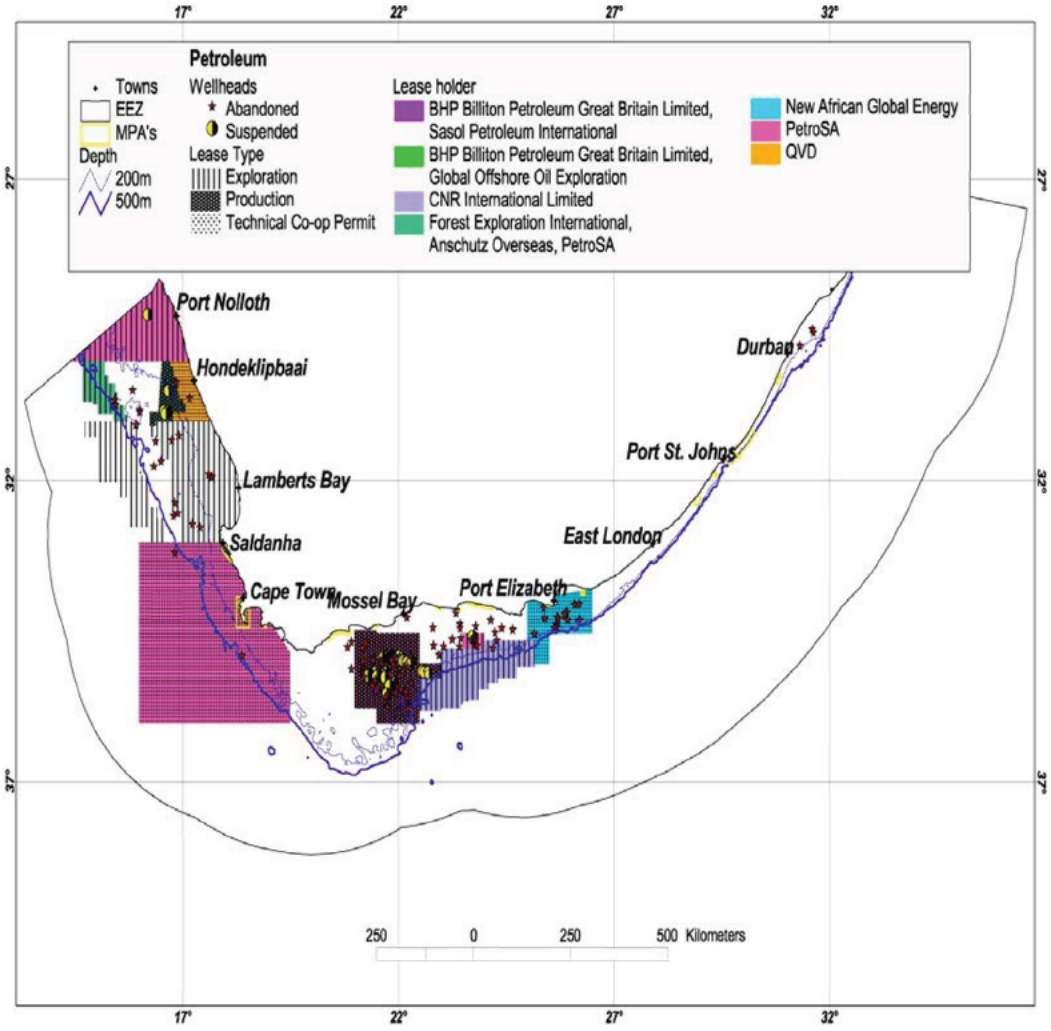
have not yet been developed. More recently, in 2012, an application for exploration rights in an area located between Saldanha Bay and Kleinzee was granted. The relevant right covers an area of 37 000 km² and is located between 150 km and 360 km from the coastline in water between 500 and 4 000 m deep. An additional discovery known as the Ibhubesi gas field (off the West Coast) has been identified. Currently there are over 300 off shore exploration wells in the South African EEZ. Developments in off shore drilling technology increase the likelihood that this industry will continue to grow. [xliv]

Map: Existing Offshore Oil and Gas Activities [xlv]



❑ Municipal and Industrial Waste Water Discharge into the Ocean

The discharge of waste water into the ocean environment in South Africa is generally comprised of municipal waste water (domestic sewage), industrial waste water and storm water flow. There are over 60 licenced pipelines which discharge effluent along the South African coast. Twenty discharge domestic sewage, 30 discharge industrial wastes and ten discharge mixed effluent. [xlvi] In South Africa disposal of sewage into the marine environment ranges from

preliminary treated sewage, to secondary treated effluent discharges in the surf zone and estuaries, to untreated sewage from informal settlements occurring in storm water runoff. [xlvii] South Africa discharges approximately 66 million litres of domestic sewage into the marine environment on a daily basis. [xlviii] The primary sources of industrial waste water discharged are oil refineries, chemical, textile, paper and pulp industries, aluminium smelters, coastal mining and fish processing plants. [xlix] South Africa discharges approximately 230 million litres of industrial waste [l] and approximately 360 million litres of mixed effluent on a daily basis. [li]

Storm water runoff from urban areas is difficult to control or predict. It is heavily dependent on rainfall which is collected and channelled from non porous surfaces into outlets onto beaches or rocks. Both Cape Town and Durban have over 100 storm water outlets in their immediate urban area. The runoff often contains heavy metals, oil residues, nutrients and pathogenic microorganisms. The first storm water flow of the rainy season is normally the most contaminated.[lii] Large amounts of plastics are also introduced into the marine environment during storm water deposits.

- **Ocean Cultural and Social Use**

South Africans engage in a wide variety of consumptive and non consumptive uses of marine resources and the marine environment. Coastal tourism has been estimated as generating approximately 13.5 billion Rand to the South African economy annually.[liii] The true value to South Africa's citizens of enjoying access to and use of thousands of kilometres of pristine coastline is incapable of calculation. Recreational fishing is a popular activity in South Africa with approximately 500 000 active sports fishermen. The value of recreational fishing is difficult to quantify but it contributes substantially to the South African economy.[liv] Diving is another popular recreational activity, as are sun bathing, swimming and picnicking. Some religious groupings use the coastal environment for performance of activities and ceremonies. Many South Africans also gather sea water for medicinal purposes. The imagery of the sea is deeply embedded in the beliefs, poetry and songs of coastal communities.

e. Emerging Ocean Resource Usage

Ocean energy could potentially be derived from the various characteristics of the sea. For example, the rise and fall of waves could be converted into hydraulic pressure by mechanical compression devices. Such pressure could drive a turbine generator to produce electricity, while the tidal variation, sea current and different thermal (temperature) layers in the ocean could also be used for energy production. The main reason why these energy sources are not currently being harnessed is that no reliable technology exists that can economically generate electricity. Various companies are testing systems internationally to develop technically viable solutions. Once technical reliability has been proven, cost effectiveness in relation to other solutions will have to be established. Research surveys of the Agulhas Current on the east coast of South Africa and of wave energy have proved the technical feasibility of extracting significant large scale renewable energy from the Agulhas current and waves. [lv]

The world's focus on the production of renewable energy includes initiatives such as off shore wind farms, tidal energy farms and even the use of the chemical composition of sea water to generate energy. Initiatives are also underway to consider methods by which the ocean seabed can be used for carbon storage.

The exploitation of marine resources continues to expand in ways that are not always predictable. South Africa is a water scarce country and plans have been made to explore the large scale use of desalinated sea water. Recently there has been a significant increase in the aquaculture industry. Marine tourism has also increased significantly, particularly in areas such as boat based whale watching and shark diving excursions. An economic assessment of the boat based whale watching industry in South Africa established that this sector generated about R45 million in tourism expenditure, contributing approximately R37 million to South Africa's GDP in the 2005 year.

Many countries are prioritising the research of technologies aimed at resource exploitation, deep sea exploration and marine biology. Focussed research is also being conducted on marine reproduction technologies, fine processing of

marine biological resources, exploration and extraction of marine pharmaceuticals and the exploitation of chemical resources in sea water.

The harvesting of seaweed is a growing industry worldwide. Seaweed contains a natural gum used as an additive, binder and emulsifier for foods, pharmaceuticals, beverages and the cosmetic industry. [lvi] Commercial cultivation of seaweed is now taking place in over 35 countries and it is estimated to be a $5.5 6 billion industry. South Africa does not currently cultivate seaweed on a large scale. In 2002 about 2 000 tonnes of brown seaweeds was collected from beaches and exported for alginate extraction, 500 tonnes of kelp was collected to produce an extract that is used as a plant growth stimulant and some kelp was also collected for feeding abalone.[lvii]

It is apparent that both the manner and extent of human exploitation of marine living and non living resources has increased rapidly in the past 50 years. Various user groups who did not previously impact on one another now find themselves using similar areas of the marine environment. It is also increasingly evident that the marine environment itself is being impacted by human usage in ways which were not previously anticipated. This has placed a responsibility on sovereign states to manage their marine resources in a more coherent manner. States are increasingly seeking to formulate management approaches which optimise marine resource usage in balance with the need to conserve these resources for future generations and ensure that they meet their ocean conservation responsibilities. Such approaches seek to integrate the planning efforts of sectoral role players to ensure sustainable use of marine resources and the protection and conservation of ocean ecosystems.

Summary Box: Ocean Ecosystem Services and Sustainable Use

South Africa's ocean management policy aims to achieve sustainable development of the South African marine environment by focussing effort on methods which contribute to: Habitat and Biodiversity Conservation, Marine Ecosystem Conservation and Earth System Conservation.

Ecosystem functions include those ecosystem level processes that contribute to the wellbeing of humans and the planet. Beneficial ecosystem functions (such as the formation of soil; the provision of food, fresh water, wood, fibre and fuel; the regulation of climate, floods and the spread of disease; protection from storm surges and floods; and a range of cultural, spiritual, educational and recreational services) are called ecosystem services and the ocean accounts for about two thirds of the value of ecosystem services on a global basis. Ecosystems are important for coastal and ocean management. Ocean management provides a balance between maintaining productivity of and biodiversity in an ecosystem and optimising the yield of marine resources. This is a key objective for sustainable development.

Various user groups, who did not previously impact on one another, now find themselves using similar areas of the marine environment. This has placed a responsibility on sovereign states to manage their marine resources in a more coherent manner. States are increasingly seeking to formulate management approaches, which optimise marine resource usage in balance with the need to conserve these resources and dependent species for future generations, to ensure ocean environmental integrity.

SOURCE: ASHLEY NAIDOO

6. ENVIRONMENTAL MANAGEMENT OF OCEAN ECOSYSTEM SERVICES

South Africa is fortunate in that it has a rich diversity of marine species and habitats, which is a substantial national asset. However, many species that occur within South Africa's territorial waters and EEZ have suffered large population decreases and have an unfavourable conservation status. The South African ocean environmental management policy, at a minimum, is aimed at preserving the marine environment while adopting measures towards the restoration of threatened biodiversity and habitat. Where habitat and biodiversity change cannot be avoided the policy aims at minimising and remedying such change. The policy is also forward looking as it anticipates that globally there will be increased directed accessing of ocean resources.

Agenda 21 recognised that land based sources contribute approximately 70% of marine pollution globally while marine transport and dumping at sea contribute 10% each. More recently, the National Oceanic and Atmospheric Administration of the USA government considered land based pollution sources to be contributing as much as 80% to global marine pollution. Under international law South Africa has taken on responsibility to deal with the pollution, which it introduces into the ocean on an ongoing basis. Under UNCLOS South Africa is required to compile pollution reports and to make these available to other states. Such reports are of particular interest to neighbouring states. So, for instance, the coastal neighbouring states adjacent to South Africa would have an interest in the nature of pollutants from South Africa which are introduced into the Benguela Current System. UNCLOS also requires South Africa to adopt specific pollution measures for South Africa's EEZ and for the protection and preservation of the South African marine environment. The CBD establishes a general principle that states must protect ecosystems, natural habitats and maintain viable species populations. States are also required to establish strategies to rehabilitate and restore degraded ecosystems. The CBD further requires that South Africa should create emergency response plans for events which present a grave or imminent danger to biological diversity.

Key spatial tools available to the Minister of Environmental Affairs for the general protection and conservation of the marine environment are contained in the Marine Living Resources Act, the National Environmental Management Protected Areas Act and the World Heritage Convention Act. The Minister has power to regulate and control human activities in specific marine conservation areas, World Heritage sites and protected environments.

Habitat and biodiversity change can occur naturally. However, it is generally induced by human activity. Existing human activities which impact on the marine environment found in South Africa's ocean include:

- **Land based pollution sources impacting ocean habitat and biodiversity**

The most common sources of land based pollution include: municipal waste; industrial waste; mixed effluent; storm water runoff; agricultural waste runoff; and atmospheric pollution. These sources are responsible for the majority of chemical, nutrient, biological and plastic pollutants found in the South African ocean environment. These types of pollutants have the potential to interact, accumulate and degrade ocean ecosystems in a variety of ways. Some of these pollutants can remain active within the marine environment for long periods of time extending to several years.

Agenda 21 encouraged states to take into account the Montreal Guidelines for the Protection of the Marine Environment from Land Based Sources. These guidelines paid particular attention to sewage and effluent discharge and emissions. Developing countries were encouraged to ensure that at least 50% of all sewage, waste water and solid waste are disposed of in line with international norms and standards by the year 1995 and that all such disposals comply with international norms and standards by 2025. In line with this imperative the Johannesburg Declaration on

Sustainable Development placed emphasis on the prevention and minimisation of waste and the maximisation of reuse and recycling to minimise adverse effects on the environment.

Land based sources of pollution, with the exception of storm water runoff, are for the most part well regulated by existing domestic legislation. The primary piece of legislation dealing with land based sources of pollution is the National Environmental Management: Waste Act ("Waste Act"). In terms of the Waste Act the Minister of Environmental Affairs is responsible for driving a national waste management strategy for South Africa. The Minister is responsible for setting national norms and standards including classifications of waste, the oversight of waste management services and the oversight of waste treatment and waste disposal facilities.

The Waste Act explicitly recognises that most discharges into the marine environment are undertaken at a local or municipal level. Any discharging local or municipal authority must be compliant with the national norms and standards. In order to give effect to this the Minister is established as the relevant licensing authority. The Waste Act considers that an application to discharge waste into the marine environment needs to be based upon a basic assessment process or a full environmental impact process. With respect to sewage, any disposal in excess of 15 000 cubic meters per annum must be subjected to an environmental impact process.

Most land based disposal of waste into the ocean environment occurs via the use of pipelines. In terms of the National Environmental Management: Integrated Coastal Management Act ("ICM") the Minister of Environment is appointed as the permitting authority. All discharges into coastal waters require a discharge permit.

The volume of municipal waste water, industrial waste and mixed effluent discharged into South Africa's marine environment is on the increase. Generally the impact of this on the ocean environment is of a localised nature. South Africa's municipal and local authorities do not all have access to similar resources and technological capacity. As a result the level of treatment of discharged sewage differs along the South African coastline. The monitoring and evaluation of the impact of all waste discharges is undertaken under a complex regulatory environment involving multiple role players. The challenge in regulating this source of pollution is the implementation and ongoing monitoring and evaluation of applicable standards. It is also necessary for South Africa to consider more fully the impact of these discharges on marine habitat degradation and biodiversity loss, with a particular focus on toxic plankton blooms.

Storm water runoff into the marine environment is a significant source of plastics and toxic heavy metals introduced into the ocean. This category of pollution is difficult to regulate and control. Some municipalities in South Africa, such as Durban and Cape Town, have established strategies preparing for the first heavy rainfalls of the season. However, such weather events are unpredictable making it difficult to anticipate when and how much effort should be expended in this regard.

Agricultural waste runoff normally enters into the ocean environment via river outflows and the quality of water entering the marine environment can be contaminated depending on upstream water usage. Agricultural waste runoff is governed by the National Water Act. The Minister of Water Affairs is responsible for the regulation of these activities. A primary focus of this regulation is the avoidance of the introduction of fertilisers and pesticides into riverine water. The Minister also bears responsibility for the regulation of the quantity of fresh water released into aquatic ecosystems in order to secure ecological sustainable development and use of water resources. Any failure to adequately control the water reserve can impact directly on biodiversity, for example the reduction of river flow into the KZN coastal waters may have an impact on the population size of the Zambezi Shark.

❑ **Port based sources of impact on ocean habitat and biodiversity**

Ports represent a significant pollution challenge with respect to the marine environment. Common challenges include the degradation of habitat and or biodiversity through the actual construction or modification of a port itself; dredging operations which are required to maintain ports and the associated dumping of dredged sediment; the introduction of

heavy metals or harmful biocides into the marine environment from anti fouling paints; spills of oil in harbours; and the risk of the introduction of alien invasive species from vessel ballast water.

Port construction can impact on existing flows along the coastline. Examples of this include port construction at Lamberts Bay and Saldanha Bay. Both ports incorporated islands, which were located close to the mainland, to form breakwaters. This led to changed sediment flow and unintended and significant impacts on habitat. Activities undertaken during port construction, e.g. blasting, can kill animals.

South Africa's commercial ports are also controlled by a complex regulatory framework involving a number of role players. Ports themselves are under the political direction of the Department of Transport through a division of the parastatal Transnet called the National Ports Authority. The majority shareholder in the National Ports Authority is the Minister of Public Enterprises. The National Ports Authority was established in terms of the National Ports Act ("Ports Act"). The National Ports Authority is responsible for, amongst other responsibilities, regulating and controlling pollution and the protection of the environment within the port limits. Aspects of ports' management and operations have been outsourced to private companies in terms of licence agreements. In terms of the licencing requirements operators are required to report on the environmental impact of their activities in line with the conditions set by the National Ports Authority. The Minister of Transport retains the power to instruct the Authority to perform functions in the national interest and to achieve compliance with international obligations. With respect to the daily operations and management of ports the Authority's key representative is the Harbour Master. The Harbour Master acts as the final authority over ships within port limits and bears the responsibility to limit environmental damage and control pollution. The Ports Act only applies to the main commercial ports, or ports specifically designated by the Minister of Transport.

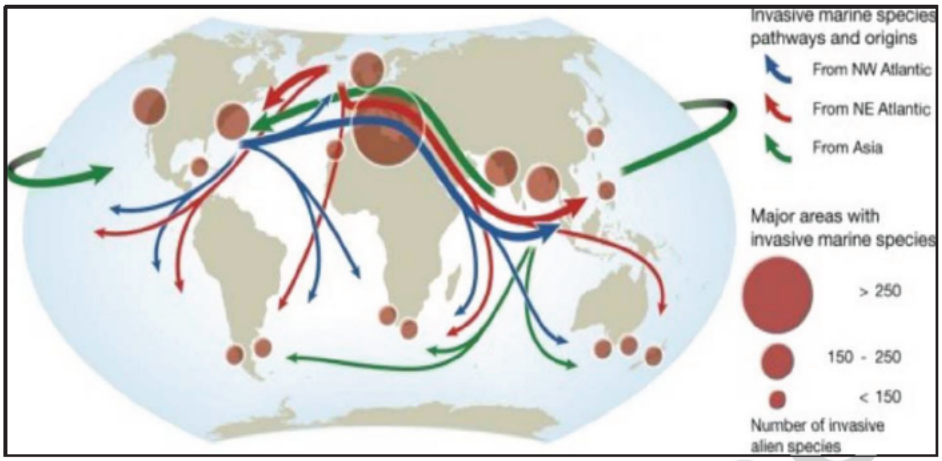
South Africa has the right under UNCLOS to enforce domestic pollution laws on foreign vessels. UNCLOS further requires South Africa to establish measures preventing the introduction of alien or new species into the marine environment. This obligation is mirrored in the CBD which obliges South Africa to protect ecosystems, habitats and species from the introduction of alien species. In terms of the International Convention for the Control and Management of Ships' Ballast Water and Sediments, South Africa is required to develop a national strategy or policy or programme for ballast water management in South African ports and waters. States are further required to ensure that ports and terminals, where cleaning or repair of ballast tanks occurs, have adequate reception facilities for the receipt of sediments. South Africa is given the right to adopt more stringent measures with respect to the prevention, reduction or elimination of the transfer of harmful aquatic organisms or pathogens through the control and management of ships' ballast waters and sediments.

The concern with respect to ballast water is also addressed in Agenda 21 and the Johannesburg Declaration. Agenda 21 encourages states to regulate ballast water discharge and to set in place adequate port reception facilities. The Johannesburg Declaration encourages states to accelerate measures to address invasive alien species found in ballast water.

Ballast water is discharged in South African ports on a daily basis. In 2000 South Africa was selected as a pilot country by the Global Ballast Water Management Programme. This programme was an initiative of the IMO and the UNDP with funding provided by the Global Environment Facility. Saldanha Bay was selected as the pilot site and a 2001 port survey demonstrated the presence of eight alien species in the bay. Two of these species were considered invasive. In 2003 South Africa undertook a ballast water policy drafting process. The draft policy recommended specific ballast water legislation and proposed that it be included in the contemplated ICM Act.

Port traffic and operations pose the risk of introducing invasive marine species. More than 22 million tonnes of ballast water is discharged in South African ports and harbours annually. Invasive species can result in serious ecological and economic problems in marine environments and a common result, as the invasive species proliferate, is the severe depletion of biological diversity.[lviii]

Diagram: Major pathways and origins of invasive species infestations [lix]



Due to the dynamic currents off the South African coast, South African ports need to be dredged on a regular basis. Dredged material is dumped at sea in areas identified by the DEA. The National Ports Authority is responsible for the actual dredging itself. Dredged material can negatively impact the environment through contaminating relatively pristine areas with pollutants such as fuel, oils and heavy metals occurring in port waters due to ship and cargo handling operations. Additionally sediment grain size may not be compatible with dumping areas and this may damage habitat at specific sites.

In terms of the International Convention on the Control of Harmful Anti Fouling Systems on Ships, South Africa must assist in the prohibition and or restriction of the use of harmful anti fouling systems on ships. This includes the avoidance of the use of harmful anti fouling paints in South African harbours.

The application of harmful anti fouling paints is normally undertaken by private companies working within the port itself. These activities would be undertaken in terms of a licence granted by the National Ports Authority. It is anticipated that the Authority, in order to fulfil its international obligations, would have specified the paint characteristics which may or may not be used. The licensed operator would accordingly need to comply with these requirements and report annually in relation to its environmental compliance.

❑ **Vessel based sources of impact on marine ocean and biodiversity**

Vessel based sources of impact on marine habitat and biodiversity are primarily a result of scuttling (sinking of unwanted ships), dumping (unwanted cargo) at sea, ship hull cleaning, bilge tank cleaning and discharge and large scale oil pollution incidents. There is wide recognition that while marine shipping is generally a safe and environmentally friendly form of transport it still holds dangers to the ocean environment.

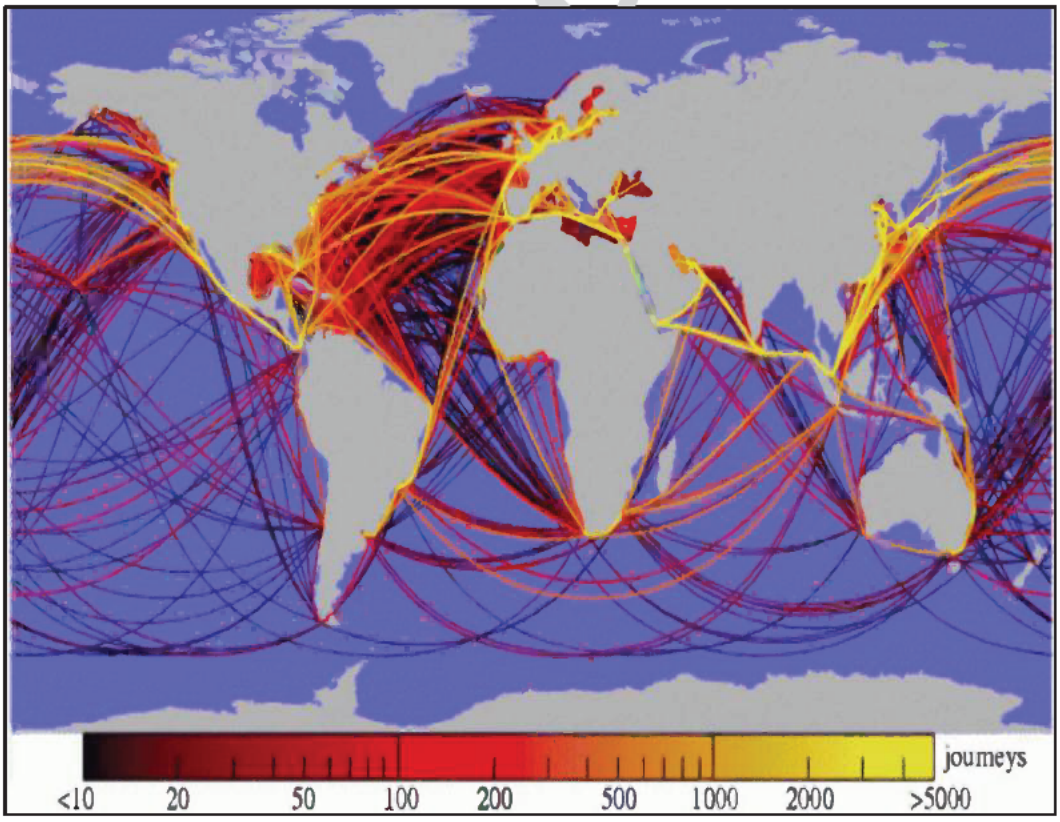
The International Convention on Oil Pollution Preparedness requires states to ensure that its offshore units and oil handling facilities have an oil pollution emergency plan. It also gives South Africa the right to inspect the oil pollution plans of ships in waters under its jurisdiction. The International Convention Relating to Intervention on the High Seas in Cases of Oil Pollution Casualties allows South Africa to take reasonable measures on the High Seas as may be necessary to prevent, mitigate or eliminate grave and imminent danger to the coastline or related interests from pollution or threat of pollution of the sea by oil. A related protocol extends this power to pollutant threats from substances other than oil.

The South African Maritime Safety Authority ("SAMSA") was established in terms of the South African Maritime Safety Authority Act. SAMSA is an agency of the Department of Transport and is tasked with the prevention and avoidance of all types of marine pollution. SAMSA is also charged with the safety of life and property at sea. SAMSA confines itself to ensuring that attempts are made to avoid vessel based pollution. At present the DEA is responsible for the clean up of pollution from ships. SAMSA derives its mandate from various pieces of domestic legislation which incorporate international conventions and establish SAMSA as the central authority in this regard. This legislation includes:

- The Marine Pollution (Intervention) Act, which establishes SAMSA as the central authority for the International Convention for Pollution on the High Seas and the associated protocol.
- The Marine Pollution (Prevention of Pollution from Ships) Act, which establishes SAMSA as the central authority for the International Convention for the Prevention of Pollution from Ships.
- The Marine Pollution (Control and Civil Liability) Act, which establishes SAMSA as the central authority for the International Convention on Civil Liability for Oil Pollution Damage.

The Marine Pollution (Control and Civil Liability) Act defines harmful substances as including any substance which if introduced into the sea is likely to cause a hazard to human health, harm living resources and marine life, damage amenities or interfere with other legitimate uses of the sea, and includes oil and any other substances subject to control by the International Convention for the Prevention of Pollution from Ships. The Act grants the Minister of Transport the authority to establish and maintain a patrol service by means of boats, ships and aircraft to monitor the marine environment under South Africa's jurisdiction in an attempt to combat pollution of the sea.

Diagram: Global Shipping Routes Mapped by Global Positioning Satellite [lx]



The Department of Health also contributes to the prevention of pollution in terms of the Hazardous Substances Act, which grants the Director General the power to appoint port inspectors to check for the presence of hazardous substances. This power is further extended to the Department of Finance: Customs and Excise and the South African Police Services.

South Africa bears international obligations with respect to dumping at sea. The Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter prohibits South Africa from the dumping of any wastes or other matter with the exception of regulated and approved substances. This prohibition is further reflected in the Convention for the Protection, Management and Development of the Marine and Coastal Environment of the Eastern African Region. The Dumping at Sea Control Act establishes the DEA as the relevant permitting authority. Applications are considered by a standing committee and recommendations are then made to the DEA. The standing committee is obliged to take South Africa's international obligations into account when making recommendations. A list of factors are provided to guide the committee and specifically include the consideration of possible effects on marine life, fish and shellfish culture, fish stocks and fisheries, seaweed harvesting and culture.

Hull cleaning refers to the practice of ridding vessel surfaces from marine growth. The cleaning of the hull holds out the danger of the introduction of alien organisms into South Africa's environment. Many countries have banned this practice in their ocean environment.

- **Mining impact on ocean habitat and biodiversity**

The International Convention on the Prevention of Pollution from Ships has application to offshore platforms used in mining operations. South Africa is obliged to follow regulations relating to the physical construction and operating procedures to be followed by offshore drilling platforms. The Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter also applies to South Africa's marine mining operations. Certain types of matter may only be dumped by special or general permit while dumping of other matter is prohibited.

The Minister of Mineral Resources bears the political responsibility for the oversight of mining activities in the South African ocean environment. The Mineral and Petroleum Resources Development Act is intended to give effect to s24 of the Constitution by ensuring that South Africa's mineral and petroleum resources are developed in an orderly and sustainable manner while promoting justifiable social and economic development. The Act stipulates that no person may undertake any aspect of mining operations for minerals or petroleum without an approved environmental management programme or an approved environ nental management plan as the case may be. The Minister, when considering the granting of rights must ensure that such activity will not result in unacceptable pollution, ecological degradation or damage to the environment. Applications for the exercising and renewal of rights must be accompanied by a report reflecting the extent of compliance with the requirements of the approved environmental programme, the rehabilitation to be completed and the estimated cost thereof.

The Act incorporates, with respect to the requirements of environmental plans and programmes, the principles set out in the National Environmental Management Act and also contains detailed regulations as to the content of such plans and programmes. These environmental principles are further bolstered by the requirement that all mining operations must be conducted in accordance with the generally accepted principles of sustainable development and intergenerational equity. The Act provides that when the Department of Mineral Resources is engaged in the consideration of any environmental plan or programme the Minister must consult with any State Department administering any law relating to matters affecting the environment. The Director General of such a Department must submit any comments within 60 days of the request.

The Minister of Mineral Resources may designate an organ of state or a state owned enterprise as the licencing authority in respect of oversight of petroleum exploration and production. The licencing authority is required to evaluate applications and review and make recommendations with regard to the approval of environmental management plans and programmes. The Dumping at Sea Control Act also applies to the introduction of mining waste into the marine environment.

The DEA performs the role of this permitting authority and considers factors including the possible effects on marine life, fish and shellfish culture, fish stocks and fisheries, seaweed harvesting and culture in its decision making. SAMSA also plays a role in respect of mining activities in terms of the Marine Pollution Civil Control Act in that they must ensure that harmful substances are not introduced into the marine environment. SAMSA is required to provide pollution safety certificates for all offshore installations. Environmental impact assessments are further required under the National Environmental Management Act for the construction facilities or infrastructure for the refining, extraction or processing of gas, oil or petroleum products or the expansion of such facilities.

Present mining activities in South Africa's ocean predominantly target diamonds, oil and gas. The disturbance of seabed sediments is considered the primary impact of marine mining on habitat and biodiversity. The top layer of seabed sediment and associated fauna is unavoidably destroyed by mining activities. Research indicates that it takes approximately five years post the mining effort for sediment to recover to the extent necessary that fauna can re establish itself.[lxi] Certain species may not recover as their habitat may be invaded by faster growing and more adaptable species. This consideration is especially important if the mining occurs in areas exposed to opportunistic or alien invasive species.

Diamond mining discharges gravel and sediment onto the seafloor but generally it occurs in a localised area and the impact is regarded as small. Impacts on phytoplankton communities and enrichment of nutrients have been found to be limited and localised.

However, potential conflict may occur with respect to the fishing industry in that fishing and marine mining on the West Coast occur in the same area. Rock lobster is extracted from the same regions as are used by boat based and shore based diamond operations. Concessions for offshore diamond mining have been given in the same area in which the demersal trawl industry operates. At present these concessions are not being used so the conflict remains potential in nature. A further area of potential use overlap between diamond mining and oil and gas activities occurs in the region between the 200 m and 600 m isobaths (depth).

Oil and gas exploration similarly disturbs sediments, habitats and seabed plants and animals by displacement, burial, smothering and sedimentation. There are potential impacts on species that prey on such fauna and flora. There are competing spatial interests between oil and gas operations and fishing. Exploration well heads remain on the seabed and pose a significant risk to demersal trawl fisheries. The mining industry is concerned about potential collision between offshore drilling platforms and fishing vessels and other forms of marine transport. Perhaps the greatest environmental threat posed by the oil and gas industry is the possibility of oil spills. The environmental impact of this is seen as high although the risk is perceived as being low. Currently no published study has been conducted on the actual physical impacts of the South African offshore oil and gas industry.[lxii]

The fishing industry has raised concerns with regard to the impact of the mining industry's use of seismic surveys and exploratory blasting on fisheries stocks. Seismic survey activities undertaken by the mining industry are considered to generally have a low direct impact. Seismic survey work can be undermined by the presence of unattended fishing gear. There is scientific uncertainty as to the effect of seismic activity on marine species, including whales and dolphins during migration and calving periods. It is possible to identify sensitive areas where these activities occur. There are currently no measures in place regulating seismic survey activities in respect of geographical location, time periods and the adoption of measures to manage exposure to marine animals.

- **Fishing impact on ocean habitat and biodiversity**

South Africa has a number of international obligations with respect to its fisheries. In terms of UNCLOS, South Africa, when exercising its rights in the EEZ is obliged to encourage optimum use of fish stocks without risking depletion through overfishing. South Africa is also required to determine the TAC for each fish species within its EEZ. The international overexploitation of fishery stocks was a large driver in the creation of EEZs. It was hoped that giving coastal states jurisdiction over the marine living resources in the EEZ would directly contribute to a more sustainable management of fish stocks.

Agenda 21 requires South Africa to establish measures which protect straddling stocks and highly migratory species. Highly migratory species should be dealt with by the adoption of regional planning initiatives. All fishery effort must avoid unnecessary bycatch. South Africa is encouraged to maintain or restore populations of marine species to levels that can produce the optimum sustainable yield, as quantified by relevant environmental and economic factors taking into consideration relationships amongst species (community of species), including the requirements of dependent species. South Africa is further encouraged to promote the use of efficient fishing gear.

All marine nations are encouraged to protect and restore endangered marine species and preserve rare or fragile ecosystems as well as habitats and other ecologically sensitive areas. This approach was endorsed by the Johannesburg Declaration, which encouraged marine nations to adopt an ecosystem approach to fisheries by 2010 in line with the Reykjavik Declaration on Responsible Fisheries in the Marine Ecosystem and the CBD. Marine nations were encouraged as a matter of urgency to maintain or restore stocks to levels that can produce the maximum sustainable yield by no later than 2015.

South Africa's primary domestic legislation governing fishing is the Marine Living Resources Act. This Act falls under the political responsibility of the Minister of Agriculture, Forestry and Fisheries. The Act pursues various objectives including optimum utilisation and ecologically sustainable development of marine living resources. Principles such as intergenerational equity and the precautionary approach are overtly referenced. The Act promotes an ecosystem approach to fishing, the need to preserve marine biodiversity, minimise marine pollution and honour South Africa's international obligations. In order to provide a scientific basis for the consideration of the annual TAC the Minister is required to establish a Consultative Advisory Forum for Marine Living Resources. The Forum advises the Minister generally on issues relating to the management of marine living resources and the calculation of the TAC. The Minister retains a broad discretion to determine the harvestable amount, type of species and geographic area where fishing effort may be undertaken. The Minister's power further extends to the regulation of gear, fishing methods and types of fishing vessels to be utilised.

The Minister of Environmental Affairs has the power in terms of the Marine Living Resources Act to proclaim a Marine Protected Area. The purpose of such a proclamation is to create a general prohibition against fishing, the removal of any fauna and flora, dredging or the extraction of sand or gravel, and the discharge or deposit of waste or other pollutants in a particular geographic area. This prohibition extends to the construction of any structures or the carrying on of any activity which may adversely impact the ecosystems of that area. The Minister may attach specific conditions to the area which allow limited use in such a way that diminishes any conflicts resulting from competing uses in that area.

The predominant impacts on habitat and biodiversity associated with the harvesting of marine living resources are the overexploitation of fish stocks and the use of destructive fishing gear or practices. The overexploitation of fisheries can result in increased competition by predators with fisheries for food. Such competition can influence species survival and reproduction and lead to large decreases in populations. Examples of this include the large declines (90%) in populations of the Cape Gannet and African Penguin in Namibia. The incidental capture of animals can decrease species survival. This has led to large reductions in many species of albatross and petrel.

The harvesting of predatory fish may alter the functioning of ecosystems by reducing the occurrence of forage fish near the sea surface, thereby impacting the availability of food for seabirds and some other animals. The discarding of unwanted fish or parts of fish can also alter the ecosystem structure by favouring opportunistic species, such as some seals and gulls. Such population increases can have knock on effects for other species, for example further reducing threatened species such as the African Penguin. Discarded or lost fishing gear (ghost fishing) may result in the unproductive killing of marine animals.

In recent times there has been an increase in potential spatial conflict between the fishing industry and other users of the marine environment, notably the oil and gas industry. Demersal seabed trawling has also been impacted by the

increase in the number of submarine cables in the marine environment, which South Africa is under both international and national obligations to protect.

- **Aquaculture impact on ocean habitat and biodiversity**

Aquaculture is a growing marine use. At least 30% of the world's fish harvest is currently obtained via aquaculture and this percentage is set to increase. Given the current exploitation levels of the world's wild fisheries, Agenda 21 encourages states to investigate techniques to improve the yields of fish, algal and other aquatic species through aquaculture. This approach is mirrored by the Johannesburg Declaration, in which states are encouraged to support the sustainable development of aquaculture including small scale aquaculture. The risks associated with aquaculture are recognised by the CBD which requires that proposed aquaculture projects that could threaten biological diversity must be subject to environmental impact assessments. When promoting aquaculture South Africa will need to be mindful of the known risks associated with this practice, namely species interactions; genetic impacts; disease impacts and habitat alteration.

South Africa's domestic legislation establishes the Department of Agriculture, Forestry and Fisheries as the regulatory authority for aquaculture in South Africa's marine environment. This power is conferred in terms of the Marine Living Resources Act. All aquaculture applications which contemplate the use of imported species need to state the measures that will be taken to avoid the introduction of exotic commensals, parasites and pathogens or species into the wild. Permit holders are required to take all reasonable measures to avoid harmful environmental impacts by the discharge of effluent and the disposal of sludge. Effluent is defined as any produced liquid waste including emulsions, solids in suspension and unwanted water, while sludge is defined as any solid or semi solid organic waste whether or not it contains non organic substances. All permit applications which hold out the possibility of incurring a detrimental impact on the environment must be subjected to environmental impact assessments.

There is a general prohibition against the release into South Africa's ocean of any exotic fish without the written permission of the Minister. There is further a general prohibition against the use of genetically modified organisms in aquaculture. A genetically modified organism is defined as an organism in which the genetic material has been altered in a way that does not occur naturally by mating or natural recombination.

In terms of the National Environmental Management Act the construction or extension of facilities for the purposes of aquaculture is a listed activity, which automatically triggers the need for an environmental impact assessment. Activities that are regulated include aquaculture facilities for finfish, crustaceans, reptiles or amphibians, molluscs, aquatic plants and all offshore cage structures. The DEA is responsible for the implementation of these provisions.

- **Sea water abstraction sources impact on ocean habitat and biodiversity**

Sea water abstraction may occur for a number of reasons including desalination and the production of energy. The abstraction or conversion of seawater for desalination can impact on marine habitat by the discharge of associated effluent having high brine content. This can change the chemical composition of seawater in a localised area. The abstraction of seawater for energy purposes involves a cyclical process of pumping water to an elevated position and then releasing the water to generate energy. This creates an artificial flow of seawater in the marine environment with possible impacts on habitat. The abstraction of seawater for cooling purposes involves the transfer of energy from a reactor or other energy source to the seawater itself. This increases the temperature of seawater which is then reintroduced into the ocean environment.

Permission is required from the DEA in terms of the Integrated Coastal Management Act for any discharge into the ocean environment. The National Water Act also contemplates desalination of water and grants the Minister of Water Affairs the right to set a pricing structure in this regard.

- **Atmospheric impact on ocean habitat and biodiversity**

Atmospheric pollution of the ocean environment is governed by the National Environmental Management: Air Quality Act and is regulated by the DEA. The Minister is responsible for the establishment of a national framework including structures to obtain compliance with ambient air quality standards and structures to give effect to South Africa's international obligations and norms and standards for the control of emissions. The national framework is flexible in that it differentiates between different geographic areas and is subject to mandatory review every five years.

- **Energy production impact on ocean habitat and biodiversity**

South Africa presently has no specific international obligations with respect to the production of energy in the ocean environment save for the general responsibilities relating to the protection of this environment. This is primarily the result of the developing nature of these sources of energy production. Internationally, considerable research effort is being placed on the investigation of methods by which the marine environment could be used as a source of renewable energy.

The generation, transmission and distribution of energy in South Africa are governed by the Department of Energy in terms of the Electricity Regulation Act. This Act has as one of its objectives the promotion of the use of diverse energy sources. This reflects a growing commitment to investigating methods of energy production which are not carbon based. The Act establishes the National Energy Regulator as the licencing authority for the operation of generation, transmission and distribution facilities, the import and export of electricity and electricity trading. The Minister is authorised to make regulations regarding, amongst others, new generation capacity, the type of energy sources from which electricity must be generated, the percentages of electricity that must be generated from different energy sources, the participation of the private sector in new generation activities and the setting of standards relating to health, safety and the environment and the incorporation of these standards into individual licences or establishing national norms and standards. These standards must be in general alignment with the principles contained in the National Environmental Management Act.

- **Bioprospecting impact on ocean habitat and biodiversity**

Marine bioprospecting is concerned with procuring and analysing marine genetic material and identifying potentially marketable products. Bioprospecting activities have been described as comprising four phases namely:

- onsite collection of samples;
- isolation, characterisation and culture of specific compounds;
- screening for potential uses such as pharmaceutical or other uses; and
- product development and commercialisation including patenting, trials, sales and marketing. [bxiii]

UNCLOS is silent with respect to marine genetic resources but recognises the sovereign rights of states to utilise all marine resources in their territorial waters and EEZ. While marine bioprospecting is currently not being undertaken on a large scale in South Africa, a well defined regulatory framework is set in place in terms of the National Environmental Management: Biodiversity Act. The Act regulates:

- bioprospecting involving South Africa's indigenous bioresources;
- the export of such resources from South Africa for bioprospecting or other research; and
- a fair and equitable sharing in benefits arising from bioprospecting involving such uses.

The Act includes a comprehensive definition of indigenous biological resources and establishes a permitting framework regulating commercialisation, export from the country and full disclosure of the purpose of any bioprospecting research. All permits must contain benefit sharing clauses whereby monies generated by this activity are paid into a Bioprospecting Trust Fund. The Act requires risk assessments to be undertaken prior to the issuing of any permits.

The Minister of Environmental Affairs is tasked with the assessment of risks and potential impacts on biodiversity. The Minister has wide regulatory powers over bioprospecting to ensure no adverse harm occurs to the marine environment. In addition, the release of genetically modified organisms into the environment is a listed activity in terms of National Environmental Management Act.

- **Communication cables impact on ocean habitat and biodiversity**

There is increasing use of undersea cables for communication purposes. Cables around South Africa's coastline include SAT3, WACX, ACE, SAex, EASSy and SeaCom. These cables come ashore at Yzerfontein, Melkbosstrand and Mtunzini. The cables represent a considerable capital investment and are of great strategic importance for South Africa. Generally the cables lie on top of the seafloor and are not buried. The laying of submarine cables can cause localised disturbance of marine sediments and fauna. There is a possible resource conflict with fishing and offshore mining operations which could cause damage to these cables. Under international law South Africa is obliged to enact domestic legislation holding the person who damages cables as being responsible for the cost of associated repairs. The Marine Traffic Act 2 of 1981 enforces a five hundred meter exclusion zone for any deep water activity near telecommunication lines and criminalises such behaviour.

- **Recreation and tourism impact on ocean habitat and biodiversity**

Eco tourism is a growing contributor to South Africa's GDP. Activities such as shark cage diving, boat based whale watching, swimming with dolphins and marine documentary film making are on the increase. These activities can have an impact on habitat and species diversity. South Africa has adopted detailed policies for both shark diving and boat based whale watching. Tourist operators are required to apply for licences which are administered by the DEA. The purpose of this regulation is to avoid harmful consequences of the activities, such as nursing whales being forced to leave an area. Human activity can also influence behaviour of animals in a manner that indirectly influences their survival and reproduction.

"Shark nets" protect bathers from shark attacks and are deployed in KZN. They are non selective and kill other species in addition to sharks.

- **Emerging technological uses impact on ocean environment**

Internationally there is increasing focus on the use of the marine environment as a source of renewable energy. It is believed that the harnessing of marine renewables could result in a reduction of carbon emissions thereby improving the sustainability of energy production and obtaining economic benefits. Energy sources which are being targeted for research include sunlight, wind, wave, tidal and geothermal applications. The long term storage of carbon do oxide in ocean geological formations is being discussed. Many states are directly funding related research on these areas.

- **Towards the DEA's Environmental Management Role**

The DEA's ability to fulfil its ocean environmental management mandate is heavily reliant on the efforts of sectoral role playing departments. Individual usage sectors contribute to the aggregated and accumulated human impacts on the ocean environment. Aggregation may be viewed as a simultaneous combined impact from various sectors while accumulation refers to the resulting effects of impacts over time. Little attention has been paid to managing the aggregation and accumulation of impacts on the ocean. The sectoral management of ocean use in South Africa has attempted to regulate and advance particular economic sectors in isolation from one another. However, considerable difficulty is faced by the DEA in influencing the environmental planning initiatives of these role players. This is exacerbated by the expansion of existing uses and the introduction of novel uses and users of the ocean environment. The duty of the DEA is to refine its ocean management policy in order better to undertake its environmental mandate. The DEA therefore, in preparing this policy, had reference to recent developments in international ocean management approaches.

Summary Box: Ocean Ecosystems, Habitats and Biodiversity Challenges

There are a number of human resource utilisation pressures which have an existing or potential impact on habitat and biodiversity conservation on South Africa's marine environment. Each of the pressures represents a specific set of ocean environmental management challenges. The pressures include:

- Land based pollution sources impacting marine habitat and biodiversity
- Port based sources of impact on marine habitat and biodiversity
- Vessel based sources of impact on marine habitat and biodiversity
- Mining impact on marine habitat and biodiversity
- Fishing impact on marine habitat and biodiversity
- Sea water abstraction impact on marine habitat and biodiversity
- Aquaculture impact on marine habitat and biodiversity
- Atmospheric impact on marine habitat and biodiversity
- Energy production impact on marine habitat and biodiversity
- Bioprospecting impact on marine habitat and biodiversity
- Communication cable impact on marine habitat and biodiversity
- Recreation and tourism impact on marine habitat and biodiversity
- Emerging technological use impact on marine environment

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7. OVERVIEW OF SELECTED INTERNATIONAL OCEAN MANAGEMENT STRATEGIES

As early as 1992 Agenda 21 called for marine states to pursue strategies for the integrated development of the ocean environment. This call was driven by the significant growth in the use and exploitation of marine resources, the increasing occupation of the continental shelf and the expansion of some activities, such as oil and gas exploration, in both the offshore and deep sea environments. "The sustainable use of the ocean and of its resources therefore calls for the application of an integrated management regime. However, at the national level, uncoordinated policies in different sectors – for example, gas and oil exploration and exploitation, ports, fisheries, shipping, aquaculture, local government, tourism, water – are the rule."[lxiv]

Many international marine organisations have highlighted the fact that sectoral management of marine resource use results in pressures arising from human usage being addressed in a silo fashion. The addressing of pressures in such a manner may result in unintended consequences with respect to other sectoral uses and to the marine environment itself.

> "A growing number of maritime nations have started building new policy frameworks for the sustainable use of the oceans that embrace every aspect of maritime affairs and set clear, predetermined, goals taking an inter sectoral approach. The principles, objectives and modalities of all these maritime policies are largely similar. All these countries recognise the major contribution made by sea based activities to their economy. They all acknowledge that the intensive development of these activities poses a challenge to sustainable development and use of their sea resources. And they have all decided to develop an overall policy that allows a comprehensive, coordinated approach, ensuring sustainable development of the different sea resources and activities." [lxv]

The DEA has undertaken an analysis of selected international ocean management strategies in order to inform its own planning. The selected countries included Australia, Brazil, Canada, China, Colombia, India, Japan, Norway, Portugal, Russia and the United States of America. There are great similarities between the objectives which various marine nations have identified in their ocean management policies. All seek to:

- Maintain and improve marine ecosystem resilience, conserve biodiversity and restore degraded habitat;
- Improve the competitiveness and effectiveness of activities existing within their marine jurisdiction while at the same time researching and developing innovative and responsible future uses; and
- Participate and strengthen their involvement in global and regional developments, which support efforts to combat climate change.

Similarly there are commonalities in the priorities which states have set themselves in order to achieve policy objectives. All have undertaken initiatives which aim to:

- Support marine research and science
  Initiatives include supporting marine research at a national, regional and global level, using research to inform citizens of existing and potential challenges in the ocean environment and building capacity in marine professions by supporting further education and training. Globally individual countries have identified that there is very poor basic information on how the ocean functions and the many types of animals and plants that live in the various ocean layers.
- Protect the marine environment and tackle climate change
  Initiatives generally follow sustainable development approaches whereby economic and environmental concerns are harmonised through planning processes. Internationally there is realisation that the ocean is the dominant

feature of the planet's surface. An example of an ocean and earth system approach is the understanding that heat from the sun is absorbed by the ocean and distributed around the planet.

- Extract optimum economic advantage from marine resources
  Initiatives here include promoting emerging marine technologies, green sources of energy, improving marine traffic infrastructure by the establishment of safe shipping routes and efficient and environmentally acceptable port facilities. Further initiatives are aimed at improving the sustainability of fisheries stocks, the efficiency of fishing gear, right sizing fishing fleets, stimulating aquaculture, exploring and exploiting marine fossil and mineral resources, the development of economic uses from marine organisms such as pharmaceutical applications and geo engineering that involves localised or large scale permanent change in the ocean physical dynamics such as artificial islands or energy generation activities such as offshore wind or ocean current energy.

- Implement marine spatial planning and the ecosystem approach
  Initiatives include integrated management of coastal zones, EEZs and continental shelves, reconciling competing uses of the marine environment and coordinating coastal area development. They also include pollution responses, coastal protection and disaster management initiatives that may arise from ocean and coastal interactions such as coastal storms and storm surges. In understanding the ocean as an ecosystem, countries have identified the need to monitor and track real and potential shifts in ocean ecosystem functions and the consideration of what impact this will have on individual communities and economies.

> "Integrated ocean management is not only the most appropriate framework for achieving long term goals for oceans and seas development, but also a necessary one to assure a proper sustainable development of the oceans and seas within the normative structure established by UNCLOS…Integrated management complements sectoral management particularly by providing decision makers and regulators with access to information and advice required to develop sectoral measures which support ecosystem based management" [lxvi]

Generally the undertaking of ecosystem based ocean management at a national level begins with the establishment of the appropriate governance structures. Political leadership is firstly established and commonly comprised of an Inter Ministerial Working Group. The political leadership is underpinned by the establishment of a formal administration organisation or secretariat, commonly tasked with driving the necessary coordination and implementation of the relevant strategic objectives. The links between governmental role players are clearly defined within this structure.

The primary initial responsibility of the administration organisation is the undertaking of an inter sectoral planning process based on transparent and inclusive dialogue with all relevant role players. The planning process is further premised on a science based approach, which helps to define a spatial approach to marine planning. Spatial planning commonly identifies LMEs or marine bio regions based on scientific criteria or unique characteristics. Ecosystem threshold indicators are then established to best reflect the preservation of the characteristics of a particular area. A mapping of all human activity within an identified area is undertaken. Enhanced scientific certainty helps in setting strategic objectives for the region and the establishment of agreed indicators. All role players are required to conduct and modify their planning within this context. Ongoing monitoring and evaluation of the indicators is undertaken and unfavourable ecosystem indicators are linked to drivers and pressures. Where these drivers and pressures are anthropogenic, adaptive management strategies are used to effect desired change. This approach to planning evolves over a relatively long time horizon and is iterative in nature. It is entirely possible to spend some years establishing the ecosystem identification, indicator selection and human drivers and pressures impacting on the identified ecosystem.

> "In essence, an integrated approach means that sector policies will have to be aligned to the principles and standards of a common National Ocean Policy, i.e. that objectives, programs and measures (policies) to manage the marine environment and its resources will be developed in such a way that the different objectives, programs and measures are mutually consistent across different sectors. This requires that the instrument that fixes the national policy be explicit in setting the standards, baselines and benchmarks upon which that consistency will be measured." [lxvii]

Summary Box: Overview of Selected International Ocean Management Strategies

Sectoral management of marine resource use results in pressures arising from human usage being addressed in a silo fashion. The addressing of pressures in such a manner may result in unintended consequences with respect to other sectoral uses and to the marine environment itself. This recognition has led to countries increasingly adopting either coordinated sectoral ocean planning and management approaches or integrated ocean planning and management approaches.

There are great similarities between the objectives which various marine nations have identified in their ocean management policies. All seek to:

- Maintain and improve marine ecosystems resilience, conserve biodiversity and restore degraded habitat;
- Improve the competitiveness and effectiveness of activities existing within their marine jurisdiction while at the same time researching and developing innovative and responsible future uses; and
- Participate and strengthen their involvement in global and regional developments, which support efforts to combat climate change.

Similarly there are commonalities in the priorities which states have set themselves in order to achieve policy objectives. All have undertaken initiatives which aim to:

- Support marine research and science;
- Extract optimum economic advantage from marine resources;
- Protect the marine environment and tackle climate change; and

Implement marine spatial planning and the ecosystem approach.

SOURCE: IAIN TEDBURY

8. SOUTH AFRICA'S OCEAN ENVIRONMENTAL MANAGEMENT POLICY

a. ORGANISATIONAL CONTEXT, VISION AND STRATEGIC OBJECTIVES

The DEA has undertaken the refinement of its ocean management policy in order better to achieve its environmental mandate, including its domestic legislative duties and international obligations. The fulfilment of this mandate is best achieved by the active cooperation and participation of a number of state and non state role players. All role players are in general agreement that South Africa should pursue sustainable development of its marine resources while conserving and rehabilitating its ocean environment. Nevertheless different user sectors may have competing opinions on the best methods of achieving these aims. The DEA needs sufficient environmental information to report on the sustainability of ocean usage under South Africa's jurisdiction and adjacent High Seas. The ocean ecosystems must further be monitored and shifts in either their physical or biological functioning must be communicated to all role players. The importance of the ocean to South Africa's environment, climate, weather and economy dictates that the early identification and communication of large scale or significant localised changes in ocean functioning is critical to effective and cost efficient planning and adaptation strategies.

The DEA believes that its present efforts in respect of ocean environmental . anagen.ent are not sufficient and that ocean planning processes need to be strengthened, particularly in the light of ever increasing human use of the ocean and mounting global environmental challenges. The DEA has commenced implementing a strategic approach to improve, in collaboration with role playing departments, the ecosystem based management of South Africa's ocean space. This approach recognises that improving ocean management is a long term endeavour. The DEA has endorsed the international trend to consider ocean management approaches based on spatial planning principles. In order to determine appropriate areas for spatial planning approaches, effort will need to be placed on increasing the availability of accurate scientific information. This information will allow South Africa to undertake a detailed spatial mapping of its marine environment for the first time in its history. The spatial mapping will be overlaid with human use in specific geographic areas. This will provide some of the essential groundwork required for South Africa to move towards more efficient ecosystem based decision making. The effort required to achieve such a comprehensive and detailed marine spatial map is considerable and will take some years to achieve.

Experience demonstrates that the administrative structures associated with undertaking a spatial mapping exercise need to be as streamlined as possible. The creation of a specialised structure is currently neither necessary nor desirable and existing political governance structures should be used where possible. Current environmental legislation and associated regulations give the DEA many of the tools required to undertake the shift towards improved ocean environmental management. In many ways the challenge for the DEA is to improve its implementation of statutory duties and enhance the value of its contribution to role playing departments. It is believed that over time the DEA will be able to demonstrate to role playing departments the increasing benefits associated with shifting to an ecosystem based ocean management approach.

The DEA has adopted four high level strategic objectives:

- *Strengthened national science programmes for integrated oceans and coastal management.*

This objective aims to expand the available scientific information on habitats and species in the various bioregions of the South African EEZ and associated LMEs. Attention will be paid to the identification and description of species and understanding physical and ecological processes in the ocean environment. This primary information on physical and ecological functioning and species identification will enhance decision making relating to existing and future marine uses.

- *Established management frameworks and mechanisms for the ocean and coastal environment*

This objective aims to establish management mechanisms and structures in order to give guidance and effect to the National Environmental Management Act framework and encourage more efficient and effective cooperation and reporting.

- *Enhanced international governance, instruments and agreements supportive of South Africa's environmental and developmental priorities*

This objective aims to refine, prioritise and advance South Africa's ocean research and management interests regionally, internationally, on the high seas and in Antarctica. The achievement of an ecosystem based ocean management framework is underpinned by effective national, regional and international cooperation. Regional and international cooperation is required because many of South Africa's marine living resources migrate widely beyond South Africa's EEZ and climate change is often best understood through such collaboration.

- *Stakeholder recognition of the value of the ocean and coastal environment and their role in its protection*

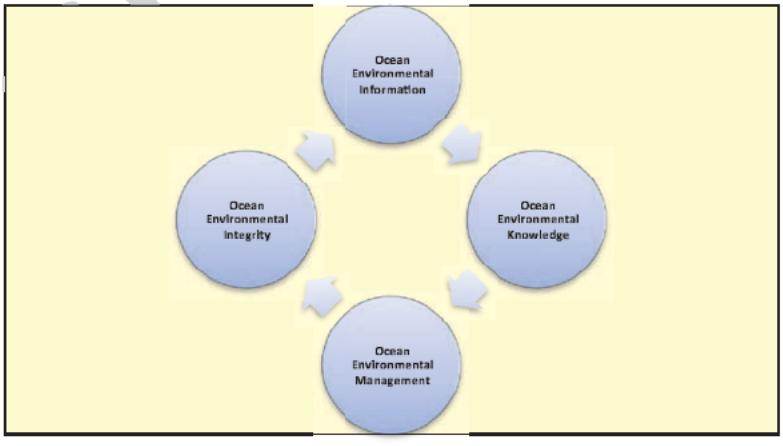
This objective aims to provide stakeholders with appropriate access to information required to understand the status and trends of the ocean and coastal environments and their components. This information will contribute directly to informing stakeholders of the value and sustainable use potential of ocean and coastal ecosystems and the role of stakeholders in contributing to ocean stewardship.

In order to achieve its strategic objectives the DEA proposes the adoption of the policy objectives and statements set out below. The implementation by the DEA of the four policy objectives will greatly enhance South Africa's ability to increase marine resource usage in a responsible and sustainable manner and to support global efforts to understand, rehabilitate, conserve and improve ecosystem services and functions.

b. South Africa's Ocean Environmental Management Policy Objectives and Statements

South Africa's ocean environmental management policy is comprised of four interdependent policy objectives. Activities and efforts under each of the objectives will be pursued concurrently. The four ocean policy objectives form a coherent reinforcing sequence initiated by the collection of environmental information to the generation of environmental knowledge informing improved environmental management approaches aimed at the protection and preservation of ocean environmental integrity. Ocean environmental integrity is critical to ensure the continued availability of ecosystem functions and services for current and future generations.

The Four Policy Objectives of Ocean Environmental Management



Objective 1: Ocean environmental information

The available information describing both the bio physical functioning and resource use of the ocean is at present inadequate to accurately determine the status and value of the marine environment. Most of South Africa's large ocean EEZ remains inadequately described. This is true for physical and ecological processes, biodiversity and human impact. Existing reporting requirements articulated in the National Environmental Management frameworks stipulate the method of sectoral reporting on environmental management. These frameworks were established in order that sectoral environmental information would be collated by the DEA. The DEA will develop and facilitate national research competence within itself and in partnership with other government and non government institutions to generate and collate meaningful ocean information.

Policy Statement 1.1: Ensure improved adherence with the ocean environmental reporting requirements contained in domestic legislation.

Policy Statement 1.1.1: Effort will be directed at communicating, assisting and obtaining improved adherence with the existing environmental legislation requiring the gathering and dissemination of management information, together with those departments that exercise functions which may affect or involve the management of the marine environment. This policy statement aims to improve and consolidate the implementation of existing legislation having reference to reporting on the ocean environment. A relatively small number of national government departments are directly involved in pursuing or regulating usages of the maritime zones under South Africa's jurisdiction.

Policy Statement 1.1.2: The DEA will facilitate the obtaining and sharing of appropriate and meaningful marine environmental information. Effort will be placed on initiating active engagement with statutory role playing departments. Assistance will be rendered in the identification of an appropriate reporting structure and templates.

Policy Statement 1.1.3: The DEA will establish, together with role playing departments, a limited number of high level indicators which will be capable of producing a synoptic description of the status of the ocean environment. The DEA will establish a central repository of marine environmental information and use impact assessments. The DEA will perform the necessary functions to compile ocean environmental compliance reports for the Minister of Environmental Affairs. This will enhance the Minister's fulfilment of constitutional and statutory duties including the presentation of meaningful information for consideration by Parliament. These DEA reports will further allow sectoral departments to obtain an integrated view of marine resource use and the status of the marine environment generally.

Policy Statement 1.2: Enhance existing research and monitoring of ocean ecosystems.

Policy Statement 1.2.1: The DEA is tasked with refining a research agenda to improve knowledge and understanding of ocean ecosystems. The research area will include the mainland continental shelf and EEZ, the Prince Edward Island Group and Antarctica. Research in the marine environment is undertaken by many entities. It is the task of the DEA to seek convergence of a managed network of research effort towards