead *et al.* in prep). Besides the Mediterranean mussel *Mytilus galloprovincialis*, which occurs on the open coastline of the south coast as far east as East London (Robinson *et al.* 2005), all alien species on the south and east coasts are restricted to the sheltered sites of Knysna Lagoon, Port Elizabeth, East London, Durban and Richards Bay harbours (Mead *et al.* in prep).

Near and offshore pipelines are used to discharge large volumes of sewage, fish waste and industrial effluent into the marine environment. The majority of near-shore pipelines are concentrated around a few major harbours and estuaries, thus leaving most of the coast unaffected (Griffiths *et al.* in press). It is important to note, however, that no formal assessment of the impact of these releases has been made.

Climate change is likely to affect the coastal zone through rising sea level and changes in circulatory and sea surface temperature patterns. Increasing sea level is not anticipated to be of great consequence to many coastal species, as they will simply move higher up on the shore. An exception might occur on the South African east coast, where many shores consist of rock platforms in the lower shore bounded by sandy habitats above. Here rising sea levels may result in the loss of some upper intertidal species (Griffith *et al.* in press). Temperature rise is likely to result in the southward expansion of the distributional ranges of coastal species, although enhanced upwelling and cooling at the coast can also result.

Physical disturbance is not considered a major threat to invertebrates along the South African coast. The main sources of disturbance are human trampling and diving activities. Both of these are thought to be limited both spatially and temporally, being very focused around recreational areas during holiday periods.

2.9.2 Fish and fish resources

- Ecosystem impacts – the target species are a primary food chain fish species and their exploitation has trophic impacts on many other predatory fish species, marine birds and

mammals – these impacts have been modelled although there remain uncertainty regarding trophic effects (Shannon *et al.* 2004).

- Cape fur seals are often trapped and drown in nets;
- Species mixing between juvenile anchovy (*Engraulis encrasicolus*) and juvenile sardine (*Sardinops sagax*) is an “early season” fishery problem (before separating into discrete shoals) presenting fishery management issues such as discarding and dumping;
- Shifts in stock biomass of sardine from the west to the east coast has been evident in recent years, possibly linked to climate change;
- There is a seasonal bycatch problem with juvenile horse mackerel – this issue however is mostly restricted to the west coast. On the east coast (ASCLME area), high bycatches of horse mackerel is problematic at times;
- Monitoring, control and surveillance of bycatch and dumping is a concern.
- There are no transboundary issues on the east coast with the main small pelagic stocks contained within the Benguela and Agulhas systems but not extending beyond RSA borders.
- Stock status – yellowfin tuna depleted (IOTC assessments), bigeye tuna considered stable but at risk, swordfish uncertain, declining levels of shark, in particular blue and mako sharks in RSA waters;
- MCS issues – monitoring of high seas fleets, misreporting of landings, illegal transshipping and other IUU activities all pose a threat to resource sustainability in the region.
- Shark bycatch and targeting – fining is a global concern prevalent in South African and adjacent waters in the ASCLME.
- Bird bycatches – incidence of bird mortality on tuna-directed longlines is high (seasonally) on the Agulhas Bank;
- Depredation by killer whales is an increasing problem;
- Discarding and targeting on non-tuna species such as the oilfish *Rivettus pritiopus* is a growing problem in the tuna longline sector – also linked to declining availability of target tuna species;
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- Stock status of Cape Hakes – Shallow-water hake catch rate declining in recent years, although there are no major concerns at this point relating to spawner biomass levels. Deep-water hake stock levels are estimated to be < 30% of B_{msy} .
- Some bycatch species are targeted necessitating precautionary catch limits for kingklip and monk. Kingklip stock status is uncertain with closed areas and seasons on the eastern Agulhas Bank;
- Trawl substrate impacts are a global issue and is a concern in South African waters – Agulhas Bank most vulnerable due to higher benthic species diversity and sensitive deep-water corals;
- Bycatch of chondrichthyans and linefish, particularly in the inshore trawl fishery (under 110 m isobath) is problematic. Issue is under review and is a condition under Marine Stewardship Certification of the hake trawl fishery;
- MCS issues are mostly well controlled although discarding and misreporting of landings does occur.
- Significance of squid in ecosystem / trophic structure and impact of exploitation poorly understood.
- Trap fisheries are selective with no major bycatch concerns;
- Prawn trawl fishery (deep and shallow) has a major bycatch concern. Issues are similar to other shrimp fisheries on the East African coast (Mozambique, Tanzania, Kenya and Madagascar included).
- Incidental mortality of turtles is problematic – vessels deploy Turtle Excluder devices (TEDs). There have been experiments with bycatch reduction devices (BRDs) to reduce fish bycatch.
- Similar substrate impacts to demersal trawl for hake although target areas are mud banks with lesser substrate impacts.
- Hake, mackerel (*Scomber japonicus*) and ribbonfish (*Lepidopus caudatus*) bycatch.
- Discarding of juvenile horse mackerel
- Incidental mortality of large pelagic species including dolphins (common and bottlenose), large pelagic sharks, sunfish sp.
- Horse mackerel stock status uncertain – Precautionary catch limits are set.
- High proportion of endemism – stock status of most linefish species is uncertain or highly depleted (Mann 2000);
- High levels of misreporting and unknown mortality – monitoring of commercial and recreational catches is under capacity and generally inadequate;
- Bycatches of linefish in other sectors present major problems for stock management – main species of concern are snoek, cob sp. and numerous other common linefish and shark.
- Over-harvesting of deepwater stocks
- Lack of capacity to manage fisheries of this nature
- Lack of regional MCS capacity to monitor high seas demersal fisheries
- Impact of heavy deepwater gear on deep water substrate with potential impacts on unknown deepsea biodiversity;

2.9.3 Mammals

Operational interactions with fisheries

Seals are opportunistic carnivores that feed on a wide variety of prey. They have learned to scavenge from fishing activities, in particular targeting demersal, small pelagic and handline fishing boats. This has led to a strong negative reaction from fishermen, who view seals as a pest that competes with them for fish and in the process destroys their fishing gear. Some fishermen retaliate by killing seals at sea by shooting or clubbing them.

Pollution

Another cause for concern is the fact that marine mammals accumulate heavy metals and pesticides that may negatively impact their survival and reproductive rates. Transfer of the mother's accumulated load to her first calf may endanger its life.

Competition with fisheries for food

Marine mammals and in particular seals benefit directly from fishing in that they scavenge discards and remove fish from fishing lines and nets. However, as fishing activities by humans have reduced fish stocks on which some marine mammal species depend, the reduction in prey resources would have a negative impact on their populations.

By-catch of marine mammals

Dolphins, whales and seals are caught and killed in fishing nets and rock lobster traps and for certain species of dolphins this may have negative impacts on their populations. It is therefore necessary to provide means of preventing entanglements.

Climate or anthropogenic induced ecosystem changes

Habitat and/or prey of marine mammal populations may be affected by medium to long term ecosystem shifts caused by climate or human activities.

2.9.4 Reptiles

Direct Harvesting

Turtle nesting for all five species in the region is spread across multiple countries. The bulk of the nesting for the southwestern Indian Ocean loggerhead and leatherback turtles take place in South Africa, with ~15% shared with Mozambique and Madagascar. The turtle rookery in South Africa is the most important in the western Indian Ocean for leatherbacks (Hughes 1996), but the largest loggerhead rookery is in the northwestern Indian Ocean on Masirah Island, Oman (Baldwin *et al.* 2003). These are however genetically distinct sub-populations with negligible interaction between them (Bowen *et al.* 1994; Baldwin *et al.* 2003). Sea turtles should therefore be viewed in management units/sub-populations as they are unique entities. Nest protection of the loggerhead and leatherback sub-populations in South Africa started in the early 1960s as a consequence of large numbers of turtles being slaughtered along the beaches of Maputaland – presumably for meat and eggs (McAllister *et al.* 1965). Through various interventions, the nesting beaches of KZN have been proclaimed RAMSAR sites, marine protected areas and now a world heritage status, making it illegal to harvest sea turtles, or even disturb a turtle or be in possession of turtle products without a permit (Hughes 2009). Since this *in situ* protection started, nest raids have become incidental, and slaughtering of turtles exceptional. The effect has been that loggerhead and leatherback numbers have increased since inception (Nel 2008). Loggerhead numbers are still rising every season (Ezemvelo KZN Wildlife).

Habitat Destruction

Other than leatherback and loggerhead turtles, South Africa also houses noticeable numbers of two non-nesting species of turtles. These are green and hawksbill turtles, which are expected to be from rookeries in the Mozambique Channel including the Comoros and Seychelles (Hughes 1974; Louro *et al.* 2006). South Africa affords exemplary protection to most of the critical turtle habitat; including the developmental and feeding areas for hawksbills and green turtles and the nesting habitat for loggerhead and leatherbacks (Hughes 1974) through a network of coastal marine protected areas (e.g. iSimangaliso Wetland Park, Aliwal Shoal MPA, Pondoland MPA, Tsitsikamma National Park etc.). To a large extent it also eliminates pollution, with a relatively good inshore water quality, especially in the north of the country. No turtle tumors (fibropapillomas) have been reported yet. Potentially destructive activities such as coastal development do not take place without proper environmental impact assessments, and tourism activities and turtle viewing, beach driving and research are heavily regulated and require a permit (Hughes 2009). There is large pressure on the conservation areas adjacent to nesting beaches to be lucrative tourism areas. This sometimes results in the conflicting needs of security by adding artificial lights to remote areas, whereas dark beaches are required for turtle nesting and hatching (Jacobson and Lopez 1994; Witherington and Martin 1996; Wilson and Tisdell 2001). This is managed to a large extent but can become a problem in the near future.

Illegal activities and developments do take place but action is taken by conservation authorities and court cases are initiated if required (pers obs). Extreme damaging practices such as trawling is not common in the inshore waters (<3nm) of the South African eastern sea board as South Africa does not have a lucrative prawn/shrimp trawling industry (Fennesy and Isaksen 2007; Bourjea *et al.* 2008). Other destructive practices such as cyanide and dynamite fishing are rare or absent.

Incidental Mortality

The non-natural sources of mortality in South Africa that pose the greatest threat to sea turtles are long lining (an order of magnitude greater than any other recorded threats with 100 – 600 estimated mortalities per annum) (Petersen *et al.* 2009) followed by gill-netting (as bather protection nets with ~50 turtles caught per annum of which about half are released alive) (Young 2001; Nel 2008). Shrimp trawling is minimal in South Africa, with a very low estimated mortality (<5 per year). There are no estimates on the number of sea turtles that die through ghost netting, boat strikes or ingestion of plastic. Destructive fishing practices such as coastal gill nets, purse seiners (with FADs) and drift nets are banned in South Africa.

Local issues caused by others

Leatherback turtles nesting in South Africa have received the same legislative and conservation protection as loggerhead turtles, but have failed to show the same recovery (Nel 2008). One potential reason for this is the wandering lifestyle of leatherbacks, with potentially a greater overlap, especially with industrial fishing practices such as longlining (Petersen *et al.* 2009). However, there is no data to substantiate a claim of greater proportionate impact on leatherbacks – but investigation is required.

An alternative explanation is that the leatherback sub-population that is shared with Mozambique has a gradient of predominantly female nests in the north and male-producing nests in the south (South Africa). However, impacts on the nesting beaches of Mozambique might have suppressed the female producing component of the population, skewing sex ratios to males. Leatherback turtles are therefore successfully produced, but are not part of the female component that is counted in monitoring areas. Verification of this is underway through student research projects at NMMU.

Either way, leatherback numbers in the South Western Indian ocean are very small, with an estimation of less than 100 females nesting per annum (Louro *et al.* 2006; Lombard 2006; Nel 2008). Any death of a leatherback should be seen as a setback for the local population.

Regional issues

The regional issues regarding sea turtles and their habitats are extremely varied as there are diverse cultures with different socio-economic and political means, turtles use a wide range of habitats, they are distributed throughout the region, and have complicated life histories. The underlying drivers of most of the regional issues are poverty and a lack of resources, as well as a lack of capacity and expertise. Detailed searches for the region or on a country basis can be viewed on <http://www.ioseaturtles.org/report.php> (also see section on gaps).

Local Activities with sub-regional impacts

From a South African perspective there should be no substantial negative impacts that have sub-regional consequences. Sea turtle conservation in South Africa has been a flagship for marine conservation and has been a high priority for more than four decades. We have contributed to the establishment of international instruments to conserve sea turtles throughout the region, and have played a role of mentoring and training personnel of many other programmes in the region. We should continue to do so.

2.9.5 Birds

Possible impact of environmental change

There has been an anticlockwise shift around the southern African coast in the distribution of several seabirds, which has matched an altered distribution of anchovy and sardine (Crawford *et al.* 2008b). The anticlockwise shift in the distribution of anchovy and sardine may be related to climate change and has led to a mismatch in the distributions of breeding localities and prey for several seabirds in southern Africa (Crawford *et al.* 2008a).

Localised concentrations of large proportions of some global populations

As a consequence, about 70% of the global population of Cape gannets is presently located at Bird Island, Algoa Bay (Crawford *et al.* 2007) and Algoa Bay supports some 40% of the world population of African penguins (Kemper *et al.* 2007, Crawford *et al.* 2009). This renders large proportions of the overall populations of these species susceptible to local events, e.g. disease at one island or an oil spill near Port Elizabeth. The latter is a particular concern given the close proximity of the recently constructed Coega harbour to St Croix Island, which in 2009 held the world's largest colony of African penguins. After *Kapodistrias* ran aground off Cape Recife, Eastern Cape, on 29 July 1985 at least 137 penguins died from oiling and 1043 oiled penguins were rescued for rehabilitation (Randall and Randall 1986). More than 40 000 African penguins were caught for rehabilitation, relocation (to Cape Recife) or captive rearing during the *Treasure* oil spill of 2000 (Crawford *et al.* 2000).

Competition with fisheries for food

Seabirds feeding on anchovy and sardine compete with purse-seine fisheries for food and some have suffered large decreases in the past 50 years (Crawford 2007).

By-catch of seabirds

Seabirds are caught and drowned on long-lines or killed through colliding with demersal trawl gear, with substantial impacts on some populations including albatrosses and petrels that breed at the Prince Edward Islands and range north to South Africa's territorial waters (Environment and Tourism 2008).

Disturbance

Disturbance of coastal areas may have adverse impacts for seabirds and shorebirds utilizing the coastal environment (e.g. Randall *et al.* 2002, Williams *et al.* 2004).

2.9.6 Exotics and invasive species

Marine introductions to the south and east coast of South Africa are strongly connected to shipping and have occurred via two major vectors: ballast and hull fouling (Mead *et al.* in prep). Both the nature and intensity of these vectors have changed through time with the transition from slow moving wooden ships carrying dry ballast, to larger comparatively fast moving steel hulled ships carrying ballast water (Griffiths *et al.* 2009b). Today, species introduced via ship fouling tend to be dominated by sessile organisms such as ascidians, sponges and mussels, although small mobile crustaceans and other associated infauna may also be introduced via this vector. In contrast, species introduced by ballast water tend to be planktonic (e.g. dinoflagellates or copepods) or have planktonic life stages (e.g. bivalves and hydroids). In addition, because ballast water is most often loaded in ports where waters tend to be shallow and turbid, large volumes of sediment can be loaded along with ballast water. This sediment can support significant numbers of infaunal species that would not be translocated via external fouling (Hewitt *et al.* 2009). Due to the strong link between shipping and marine introductions, the threat from new alien species in the region remains high due to the high volume of shipping processed at Richards Bay and Durban harbours.

Although no introductions along the south and east coasts have been linked to aquaculture, the threat from this industry remains significant. Elsewhere in the world major ecological impacts have been recorded due to naturalization of the cultured species (Minchin 2007). Additionally, parasites, diseases and epifaunal species associated with target species may accidentally be introduced (Minchin *et al.* 2009).

2.10 Long-term predicted atmospheric changes

While there is general confidence in the large-scale patterns of change, at the local and regional scale the envelope encompassing the range of possible change remains large. Thus difficulties at the regional scale largely relate to the magnitude of change rather than the direction of change. However, regions that lie on the boundary between two regions of different projected change are especially sensitive to uncertainty in the spatial positioning of the boundary. The weak areas in understanding projected change are not due so much to the quality of the models, so much as to the resolution issues of what the models are able to capture, and the quality of the downscaling used to regionalize the GCM information. The largest concern in this regard is the temptation to select one model, or one data product, and over-interpret this possibly leading to inappropriate response actions.

In regard to limitations on the science of projecting climate change, there are a range of issues relating to sources of structural uncertainty (the tools), limitations in the science (understanding feedbacks, etc.), and uncertainty due to the natural stochastic elements of the coupled climate system (natural variability). Addressing these requires concerted efforts on a number of fronts, and is complicated by the limited infrastructural and human capacity in the region.

Further compounding these issues is the question of data availability. Across the region there are notable gaps in the observational system, while there is a need for data rescue of old archives, and access is limited through regulations or infrastructural constraints. This collectively hinders the development of the science. In particular it becomes difficult to assess the baseline natural variability of the system in some regions, and for some parameters. The marine sector is notably constrained in this regard.

While the above are areas of concern in relation to the core knowledge base, there is equally a limitation in relation to the translation, tailoring, and communication of climate projections, especially in regard to users understanding the limitations and assumptions of different data products. Little attention is currently given to this issue, with the consequence that data products are readily treated as more authoritative than their underlying robustness would allow for. In general the awareness of the nuanced nature of regional climate change in relation to the robustness of global scale warming is not well understood.

3. HUMAN ENVIRONMENT

3.1 Coastal and Island Populations – Current Status and Trends

Water supply and contamination issues

Apart from the coastal cities, the coast is sparsely settled. However, in some areas, particularly the 'south coast' of KwaZulu-Natal, the Port Alfred and Cape St Francis areas to the east and west of Port Elizabeth, and along the Garden Route, there are many coastal towns where homeowners are absent for much of the year. The influx of people to these coastal towns during holiday seasons places tremendous pressure on infrastructure and services. For example, Sedgfield on the Garden Route has a water storage capacity of only 4-5 days, and the municipality is dependent on water pumped from the Karatara River for the town's water supply. The recent drought in the area resulted in the river drying up over the 2008-2009 holiday season, necessitating the implementation of emergency measures to provide water to residents. Many households have now installed borehole pumps, which may result in over-exploitation of coastal aquifers, with negative consequences for terrestrial and estuarine ecosystems. In the Port Alfred area, most of the coastal settlements have inadequate water supplies, and those that source water from boreholes close to the sea or from desalination plants must contend with brackish water. Expansion and development of new coastal settlements and resorts is constrained by such water supply problems. In the Port Alfred area, most holiday homes along the coast make use of septic tanks for sewage disposal, but overflows and leaks may cause groundwater contamination as well as nutrient enrichment of estuarine and inshore environments.

Development pressure along the coastline

The intense development pressure on the coastline threatens natural biodiversity and its ability to provide ecosystem services such as protection from storm damage. Many linefish species targeted by increasing numbers of recreational fishers are considered severely overexploited, while development is in danger of ruining the aesthetic appeal of scenic areas like the Garden Route. The lack of effective land use management and spatial development planning by local Municipalities, particularly in the underdeveloped former homeland areas such as Kwa-Zulu, Transkei and Ciskei, has also facilitated strip development along many parts of these undeveloped coastal areas.

Poverty and pressure on natural resources

Along the coastal sections of the underdeveloped former homeland areas such as Kwa-Zulu, Transkei and Ciskei, high rural population densities, pervasive poverty, a lack of development and very limited control over natural resource use have resulted in the stripping of coastal shellfish and other natural resources for subsistence consumption. Almost all of this use of coastal resources by poor local residents is unregulated and illegal. In some cases disputes over land and natural resources have also resulted in considerable conflict between local communities and the conservation authorities. Where the opportunity presents itself, many rural residents of these areas also harvest fish and shellfish along the coastline for sale to tourists at local resorts/holiday settlements.

Abalone poaching

Abalone poaching for illegal export to lucrative Asian markets has been a major activity along the South African coastline over the last decade or more. Many of these poachers are well equipped, armed and dangerous. In some cases they use poor local residents to assist or supply them. While there has been some success in curbing such activities along some parts of the coastline, attempts by conservation authorities to enforce compliance with regulations in many areas have been undermined by capacity constraints and threatening and violent tactics used by poachers. Some efforts are also now being made to facilitate the commercial production/farming of abalone for the export market.

Land degradation and erosion

Land degradation and erosion in inland areas, associated with unsustainable intensive commercial land uses (i.e. forestry, sugarcane and livestock) and - in the poverty-stricken communal areas, heavy grazing pressures and poor land use management practices - results in high levels of land degradation and erosion. This has resulted in heavy sediment loads in many rivers and their associated estuaries and coastlines.

Management of marine resources and coastal development

Conservation of marine resources and the management of their use is a responsibility that is shared by a number of different authorities along the South African coastline. The Marine Protected Areas (MPAs) along the coast are managed by a variety of provincial and national government institutions such as SA National Parks and the various provincial departments of Environmental Affairs. The monitoring and management of the use of marine resources outside of these MPAs is the responsibility of Marine and Coastal Management (MCM) who have very limited human and physical resources in most of the areas along the coastline. The ability of these authorities to ensure compliance and conservation is constrained by capacity constraints.

The local municipalities along the coastline are responsible for land use developments and planning in the non-reserve areas as well as the management of municipal waste and public facilities. In general, most of the local municipalities are under staffed and have problems securing and keeping suitably qualified staff. This is particularly problematic for more rural municipalities. One of the consequences of this lack of capacity is that the Municipalities have taken a long time to make the required progress towards developing and implementing IDPs, Spatial Development Plans and Land Use Management Systems. While all municipalities now have IDPs, not all have SDFs and very few have progressed to the Land Use Management Systems phase.

The conservation of natural resources and ecosystems has historically not been prioritised by Local Municipalities and has often been seen to be in conflict with development. Fortunately, the growth of nature- and coastline-based tourism in some areas has sensitized many local authorities to the need to protect their natural heritage in order to ensure that tourists are attracted to their area and tourism can contribute to the areas economic growth.

Climate change

Property owners and local municipalities along South Africa's coastline have recently faced a variety of problems relating to storm damage. Climate change is expected to increase the frequency and intensity of storm events and associated flooding. In some areas it will likely also result in more frequent droughts. Increasing water scarcity will increase pressure for dam/water storage projects and water extraction from rivers, which will probably have negative effects on rivers and estuaries. In the long term, climate change may also have negative impacts on some productive economic activities, and could result in population movements.

3.2 Sites of religious or cultural significance

Many of the accessible wrecks around our coast have been damaged by the divers who visit them. While some of this damage is the result of anchoring on the site, the vast majority is from divers looting sites for souvenirs. Both are indicative of a lack of understanding of the importance, fragility and non-renewable nature of underwater cultural heritage. Despite the fact that historical wrecks have enjoyed legal protection as archaeological sites in South Africa since 1986, there remains a belief amongst some divers that wrecks are an underwater 'scratch patch' where anything found is free for the taking. To counter this lack of awareness, the South African Heritage Resources Agency has produced a "Notice to Divers" sign and poster, which outlines the legal position of wrecks. Signboards have been deployed at harbours and slipways along the entire coast, and the posters are being distributed as widely as possible. (<http://www.sahra.org.za/shipwrecks.htm>)

3.3 Human health

Apart from obvious concerns about the health and welfare of all South Africans, a number of the aspects discussed above have implications for the country's marine and coastal environment.

For example, untreated sewage from bucket toilets, pit latrines and septic tanks may enter the coastal zone via stormwater runoff or groundwater flow, while large volumes of poorly treated sewage effluent is discharged into rivers from wastewater treatment works. This may result in elevated nutrient levels in estuaries and the inshore environment, causing excessive growth of algae and water weeds, which subsequently die and decay. The decomposition process causes oxygen depletion of the water column and benthic sediments, and in extreme cases may be replaced by anaerobic decomposition, producing foul-smelling methane and sulphide gas that is toxic to marine life. Furthermore, the faecal bacteria in sewage may cause diseases of fish and other organisms, and make seafood unsafe for human consumption.

The poor education levels in some parts of the country compromise people's employment opportunities and thus limit their alternatives to a subsistence lifestyle. Along the Wild Coast (former Transkei homeland) of the Eastern Cape, as well as parts of the KwaZulu-Natal coast, rural communities rely heavily on intertidal marine resources to supplement their diet. In places along these coastlines the rocky shore is regularly stripped of all sessile organisms, posing a severe threat to biodiversity and the sustainability of these resources.

Given the large disparities in income and education amongst population groups in South Africa, there are considerable differences in attitudes towards conservation and to Marine Protected Areas. On the one hand there is considerable support for conservation efforts by many wealthy local residents and holiday homeowners, as well as from nature-based tourism developers/operators, and the local conservation organizations and environmental activists. Many of these people have been attracted to the coast due to its scenic beauty and natural character and wish to conserve this. As a consequence, there are many small local conservation and environmental education efforts initiated and run by wealthier permanent residents with vested interests in the conservation of the coastline and marine environment and in tourism development.

However, there are also many wealthier visitors and residents of the area who are not environmentally aware and do not actively support conservation efforts. Many of these people are attracted to the area because of the fishing or other recreational activities available and are opposed to conservation efforts that are perceived to restrict their recreational activities and lifestyles.

In addition, there is the 70% of the population (mostly black Africans or people of colour) who live in poverty (or have low incomes) and usually have low levels of education and environmental

awareness. Most of these persons live from hand to mouth and do not have the luxury of being able to abstain from the exploitation of local natural resources. They depend on these resources for their water, sanitation, fuel wood, building materials and food and medicinal supplies. Some also have livestock that depends on the natural veld for its nutrition. Historically, many of these residents have depended on the sea for food and income (from fishing). Many of them have also depended on the coastal forests and forest plantations for their employment as well as for fuel and building materials. The collapse of the local fishing and timber industries, and the creation of protected areas has resulted in considerable unemployment and economic hardship and decline in many of these coastal communities. It is not surprising therefore, that such communities would have developed negative attitudes towards the conservation of marine and forest resources. The fact that many of these protected areas were imposed on them by the apartheid government in a very top-down manner has created further antagonism towards such initiatives.

Recent fisheries licensing processes aimed at restricting fishing effort are also perceived to have benefited the commercial sector more than the small-scale coastal fishing sector. The recent attempts to develop a Bay Management Proposal for the Plettenberg Bay area has shown that there is considerable resistance to the expansion of MPAs from such disadvantaged communities and from local commercial and recreational fishermen. As a consequence of this, more emphasis is being placed on management and control areas – rather than exclusion zones.

Unfortunately, the growth of tourism has not provided alternative livelihoods for most of the disadvantaged residents along the coastline. Much of the growth of tourism along the Garden Route, Eastern Cape and Kwa-Zulu Natal coastlines have been associated with the construction of holiday homes. This type of development provides few jobs outside of the construction phase. Most of these houses/flats remain empty for large periods of the year and the influx of visitors during the summer and other holiday periods is not sufficient to sustain the development of a viable (non-seasonal) retail and service sector. In addition, many of the disadvantaged residents in these areas cannot access jobs in the tourism sector due to their spatial dislocation from tourism sites/centres and their lack of suitable language, managerial and practical skills for the sector. This difficulty in securing access to the economic benefits of tourism represents an additional obstacle to the transformation of local attitudes towards coastal/marine conservation and MPAs.

So while there is considerable support for conservation effort, there is also considerable apathy and active opposition. The development of coastal- and nature-based tourism has encouraged the growth of environmentalism, but the skewed distribution of access to and economic benefits from these developments effectively limits the extent to which it can be used to expand support for conservation measures. The key to achieving sustainable economic growth based on coastal- and nature-based tourism will lie in shifting it from a seasonal to a sustained economic activity that provides economic opportunities for all sectors of society, but particularly for the poor.

3.4 Infrastructure

Ports: The process of expanding and deepening port facilities in South Africa is a cause for concern in terms of its impact on the coastline and marine environment, as well as the threat of pollution associated with increasing volumes of international shipping traffic. The new Coega/Ngqurha port in the Eastern Cape is located adjacent to the Addo Elephant National Park and its newly acquired Marine Protected Area (MPA), which includes the seal and penguin colonies on Bird island. The risk of oil spills from the proposed oil refinery and tanker docking facility could pose a serious risk to the marine life and ecosystems of this MPA and the adjacent coastline.

Roads: The infrastructure in most small coastal towns is inadequate to cope with the influx of holidaymakers during the summer season, leading to severe traffic congestion. In many areas, bridges and causeways for coastal roads and railway lines have disrupted estuarine floodplains, aggravating floods, increasing sedimentation and limiting seawater exchange, which has a range of ecological impacts.

A decision is imminent regarding environmental authorisation for the N2 Wild Coast Toll Road Project tendered by SANRAL. The road is intended to improve the existing road link between East London and Durban – a current distance of approximately 631 km. Approximately 80% of the total route utilises existing road alignments of the N2 and R61 routes. The remaining 20% consists of a new section between Port St. Johns and Port Edward, referred to as the “Greenfields Corridor”, which will shorten the journey between Durban and East London by an estimated 81 km. However, environmentalists have objected to the project on the grounds that the Greenfields section passes through the Pondoland Centre of Plant Endemism, and that a tolled road will not address the socio-economic needs of the local communities.



Figure 34: The route of the proposed N2 Wild Coast Toll Road

Electricity: The electricity capacity constraints and power cuts over the last two years in South Africa have had significant negative economic impacts. While the current economic recession has reduced the demand for electricity and alleviated the electricity problems, these problems are likely to resurface as economic growth recovers. This will remain the case until significant new power generation capacity can be developed. One concern associated with investment in electricity power stations is the plan to develop a number of new nuclear power stations along the coastline. This is advocated as a means of reducing South Africa’s dependence on coal power stations, which are major air pollutants and make the country the 14th highest emitter of greenhouse gases in the world.

4. COASTAL LIVELIHOODS

4.1 Small-Scale Fisheries

SWOT Analysis

<p>Strengths</p> <ul style="list-style-type: none"> • Relatively well understood ecosystems and species • Strong marine science research capacity • Growing consumer awareness for responsible fishing practices • Internationally linked small-scale fishery NGO base • Low capital investment needed to harness the fishery resource in the small-scale sector; simple fishing techniques such as nets, traps and lines • Good local knowledge of the fishing grounds • High productivity and biodiversity • Long coastline • Numerous formal and informal refuges in region for certain shellfish species with little or no fishing 	<p>Weaknesses</p> <ul style="list-style-type: none"> • Low level of education in most fishing communities • Eroded customary laws and practices • Policy vacuum for many years: most co-management pilot projects failed as no support capacity • Lack of trust in fisheries authority • Poorly studies social systems • Social science research capacity not focused on small-scale fishery systems • Many informal fisheries have not yet been recognized by government • Lack of local management plans (fisheries and ICZM and Local Economic Development) • Low participation of civil society in fisheries support work • No small-scale fishers training infrastructure • Lack of alternative employment opportunities in marginalised communities • Poor post-harvest structures • Pricing determined by bulk-buyers and processors • Current top-down management system with lack of legitimacy among local stakeholders • No special protection of the small fisheries from the competition of industrial fishing boats • Weak arrangements to ensure that the information reaches the fishing communities • Low levels of monitoring, enforcement and compliance • Means for fishing surveillance insufficient compared to the length of the country's coastline • Marine protected areas and fishing reserves exist but many lack legitimacy resulting in illegal fishing activities
<p>Opportunities</p> <ul style="list-style-type: none"> • Very diverse in terms of species, gear and social context • The draft policy embrace a human rights based approach, meaningful co-management and attention to post-harvest opportunities. • Management could be improved by 	<p>Threats</p> <ul style="list-style-type: none"> • Coastal projects are implemented without clear policy guidelines • No cohesion between Integrated Coastal Management Act, Marine Protected Area policy and small-scale policy • Control of large industry over the marketing • Macro-economic approach to small-scale fisheries

<p>consolidating, co-management structures, community-catch monitoring and capacity building initiatives</p> <ul style="list-style-type: none"> • New policy offers possibility for increased legitimacy of input and output regulations • Establishment of new governance model whereby a sense of ownership is instilled among resource use through legitimate rights and co-management • New policy emphasises post-harvest sector and role in local development • Diversify market share by value adding and better post-harvest strategy • Marketing of regional delicacies and traditional recipes to the tourist market • Adding value to small-scale catch by labelling it's unique characteristics • Certification of small-scale fisheries based on traditional character or ecological sustainability • Better linkage of local development needs, and with integrated coastal management • High demand from local and export markets • Small-scale mariculture development opportunities 	<p>instead of valorization of traditional communal character as well as ecologically less harmful fishing methods</p> <ul style="list-style-type: none"> • Political interference with small-scale policy process and allocations • Commercial and small-scale fisheries governance systems overlap in the inshore zone • Oversubscribed inshore resources by commercial, recreational and informal small-scale fisheries sector • High levels of IUU across inshore and offshore sectors • Confusion about "legal" status of many fisheries • Lack of institutional capacity within fisheries authority to implement various sector policies • Increased fuel prices for motorized small coastal fisheries • Lack of coordination between government departments involved in coastal activities • Conflicts among multiple users; namely fishers, conservationist, coastal residents • Pollution from land based activities • Food insecurity for protein insecure communities
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4.2 Tourism

SWOT Analysis

<p>Strengths</p> <ul style="list-style-type: none"> • Favourable climate. • Rich levels of coastal biodiversity, albeit these are declining and constantly being degraded. • Long scenic coastline. • No mass tourism as yet. • Well developed coastal tourism infrastructure. • Pro poor tourism has been introduced throughout a number of layers of the economy. • Community oriented success stories are few but those that exist set the benchmark • Advanced tourism institutional capacity • Well established informal tourism economy 	<p>Weaknesses</p> <ul style="list-style-type: none"> • Limited follow through of tourism livelihood policy. • Tourism capacity lacking in service delivery at provincial and municipal government levels uncondusive to tourism development. • Poorly designed communities based tourism models by interventionists • Supply driven community tourism projects as opposed to demand driven. • Lack of value chain distributions through the community tribal structures. • Poor market access of community level tourism products.
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<p>Opportunities</p> <ul style="list-style-type: none"> • Extend the season of enterprises by developing new products to create better employment conditions and to provide a stronger base for local economic development. • The historically disadvantaged are a significant emerging domestic tourism market. Identify and encourage commercial responses to this opportunity. • Encourage business relationships between foreign entrepreneurs and local and emerging entrepreneurs, partnerships. • Exercise a preference for business and land tenure arrangements that directly benefit local communities and/or conservation. • Government and established businesses need to redress previous imbalances, and to enable the historically disadvantaged to engage in the tourism sector. • Develop joint ventures in which communities have a significant stake, and with appropriate capacity building, a substantial role in management. Communal land ownership can provide equity in enterprises. • To strengthen value chain links at the lower levels of the tourism economy. 	<p>Threats</p> <ul style="list-style-type: none"> • Culture of poverty associated with sub-culture of crime. • Over dependence on community based tourism as a panacea for local economic development. • An over-dependency on tourism to deliver local economic development to coastal communities • Crime and often perceived crime is still an area of concern given no provision of guaranteed security for any tourist. • Poor competency levels of provincial and municipal tourism officials working in the livelihoods sector. • Not continuing with the emerging pro poor tourism concept of enhancing business linkages with the formal and informal tourism sector.
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4.3 Mariculture

<p>Strengths</p> <ul style="list-style-type: none"> • Climate on the coast is suitable for a number of culture species for which the technology has been or is currently being established (e.g. abalone / finfish) • Strong technical and research support is available at the country's Universities and research institutions • Training in aquaculture at a tertiary level. • Mariculture development nodes are being developed to promote private sector investment. Some are located in IDZs. • Strong governmental support for mariculture development. A credible, industry focused pro-active policy dispensation has been developed 	<p>Weaknesses</p> <ul style="list-style-type: none"> • High barrier entry to most operations as aquaculture is generally capital-intensive • High energy nature of the coastline makes sea-based culture systems capital intensive and technically difficult to develop • The potential for small scale mariculture production models to be developed as a tool to improve coastal livelihoods is likely to be limited • Limited dedicated aquaculture veterinarian / health laboratory services • A lack of high quality aquafeed manufacturing capability • The demand for coastal sites is high and there is competition with other resource
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<ul style="list-style-type: none"> • Good infrastructure to support development (e.g roads, power, telecommunications etc) 	<p>users. The cost of coastal land is high, and access to cost effective coastal sites is therefore limited</p>
<p>Opportunities</p> <ul style="list-style-type: none"> • There are opportunities to invest in commercial scale farms in rural areas, and in doing so significantly impact coastal livelihoods • Opportunities to develop mariculture development nodes • There is potential to develop community based farming systems for some high value finfish species • New marine fin-fish species such as kob and yellowtail can be cultivated in land based systems. There is potential for yellowtail production in sea-cages • There is a good potential for the abalone farming sub-sector to be expanded in terms of both land based facilities and ranching • Culture technologies are being developed for new species (finfish, mollusc, crustaceans). This will broaden the range of culture / development opportunities 	<p>Threats</p> <ul style="list-style-type: none"> • The permitting and approvals process is onerous and compliance with the system is an expensive and time consuming process - this is now viewed as a barrier to the small to medium sized investors entering the sector • High cost of compliance with environmental and health regulations • There is a lack of veterinarian support services • Biodiversity legislation is restrictive and confusing and potentially damaging to the development of the ornamental fish culture sector

4.4 Agriculture and Forestry

<p>Strengths</p> <ul style="list-style-type: none"> • Vibrant economy based around major urban centres concentrated in the coastal zone ensures a prominence to coastal development issues at high policy level. • Coastal agriculture not just for subsistence but strongly for export too and this is likely to continue. • Value of coastal forests – directly to the economy and in terms of ecosystem services – readily acknowledged and solid efforts in participatory forest management already being made. • Excellent legislation in place to ensure sustainable coastal management. 	<p>Weaknesses</p> <ul style="list-style-type: none"> • Sustainability of small scale community livelihoods projects and efforts to manage coastal resources sustainably and at community level is a challenge. • Excellent national policy is not backed up by capacity to implement this policy at a local level. • Poor access and infrastructure in rural areas slows down sustainable development.
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Opportunities

- South Africa is seen as an engine of growth across the continent and has an important political and economic role internationally, not just within Africa or the WIO region, which presents an incentive for policy-makers, government officials and civil society to work together to effectively manage coastal resources, develop non-marine resource based livelihood alternatives such as agriculture and forestry activities, and thus set an example to other countries (and perhaps even best practice) in doing this in a sustainable and participatory way.
- Huge potential exists for responsible tourism development in under-developed coastal areas.
- The relatively new concept of forestry outgrowers who obtain support from a commercial forestry partner could provide opportunity to communities in areas adjacent to commercial forestry areas.
- Non-traditional high value crops could be grown in various marginalised coastal areas to bring benefits to communities.

Threats

- The vested interests that have long held sway and economically dominated the coast (e.g. mainly private sector commercial interests) may not respond well to the policy shift in favour of more participatory community-based coastal resource management.
- South Africa's land reforms still working their way through the system so it is not yet clear what impact this will have on access to and ownership of the land required for land-based economic activities like agriculture and forestry in the coastal region.
- Increased tourism around the World Cup and thereafter may put additional pressure on coastal resources in areas where tourism is well established, which may create (temporary) employment but could also jeopardise some subsistence agricultural and forestry activities if not well managed, and there may not be sufficient capacity yet at local levels to manage a significant increase in tourist numbers.
- Commercial forestry in the coastal zone may have a severe impact on biodiversity and seriously disrupt sensitive and rare habitats.
- Lack of capacity at a local level to implement national policy could threaten effective implementation.
- Poverty reduces options for coastal communities and encourages illegal activities that are detrimental to coastal resources.

4.5 Energy

<p>Strengths</p> <ul style="list-style-type: none"> • Strong and growing economy, offering good business environment and skilled workforce to the sector • Support of government to the Oil & gas sector, with growing energy demand • Proper legislation in place for environment in general, and more specifically for sustainable coastal management • Environmental regulations • Technical and financial capacity for agribusiness (and growing of biofuels feedstock) 	<p>Weaknesses</p> <ul style="list-style-type: none"> • National policies and strategies are not supported by implementation capacity at a local level. • Huge disparities among the population in terms of livelihoods, incomes, access to services, etc., which makes it difficult to build national strategies and policies applicable to all local contexts • Poor access to infrastructure in rural areas slows down sustainable development • Limited availability of land for biofuels
<p>Opportunities</p> <ul style="list-style-type: none"> • Oil and gas activities are implemented by large companies engaged in corporate social responsibility • The huge energy demand of the country calls for improving efficiency for oil and gas processing and use, and for supporting the development of renewable energies • In its role of regional leader, South Africa could be a model for sustainable coastal development 	<p>Threats</p> <ul style="list-style-type: none"> • Important maritime traffic along South African's coasts, with serious oil spill risks. • Rapid economic development could make the implementation of environmental legislative framework difficult • Economic interest of biofuels could reduce food crop areas and affect food security • Poverty reduces options for coastal communities and encourages illegal activities that are detrimental to coastal resources.

4.6 Ports and Coastal Transport

<p>Strengths</p> <ul style="list-style-type: none"> • Extensive development of main ports with modern facilities. • Largest general-cargo port in Southern Hemisphere and largest bulk export port in Africa. • Private-sector provision of road transport ensures timeous movement of goods. • Well-developed cargo clearing and handling systems to support import-export trade 	<p>Weaknesses</p> <ul style="list-style-type: none"> • Monopoly by state-owned enterprise reduces rail and port efficiencies. • Over-regulation stifles private-sector investment and initiatives. • Flawed transport policy is biased in favour of road haulage and has led to decline in rail transport. • Flawed black economic empowerment policy has led to loss of skills and declining efficiency of rail and ports. • Geography of coastline and heavy seas are not conducive to small craft operations. • Failure to develop coastal shipping
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	<p>between South African and other east coast ports.</p> <ul style="list-style-type: none"> • Rampant corruption at all levels of government.
<p>Opportunities</p> <ul style="list-style-type: none"> • Development of new industrial node at port of Ngqura. • Expanding container trade in Cape Town and Durban will create more jobs. • Long-term shift of manufacturing to the coast should increase transport efficiency. • Privatisation or concessioning of railways, ports and pipelines would increase efficiency and competition. 	<p>Threats</p> <ul style="list-style-type: none"> • Continued unionisation of nationalised transport may hamper development. • Inter-port competition is favouring Mozambican and Namibian ports with less-restrictive operating environments for future corridor development. • Decreasing proportions of funding for national transport infrastructure and equipment from the fiscus may hamper port and transport growth. • Political patronage, labour-market rigidity, skills deficiencies and lack of training institutions pose threat to sustainability of port and transport operations. • Declining national manufacturing capability and increasing dependence on bulk commodity exports may place limits on ability to afford imports and inhibit port general cargo and container growth. • Failure of manufacturing economy to compete with imports from the East. • Growing political dissension could lead to radical left-wing government.

4.7 Coastal mining

Strengths <ul style="list-style-type: none">• Strong environmental regulations and enforcement• Long tradition of mining• Government supports mining industry• Strong coastal zone development policy• Investment agencies for each province	Weaknesses <ul style="list-style-type: none">• Electricity shortage for mines• Conflict between mining, tourism and environmental interests
Opportunities <ul style="list-style-type: none">• South Africa is rich in mineral resources• Many mining projects on-going• Heavy sand potential in the Transkei area• Mining projects develop infrastructure, employment and ancillary business opportunities	Threats <ul style="list-style-type: none">• The federalism system of the government may affect the status of the project as the EIA process depends on the localization of the project.• Some political leaders call for nationalization of mines

5. PLANNING AND MANAGEMENT

5.1 National Disaster Management Plans

- As there are a variety of potential disaster events, contingency plans may have to be adapted where necessary, and in some instances these plans may not exist.
- Early Warning Systems for storm surges, tsunamis, and extreme weather conditions may only be activated a matter of hours before they occur, leaving very little time for relevant authorities to be notified and to react.
- Communication and coordination between the relevant authorities may not always be well-established.
- Communication to rural communities in the event of an upcoming disaster

5.4 Areas under special management

Poaching – The poaching of marine resources has become an increasing problem in protected areas as stocks in certain open areas are becoming increasingly depleted. Criminal elements have become entrenched in certain areas, with high value resources being harvested aggressively for sale outside the areas. Poaching for own consumption is viewed as a lesser threat, but one which still needs to be addressed in appropriate ways. Law enforcement capacity is inadequate in most areas, meaning that it should be increased, but also that community support for conservation measures is needed.

Coastal development – Inappropriate coastal development is a problem mainly outside protected areas, and in particular it is a problem along the margins of estuaries and within their historical flood plains. The new ICM Act introduced a “Coastal Protection Zone” which covers the 100m of coast immediately landward of the high-water mark in urban areas and 1 kilometer of coast in rural areas, where special authorization will be required for development. Pollution is mainly a problem in urban coastal waters and estuaries, and is related to both development and inadequate or neglected infrastructure like sewerage treatment works

Conflict between users and lack of participation in planning process (leading to conflicts) – This can take the form of conflict between legal users (eg. fishers and scuba-divers) or conflict involving illegal activities. Here (apart from hardened poachers) the actors do not view themselves as the main problem (or even illegal) – for example well-off landowners do not regard their illegal jetties and their fences restricting access to estuaries as a big problem, and neither do subsistence bait collectors regard their exceeding bag limits or using illegal gear as the problem – but they regard each others activities as causing the conflict. Clearly joint approaches, such as being done in the development of estuarine management plans are an important part of the solution. This experience shows that such approaches were largely lacking in the past.

Lack of education and awareness of the value of managed areas – This is a key area to which all levels of government, NGOs and civil society can contribute. It may require that parallel approaches to address regulations or other measures which are regarded as unfair are addressed as well. Some of the benefits also need to accrue locally, and to those in most need of them.

Conflict over increasing area under protection – This is real but can be addressed by a consultative approach and through guidance by acceptable policy and strategy documents (eg. on MPAs, on Subsistence Fishing) to ensure that the “costs of conservation” are borne equitably. (Such documents are under preparation but are still needed in approved form). Zonation of Protected

areas is a very powerful tool in ensuring that communities and stakeholders are not “shut out” of areas altogether, although they may need to do things differently.

5.5 Monitoring, Control and Surveillance

- Financial constraints
- Human capacity: the current ratio of FCOs per kilometer of coastline is 1:17 compared to the international norm of 1:5, making shift work and 24 hour coverage impossible
- Lack of night- and thermal-imaging capabilities
- Outdated equipment and aging small craft fleet
- Full-time aerial platform with offshore and night vision capabilities needed
- Split mandate: South African Police Services (SAPS), South African National Defense Force (SANDF), South African Revenue Services (SARS) and local authorities (municipalities)
- Development of compliance monitoring and transgression databases.