



Government Gazette Staatskoerant

REPUBLIC OF SOUTH AFRICA
REPUBLIEK VAN SUID-AFRIKA

Vol. 568

Pretoria, 30 October 2012
Oktober 2012

No. 35783

N.B. The Government Printing Works will not be held responsible for the quality of "Hard Copies" or "Electronic Files" submitted for publication purposes



AIDS HELPLINE: 0800-0123-22 Prevention is the cure

IMPORTANT NOTICE

The Government Printing Works will not be held responsible for faxed documents not received due to errors on the fax machine or faxes received which are unclear or incomplete. Please be advised that an "OK" slip, received from a fax machine, will not be accepted as proof that documents were received by the GPW for printing. If documents are faxed to the GPW it will be the sender's responsibility to phone and confirm that the documents were received in good order.

Furthermore the Government Printing Works will also not be held responsible for cancellations and amendments which have not been done on original documents received from clients.

CONTENTS • INHOUD

No.

Page
No. Gazette
 No.**GENERAL NOTICE****Environmental Affairs, Department of***General Notice*

828 Green Paper on the National Environmental Management of the Ocean: For general comment	3	35783
--	---	-------

GENERAL NOTICE

NOTICE 828 OF 2012

DEPARTMENT OF ENVIRONMENTAL AFFAIRS

GREEN PAPER ON THE NATIONAL ENVIRONMENTAL MANAGEMENT OF THE OCEAN FOR GENERAL COMMENT

Minister, B. E. E. Molewa, Minister of Water and Environmental Affairs, hereby publish for public comment, the green paper on the National Environmental Management of the Ocean:, as set out in the Schedule hereto.

Any person who wishes to submit representations or comments in connection with the green paper are invited to do so by no later than 16h00 on **15 January 2013**. Comments received after this time may not be considered. All representations and comments must be submitted in writing to the Deputy Director-General of the Department of Environmental Affairs, Branch Oceans and Coasts:

**By post to: The Deputy Director-General
Environmental Affairs
Oceans and Coasts
Attention: Ashley Naidoo
PO Box 52126
V and A Waterfront, Cape Town
8002**

By e-mail to YMngxe@environment.gov.za

Copies of the English version of the green paper are available at the offices of the Department's Oceans and Coasts branch, located at East Pier Building, East Pier Road, V and A Waterfront and on the Department's website at www.environment.gov.za.

**B. E. E. MOLEWA
MINISTER OF WATER AND ENVIRONMENTAL AFFAIRS**



**The South African Policy on the National
Environmental Management of the Ocean**



environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

October 2012

Table of Contents

TABLE OF DIAGRAMS, MAPS AND TABLES	II
ACRONYMS	III
EXECUTIVE SUMMARY	IV
1. INTRODUCTION	1
2. THE SOUTH AFRICAN OCEAN ENVIRONMENT	1
3. THE DEPARTMENT OF ENVIRONMENTAL AFFAIRS' OCEAN MANDATE	8
4. THE EVOLUTION OF INTERNATIONAL OCEAN GOVERNANCE	12
a. The Emerging Global Ocean Management Agenda	12
b. International Ocean Governance Frameworks and Responsibilities	15
5. OCEAN ECOSYSTEM SERVICES AND SUSTAINABLE USE	17
a. The Ocean and Earth System	17
b. Ocean Ecosystems	21
c. Ocean Ecosystem Services	24
d. Existing Ocean Resource Usage	24
e. Emerging Ocean Resource Usage	30
6. ENVIRONMENTAL MANAGEMENT OF OCEAN ECOSYSTEM SERVICES	33
7. OVERVIEW OF SELECTED INTERNATIONAL OCEAN MANAGEMENT STRATEGIES	45
8. SOUTH AFRICA'S OCEAN ENVIRONMENTAL MANAGEMENT POLICY	48
a. Organisational Context, Vision and Strategic Objectives	48
b. South Africa's Ocean Environmental Management Policy Objectives and Statements	49
9. CONCLUSION	58
Annexure A: Table of International Instruments	59
Annexure B: Table of Domestic Legislation	65
END NOTES	66

Cover photographs source: Ashley Naidoo

Cover map source: Petroleum Agency SA, 2012

TABLE OF DIAGRAMS, MAPS AND TABLES

MAP: SOUTH AFRICA'S EXISTING MAINLAND EEZ	2
DIAGRAM: WORLD OCEAN THERMOHALINE CIRCULATION	3
MAP: SOUTH AFRICAN COASTLINE CURRENTS	4
DIAGRAM: BENGUELA CURRENT UPWELLING	5
MAP: SUB-ANTARCTIC ISLANDS OF THE SOUTHERN OCEAN	6
MAP: GLOBAL OCEAN SEA SURFACE TEMPERATURES 1982 – 2006	19
DIAGRAM: GLOBAL OCEAN ACIDIFICATION 1985 – 2005	20
MAP: LARGE MARINE ECOSYSTEMS: FISHERIES CATCH ABUNDANCE 2000 - 2004	22
DIAGRAM: SCHEMATIC REPRESENTATION OF ECOSYSTEM SERVICES IDENTIFIED BY UNEP	24
MAP: TOTAL TRAWL (INSHORE AND OFFSHORE) EFFORT DISTRIBUTION AROUND THE SOUTH AFRICAN COAST	25
TABLE: KEY COMMODITIES THROUGHPUTS ACROSS THE SOUTH AFRICAN PORT SYSTEM 2008/09	27
MAP: SOUTH AFRICAN OCEAN DIAMOND MINING CONCESSION AREAS	28
MAP: EXISTING OFFSHORE OIL AND GAS ACTIVITIES	29
DIAGRAM: MAJOR PATHWAYS AND ORIGINS OF INVASIVE SPECIES INFESTATIONS	36
DIAGRAM: GLOBAL SHIPPING ROUTES MAPPED BY GLOBAL POSITIONING SATELLITE	37

ACRONYMS

CBD	Convention for Biological Diversity
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CCO	Columbian Ocean Commission
DEA	Department of Environmental Affairs
DOD	Indian Department of Ocean Development
EEZ	Exclusive Economic Zone
GDP	Gross Domestic Product
GHGs	Green House Gases
ICM Act	National Environmental Management: Integrated Coastal Management Act
ILA	International Law Association
IMCRA	Interim Marine and Coastal Regionalisation for Australia
IMO	International Maritime Organisation
IOC	Intergovernmental Oceanographic Commission
KZN	KwaZulu-Natal
LME	Large Marine Ecosystem
Ports Act	National Ports Act 12 of 2005
Prince Edward Island Group	Prince Edward and Marion Islands
SAMSA	South African Maritime Safety Authority
TAC	Total Allowable Catch
TEU	Twenty Foot Equivalent Units (containers)
UNCED / RIO	United Nations Conference on Environment and Development, 1992
UNCLOS	United Nations Convention on the Law of the Sea
UNDP	United Nations Development Programme
UNEP	United Nations Environmental Programme
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UNFA	United Nations Fisheries Agreement
USA	United States of America
Waste Act	National Environmental Management: Waste Act

EXECUTIVE SUMMARY

South Africa's Constitution requires the protection, conservation and sustainable use of the environment. The ocean space under South Africa's jurisdiction is a wilderness area larger than the size of its land territory. The unique ocean current systems around the coast are highly productive and display rich biodiversity. The available living and non-living ocean resources represent a significant economic and development opportunity for present and future generations of South Africans. This economic opportunity comprises both historical sectors, like fishing and shipping, as well as significant new and emergent technologically advanced sectors relating to medicine, energy, mining and food production. The Department of Environmental Affairs ("DEA") bears the primary mandate of developing and implementing policies to protect and conserve South Africa's ocean environment.

In protecting and conserving the ocean the DEA aims to maintain the environmental integrity of ocean ecosystems. Ocean ecosystem services are important as they directly and indirectly impact on human livelihoods, food security and agriculture, trade and industry. These services range from planetary functions such as heat distribution, oxygen production, carbon dioxide absorption and influencing rainfall and weather patterns to the harvesting of fish and mining of oil, gas and other minerals. The DEA must also contribute to national planning by understanding and informing decision makers of how the delivery of ecosystem services may vary or change over time.

The DEA also bears the mandate of encouraging the sustainable use of South Africa's ocean resources. It does so in partnership with other role-playing departments. The management of South Africa's vast ocean space is a complex and challenging undertaking. The DEA has identified that present ocean environmental management arrangements are not optimal.

The DEA's ability to fulfil its ocean environmental management mandate is heavily reliant on the efforts of sectoral role-playing departments to assist it in meeting the DEA strategic objectives. Individual usage

sectors contribute to the aggregated and accumulated impacts on the ocean environment. To date, little attention has been paid to managing the aggregation and accumulation of human use impacts on the ocean. Sectoral management of ocean use in South Africa regulates and advances particular economic sectors separately within respective departments. All role playing departments recognise and implement, to varying degrees, environmental management objectives and initiatives. The opportunity exists to considerably enhance the efficiency of these environmental initiatives through improved information sharing and cooperation. This opportunity is increasingly being actioned by coastal states around the world through the development of national ocean policies. Such policies, while seeking to provide better communication among role-playing departments, also attempt to unlock and expand the relatively unused sustainable development potential of large ocean territories. This is often achieved through national ocean environmental management policies that are based on the development and efficient distribution of information, understanding and knowledge of the ocean ecosystems within and adjacent to coastal states.

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

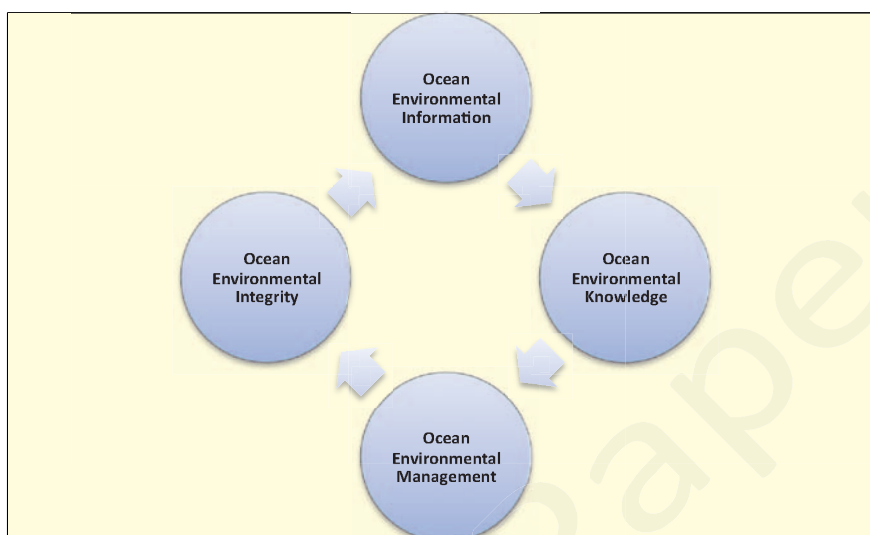
- Improve the competitiveness and effectiveness of activities existing within their marine jurisdiction, while at the same time researching and developing innovative and responsible future uses;
- Maintain and improve marine ecosystems resilience, conserve biodiversity and restore degraded habitats;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

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 commonly agreed goals. Data and information accumulated from research efforts will be maintained in the planned central repository of marine environmental information.

Policy Statement 1.2.2: The unique policy complexity and global importance of ocean ecosystems adjacent to South Africa attracts

national and international research interest. South Africa has permanent research bases at Marion Island and Antarctica and has a track record of research excellence in specialised areas. These nodes of excellence will be supported by investment in further capacity and infrastructure. Towards enhancing this capacity, South Africa has in 2012 taken delivery of a technologically advanced polar research and supply vessel. The DEA will increase the number of South African science and engineering graduates in ocean-related studies and provide opportunities for them to contribute to ocean knowledge, management and beneficial use. Particular attention will be paid to promoting more science and engineering graduates who reflect broadly the racial and gender composition of South Africa.

Policy Statement 1.2.3: South Africa's ocean jurisdiction and the territory under the Extended Continental Shelf Claim remain largely unexplored and the ability to monitor its ocean environment is resource constrained. The DEA will consider and implement innovative methods of monitoring South Africa's extensive marine area including the use of ship-based systems, satellite observation, monitoring buoys and other emerging technologies. In addition to gathering information on ocean systems, innovative use of such technologies can also enhance compliance efforts in the EEZ.

Objective 2: Ocean environmental knowledge for sustainable development decision making

Sustainable development decision making is constrained by the present limited knowledge of the ocean environment. This frustrates efforts both to develop and conserve the marine environment. The DEA will undertake the collation, analysis and interpretation of the increasing amount of marine environmental information obtained under Objective 1. In consolidating environmental information the DEA positions itself to promote rehabilitation, conservation and sustainable development by providing better services to role-playing departments. The provision of

improved knowledge to enhance decision making by sectoral role-players is an important component in fostering better understanding of the roles and responsibilities of the relevant departments. Improving communication and cooperation in this manner is a necessary precursor for the active pursuit of a common set of marine conservation and development goals.

Policy Statement 2.1: Produce information tools to facilitate knowledge and understanding of the natural functioning of ecosystems and of human impact on the ocean environment.

Policy Statement 2.1.1: The DEA has identified that the production of a detailed spatial-mapping of biodiversity and natural physical processes of South Africa's marine area is a priority. This process will include mapping the distribution of biodiversity and ocean current dynamics within South Africa's EEZ. The information obtained during the spatial-mapping process will be complemented by additional internal and external data sources to produce a South African Ocean Information System. The South African Ocean Information System will enhance South Africa's ability to archive information, summarise data, generate scenarios and support informed decision making. Identified gaps in marine knowledge and data will be fed back into the ongoing marine research agenda pursued in Objective 1.

Policy Statement 2.1.2: The spatial-mapping process will inform the division of South Africa's marine environment into Large Marine Ecosystems ("LMEs") or bioregions to be used for management planning purposes. Such regions are capable of further division into spatial zones reserved for specific or mixed use such as development, control and protection, nature preservation and reserved zones, in consultation with roleplayers.

Policy Statement 2.1.3: The scientific effort used while developing the spatial-map and

analysing existing ocean environmental data will be supplemented with the collection of other information in order to produce knowledge such as scenarios, predictions and trends. The DEA will provide role-playing departments with ongoing analyses of the aggregated environmental information. This information will be of great value in improving sustainable sectoral planning initiatives and environmental reporting both domestically and internationally.

Policy Statement 2.2: Establish, in consultation with role-players, ocean ecosystem thresholds for human health and biodiversity conservation.

Policy Statement 2.2.1: The knowledge products generated through spatial-mapping, improved environmental data analysis and other research and monitoring will assist the generation of a baseline assessment of the current environmental status of South Africa's marine environment. The establishment of this baseline assessment will provide a comprehensive inventory of living and non-living aspects of South Africa's ocean environment. It will provide the basis for dialogue with sectoral role-players in establishing a common set of marine ecosystem impact thresholds for the reporting indicators described in Objective 1 above. Impact thresholds may be defined per LME, bioregion or spatial zone. These agreed impact threshold indicators will provide the foundation for proactive and adaptive environmental planning. This planning approach facilitates sectoral alignment in the pursuit of functioning ecosystems for current and future generations.

Policy Statement 2.3: Provide knowledge to promote sustainable development whilst maintaining the resilience of the ocean.

Policy Statement 2.3.1: The inertia around developing the economic potential of the ocean exists in the lack of publically accessible information and knowledge regarding most of the ocean space under South African jurisdiction. Spatial-maps, inventories and knowledge tools represent a considerable government investment in unlocking the economic and development potential of the South Africa's extensive EEZ. Increased scientific knowledge of South Africa's EEZ will make more apparent economic opportunities which are currently unknown and increased understanding of ecosystem functioning will directly contribute to sustainable development and job creation opportunities.

Policy Statement 2.3.2: The establishment of commonly agreed LME, bioregion or spatial zone indicators and threshold limits will simplify and focus impact assessments. This will have the benefit of providing direction and reducing the cost and time of environmental assessments, facilitating economic investment in the ocean area.

Policy Statement 2.3.3: Technological innovation is required to efficiently research, monitor, explore and use the large ocean surface, water column and depths. The DEA will partner with the Department of Science and Technology and specialist tertiary educational institutes to stimulate innovation in technology that supports ocean-based science and industry.

Objective 3: Environmental management of South Africa's ocean

This objective seeks to identify the DEA's management responses to acting on the information and knowledge produced under Objectives 1 and 2. Increased knowledge of South Africa's ocean environment is likely to highlight existing and emerging challenges faced by ocean ecosystems and the earth system itself. The DEA will engage with role-playing departments to determine appropriate management responses to these environmental challenges and trends. The DEA also has at its disposal various existing environmental management tools including the

establishment of protected areas and environments. This objective explains how the DEA will pursue its environmental mandate and seek to influence role-players in their ocean environmental management planning.

Policy Statement 3.1: Provide timeous information on trends and extremes in ecosystem and earth system functioning.

Policy Statement 3.1.1: The ocean monitoring and mapping efforts together with the other knowledge products developed in Objective 2 will allow the DEA to undertake forecasting, prediction and trend analysis within the marine environment as required by South Africa's Climate Change Policy.

Policy Statement 3.1.2: Long-term monitoring programmes will be enhanced to generate time series data that can be used to identify and track shifts in ecosystems functioning that contribute to or result from climate change. Climate change will likely alter the availability and delivery of ecosystem services including rainfall and its seasonal patterns. Changes in rainfall and its seasonal patterns will challenge the sustainability of existing agricultural crop selection and geographic locations. The areas of operation of fisheries may also be influenced. Without the necessary adaptation strategies being set in place South Africa's food security may be challenged. Climate change may also result in exaggerated weather phenomena along South Africa's coastline such as coastal storms and storm surges and impacts on biodiversity.

Policy Statement 3.1.3: The DEA will provide better trend and scenario planning services and reports to aid climate change mitigation and adaptation decision making by role-players. This will allow the DEA to inform national planning on how ocean human livelihood services will vary or change in the short, medium and long term at local,

national, regional and global scales. Such services and reports will include variability of the ocean as a rainfall source; the magnitude of sea level rise and implications for coastal communities and improved predictability of exaggerated weather phenomena such as coastal storms and storm surges. Recent extreme weather events have demonstrated that poor communities are disproportionately affected by such phenomena. Understanding trends in ocean temperature and ocean atmosphere interactions will allow the DEA to provide timeous reporting to role-players and contribute to early warning.

Policy Statement 3.2: Ensure the conservation, protection and rehabilitation of ocean habitat and species.

Policy Statement 3.2.1: The DEA will seek to partner with role-playing departments to improve the implementation of conservation measures and increase the availability of ocean environmental data. This will be done by ensuring that the relevant management authorities of ocean use include targeted conservation and data collection responsibilities into the relevant permitting and licencing frameworks.

Policy Statement 3.2.2: The DEA will assume responsibility as the environmental regulatory authority for all unregulated and new human activity in the ocean environment. International trends suggest that these activities are likely to include carbon sequestration, ocean fertilisation, geo-engineering and deep sea exploration.

Policy Statement 3.2.3: The DEA will establish a representative network of marine conservation areas under South Africa's jurisdiction to promote conservation and thereby also contribute to the long-term sustainable use of living resources. The DEA recognises the significant contribution of islands to ocean ecosystem functioning. Islands will receive prioritised conservation

status. Maximum conservation status will be afforded to the sub-Antarctic Prince Edward Island Group additional to the provisions of the Convention for the Conservation of Antarctic Marine Living Resources. There is also currently an international movement towards the establishment of a representative network of marine conservation areas beyond state jurisdiction. The DEA will support this initiative.

Policy Statement 3.2.4: The DEA will undertake and support actions aimed at the rehabilitation of degraded habitats, where necessary, and the protection of threatened species.

Policy Statement 3.2.5: The DEA will adopt internationally agreed conservation targets and practices, where appropriate, as the minimum necessary requirements for conservation.

Policy statement 3.2.6: The DEA will support international efforts aimed at the protection and conservation of habitats and species in the High Seas and in Antarctica.

Policy Statement 3.3: Establish ecosystem and biodiversity management plans in consultation with role-players.

Policy Statement 3.3.1: The DEA will, together with role-playing departments, develop and pursue uniformity of high level ocean environmental norms and standards to inform sectoral planning efforts. These norms and standards are aimed at guiding environmental best practice in ocean sectoral use.

Policy Statement 3.3.2: The DEA will develop ecosystem and biodiversity management plans for the ocean environment to protect species and habitats. These management plans will offer maximum protection to key species, such as top predators, and habitats, such as unique benthic fauna and flora and endangered coral reefs and estuaries. The

plans will provide guidance with respect to the setting of common objectives for the conservation and management of the ocean environment in collaboration with role-players.

Policy Statement 3.3.3: The DEA recognises the importance of ocean heritage relating to both geographic areas and species. The DEA will prioritise the protection and conservation of South African ocean heritage resources, such as coelacanths.

Policy Statement 3.3.4: The DEA will establish best practice guidelines governing the transport of harmful and noxious substances in the marine environment. The DEA will seek to influence planning aimed at minimising the risk of environmental exposure to harmful and noxious substances including hydrocarbons, persistent organic pollutants and industrial waste.

Policy Statement 3.3.5: The introduction of untreated sewage and industrial waste into the ocean environment will remain prohibited and effort will be placed on encouraging coastal role-players to pursue efficient and affordable approaches to treatment.

Policy statement 3.3.6: The DEA will establish and enforce regulations controlling the introduction and beneficial use of alien marine species and minimise the threat of invasive species.

Objective 4: Ocean environmental integrity

Promoting ocean environmental integrity is reliant on coherent and rational approaches to the conservation, protection and sustainable use of South Africa's rich marine resources. It further supports South Africa's contribution to regional and global ocean management responsibilities. The importance of maintaining ocean environmental integrity lies in the preservation of ocean environmental goods and services for current and future generations of South Africans. This objective can only be achieved through effective partnerships and efficient cooperation. The

EEZ represents a geographic space larger than the size of South Africa's land area. The State is the custodian of this large ocean space on behalf of the people of South Africa. The management of such a vast space is a complex undertaking involving various role-players at a national, regional and international level. The realisation of this custodianship responsibility demands cooperation in effort and investment by all State role-players to preserve ocean environmental integrity. The improvement of environmental information, knowledge and the management of South Africa's ocean environment provide the necessary platform for the achievement of this objective.

Policy Statement 4.1: Cooperate at a national, regional and international level to advance sustainable ecosystem-based management of the EEZ, High Seas and Antarctica.

Policy Statement 4.1.1: At a national level the DEA will drive the movement from a sectoral to an ecosystem-based bioregional ocean management planning approach. The ecosystem-based approach implies coordinated sectoral planning that pursues common ocean environmental objectives. It further underpins the eventual migration to integrated ocean management.

Policy Statement 4.1.2: The DEA will use the existing cluster cooperative governance mechanism to facilitate the improved coordination of ocean environmental management.

Policy Statement 4.1.3: At a regional level the DEA will seek to participate in programmes based in the LME management framework. Initially attention will be paid to the five African and the Antarctic LMEs. The DEA will promote cooperation and strengthen information exchange and management principles across these LMEs. The implementation of national ocean management objectives will be strengthened by aligning them with the regional LME structures, in particular the adjacent

Benguela and Agulhas Current LMEs. This allows for the development of integrated regional ocean governance at the Southern African Development Community level, as well as active participation in, and support for, the Nairobi and Abidjan Convention structures.

Policy Statement 4.1.4: The DEA will continue to play a leadership role with respect to regional ocean governance underpinned by its ocean research and management capacity. Through leadership roles the DEA will secure alignment between national environmental management objectives and regional and international programmes.

Policy Statement 4.1.5: At an international level, attention will also be paid to improving channels of communication between South Africa's various central authorities established by international agreements. Currently central authorities, who bear international reporting responsibilities, are located within a variety of role-playing structures. The ability of central authorities to interact and communicate with one another is not optimum. Improved communication will allow South Africa to undertake its international responsibilities and reporting in a more harmonised manner.

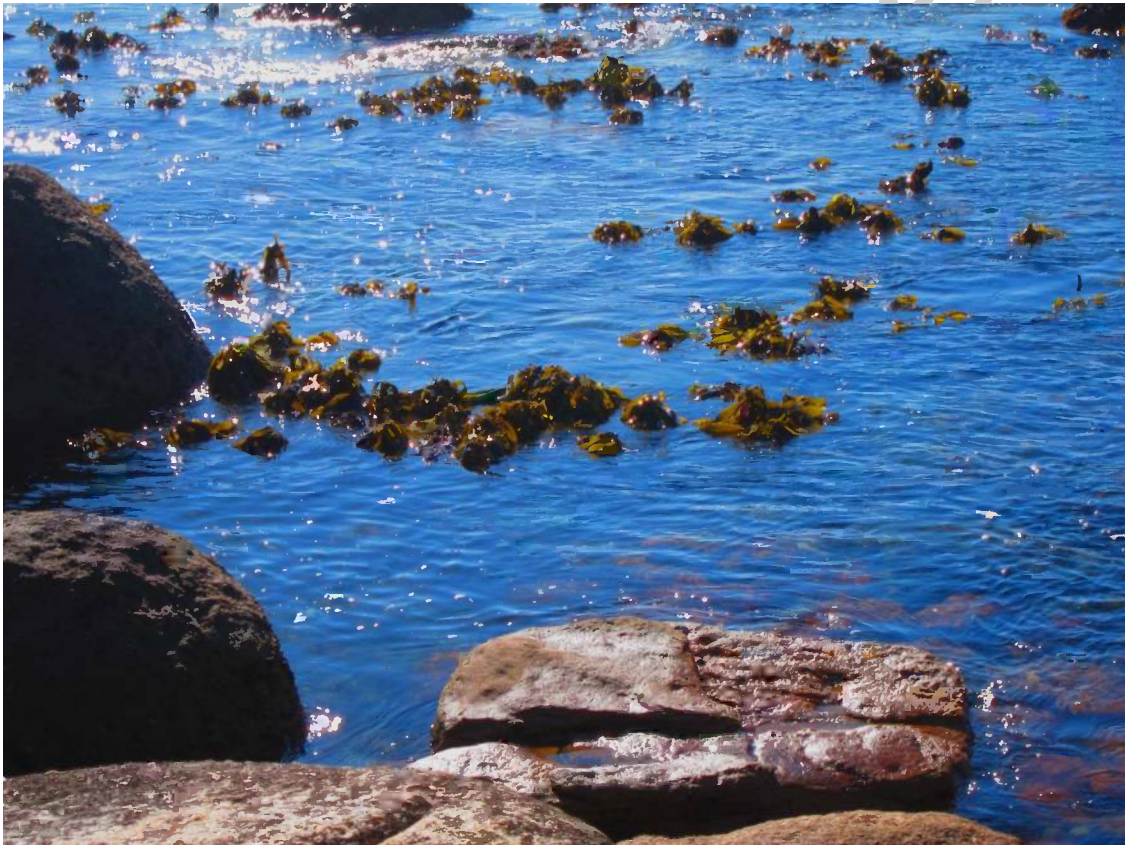
Policy Statement 4.1.6: The DEA will support continuing engagement at international ocean governance fora to promote equitable access and benefit sharing of resources in the High Seas and Antarctica.

Policy Statement 4.1.7: The DEA will promote global ocean environmental protection in South Africa's national interests. South Africa is an original signatory of the Antarctic Treaty and exercises sovereignty over two sub-Antarctic islands. As such South Africa is well positioned to influence planning and management strategies in the Southern Ocean. The DEA exercises many of South Africa's international ocean responsibilities and intends to strengthen its interactions on global environmental management initiatives in an attempt to appropriately influence

global strategies. The DEA will assist in furthering South Africa's ability to actively partner with Southern Hemisphere marine nations in particular and developing nations generally, such as the India Brazil South Africa partnership. Such partnerships are aimed at enhancing the economic and scientific resources available for the undertaking of large-scale research projects with the objective to increase knowledge of shared ocean dynamic processes. This knowledge will enable regional ocean environmental management planning and improved national adaptation decision making. The DEA will also support ongoing cooperation and collaboration with developed countries in the pursuit of global ocean environmental integrity.

The successful implementation of the policy objectives listed above will allow South Africa, in the next five years, to complete the move from sectoral ocean management planning towards coordinated sectoral environmental management. This shift is made possible by building better understanding amongst role-players of the benefits of improved environmental information and knowledge to inform environmental planning. Environmental spatial-planning relies on improved scientific knowledge of the South African ocean environment and is underpinned by the comprehensive spatial-map of the South African marine environment. It allows for a more informed strategic planning process to be undertaken, which seeks to advance sustainable development and conservation and protection of the ocean through an ecosystem-based management approach. In the longer term it will be possible to undertake the move from coordinated sectoral environmental management to integrated environmental ocean management. International experience has shown that the undertaking of integrated ocean management planning cannot rely purely on principles of cooperative governance. It will be necessary to undertake the drafting of specific legislation such as an Ocean Act. The Ocean Act will need to establish clear political, reporting and administrative structures, set out an ecosystem-based ocean management approach, define the jurisdiction of the Act including linkages to existing legislation and provide for mechanisms to be followed during

integrated spatial-planning. The achievement of the policy objectives will give effect to the ocean environmental management responsibilities articulated in s24 of the Constitution and DEA's responsibilities as contained in the National Environmental Management Act. It will further directly contribute to fulfilling South Africa's commitment to Chapter 17 of Agenda 21 (the Rio Declaration) and the Johannesburg Declaration on Sustainable Development, produced during the World Summit on Sustainable Development in 2002.



SOURCE: ELZETTE HENSHILWOOD

1. INTRODUCTION

South Africa's Constitution requires the protection, conservation and sustainable use of the environment. The ocean space under South Africa's jurisdiction is a wilderness area larger than the size of its land territory. Countries with large Exclusive Economic Zones ("EEZs") are increasingly realising the immense global competitive advantage that the living and non-living marine resources offer them. The unique ocean current systems around South Africa's coast are highly productive and display rich biodiversity. The available living and non-living ocean resources represent a significant economic and development opportunity for present and future generations of South Africans. This economic opportunity comprises both historical sectors, like fishing and shipping, and significant new and emergent technologically advanced sectors relating to medicine, energy, mining and food production.

Under apartheid the management of South Africa's oceans was characterised by the exclusion of the majority of South Africans from access to, and exploitation of, the ocean and coast resources. Access to beaches, coastal areas and rights to exploit marine resources was concentrated in the hands of one racial group. The exploitation of resources was further characterised by selective rights allocation in a few capital-intensive sectors. The DEA is required to ensure increased equitable access to the ocean and its resources in its planning processes.

The DEA bears the primary mandate of developing and implementing policies to protect and conserve South Africa's national ocean assets. The DEA also bears the mandate of encouraging the sustainable development of South Africa's ocean resources. It does so in partnership with other role-playing departments. The management of South Africa's vast ocean space is a complex and challenging undertaking. The DEA has identified that the current environmental ocean management arrangements are not optimal. In order better to fulfil these responsibilities towards ensuring the integrity of South Africa's environment and ecosystem services, including supporting the earth system, the DEA proposes that the following South African Ocean Environmental Management Policy be considered.

2. THE SOUTH AFRICAN OCEAN ENVIRONMENT

South Africa is a nation bordered by the ocean on three sides – to the west, south and east. The approximate length of South Africa's coastline has been calculated in different ways in various documents. The South African Navy calculates South Africa's coastline as being approximately 3 924 km.¹ This calculation includes South Africa's sovereign possessions of Prince Edward and Marion Islands ("Prince Edward Island Group"). Prince Edward Island has a coastline of 32 km while that of Marion Island is 134 km. Generally most documents reference South Africa's mainland coastline as being approximately 3 000 km. This coastline stretches from the Namibian border on the West Coast to the Mozambique border on the East Coast with few bays or indentations naturally suitable for harbours. There are eight major ports namely: Richard's Bay; Durban; East London; Port Elizabeth; Mossel Bay; Cape Town, Saldanha Bay and Ngqura, which has recently been developed on the East Coast.

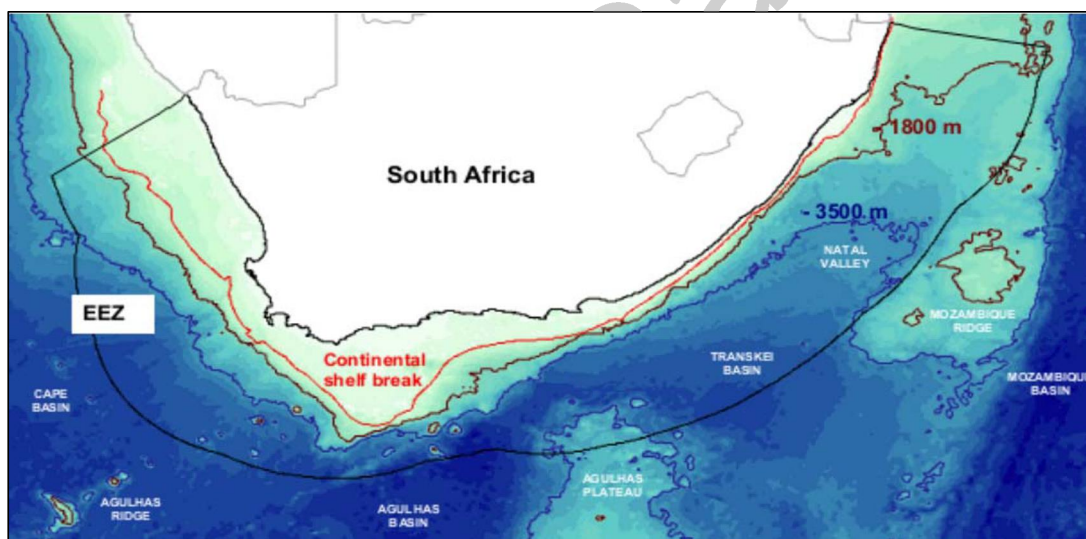
Under international law South Africa exercises marine jurisdiction over:

- its internal waters which include all harbours;
- its territorial waters which include the sea within a distance of twelve nautical miles from the coastal baselines. A nautical mile approximates to 1.85 kilometers;

- its contiguous zone, including its marine cultural zone, which includes the sea beyond the territorial waters but within a distance of 24 nautical miles from the coastal baselines;
- its EEZ which includes the sea beyond the territorial waters but within a distance of 200 nautical miles from the coastal baselines; and
- its continental shelf as defined in Article 76 of the United Nations Convention on the Law of the Sea (“UNCLOS”).

Within the EEZ states have the right to exploit, develop, manage and conserve all resources to be found in the waters, on the ocean floor and in the subsoil. The current extent of South Africa’s EEZ is approximately 1 553 000 km² and South Africa has lodged further claims under international law to extend its jurisdiction to certain parts of the continental shelf. UNCLOS broadly speaking defines a coastal state’s continental shelf as comprising the seabed and subsoil of the submarine areas that extend beyond its territorial sea throughout the natural prolongation of its land territory to the outer edge of the continent shelf, or to a distance of 200 nautical miles from the baselines. It is anticipated that once these claims have been processed they will add an additional 1 137 000 km² to South Africa’s mainland EEZ and 1 108 000 km² to the EEZ surrounding the Prince Edward Island Group.ⁱⁱ Comparatively South Africa comprises 1 200 000 km² of terrestrial jurisdiction. With the additional shelf claims South Africa will potentially exercise spatial jurisdiction over one of the world’s largest EEZs.

Map: South Africa’s Existing Mainland EEZ. The continental shelf break is shown in red and the 1800m and 3500m are shown in brown and blue respectively.ⁱⁱⁱ

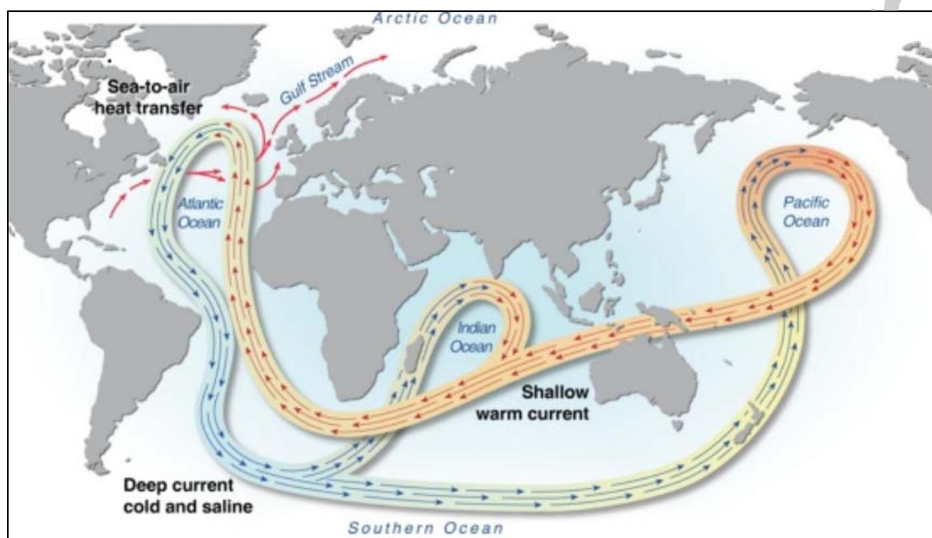


The ocean environment around Southern Africa is one of the most varied in the world. The strong oceanographic variability and in particular the contrasts in temperature, productivity and dissolved oxygen content of the ocean are reflected in the general division of South African marine biodiversity into three broad biogeographic regions (excluding the Prince Edward Island Group) namely, the cool temperate West Coast, the warm temperate South Coast and the subtropical East Coast.

The complex interactions between the ocean and the atmosphere on a regional and global scale, combined with the effects of latitude and topography, affect the rainfall patterns in South Africa. Southern Africa forms a wedge of land sticking into the vast marine region of the South Atlantic, the South Indian and the Southern Oceans. While this ocean

environment plays a definitive role in our own regional climate, it also has significance far beyond South Africa's shores. There is a slow passage of water containing enormous amounts of heat moving past South Africa and up the length of the Atlantic Ocean, where it has a profound warming effect on the climate of Western Europe. This movement of surface waters from the Indian Ocean to the Atlantic is an important component of the global circulation of water. Increasingly international research is being undertaken to obtain accurate data from the ocean adjacent to South Africa due to scientific recognition of the global significance of these ocean processes.

Diagram: World Ocean Thermohaline Circulation^{iv}



South Africa displays high levels of both terrestrial and marine biodiversity within a relatively small area. For example, some 10 000 species of marine plants and animals have been recorded in South Africa, that is almost 15% of the global marine species diversity. In broad terms, plants and animals are distributed according to the distinctive physical characteristics of the different regions. The marine environment along the West Coast is characterised by cold upwelled waters and has low species diversity and large populations of some species. The South Coast is a transition region between the cool dry West Coast and the warm moist East Coast, and shows characteristics of both areas. The marine environment here has a high biological diversity and moderate productivity. The East Coast becomes increasingly warm, humid and tropical northwards. The marine biodiversity on the East Coast is characterised by increasing species diversity and smaller species populations.^v The high productivity of the West Coast allows for large volume offshore commercial fisheries and inshore subsistence and recreational fishing. Towards the East Coast the low productivity but higher species diversity allows for subsistence and recreational fishing but is not suitable for large offshore commercial fishing.

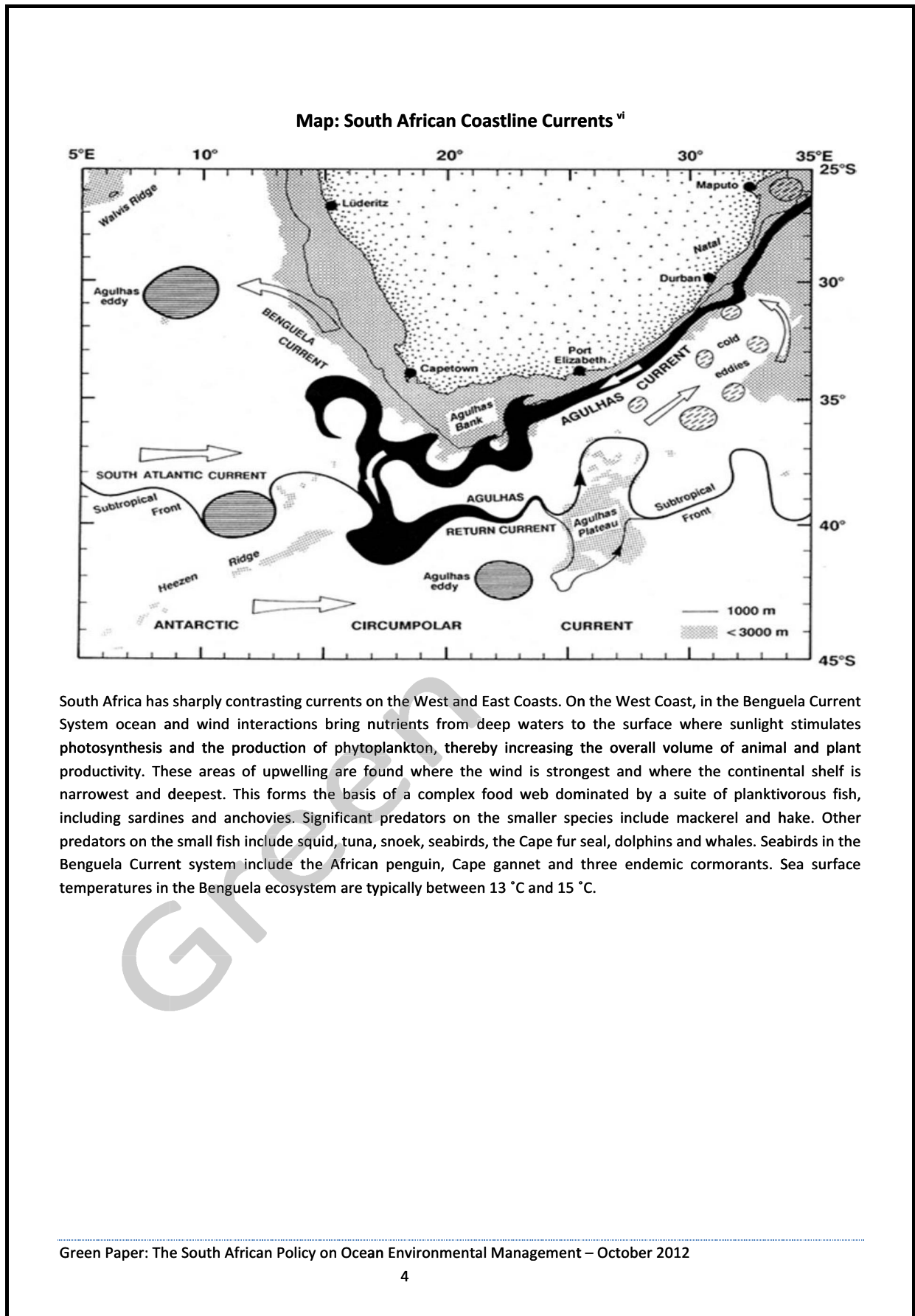
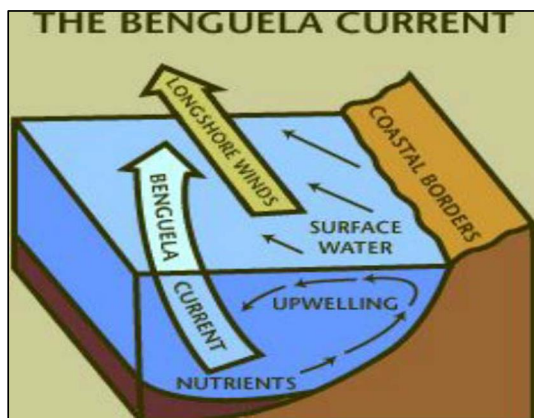


Diagram: Benguela Current Upwelling^{vii}

On the East Coast, the Agulhas Current System becomes established between southern Mozambique and Durban. This warm western boundary current flows strongly southward along the East Coast, bringing nutrient-poor tropical water from the equatorial region of the Western Indian Ocean. The waters are typically blue and clear, with low nutrient levels but very diverse biota from the rich Indo-Pacific region. Coral reefs, mangroves and high river input from sources along the East Coast characterise the shelf waters. Two species of turtle breed in Northern KwaZulu-Natal ("KZN") and adjoining coastal regions in Mozambique and are dispersed widely into the South West Indian Ocean. The Agulhas Current contains several species of coral, tropical fish, sharks, seabirds, dolphins and whales. Along the narrow shelf on the East Coast, the Agulhas Current runs close to the shelf break (edge of continental shelf), except off the Thukela (Tugela) Bank where the shelf is a little wider. The coastline and adjoining interior has a higher rainfall than the West Coast as heat and moisture are transferred from the ocean to the atmosphere.^{viii}

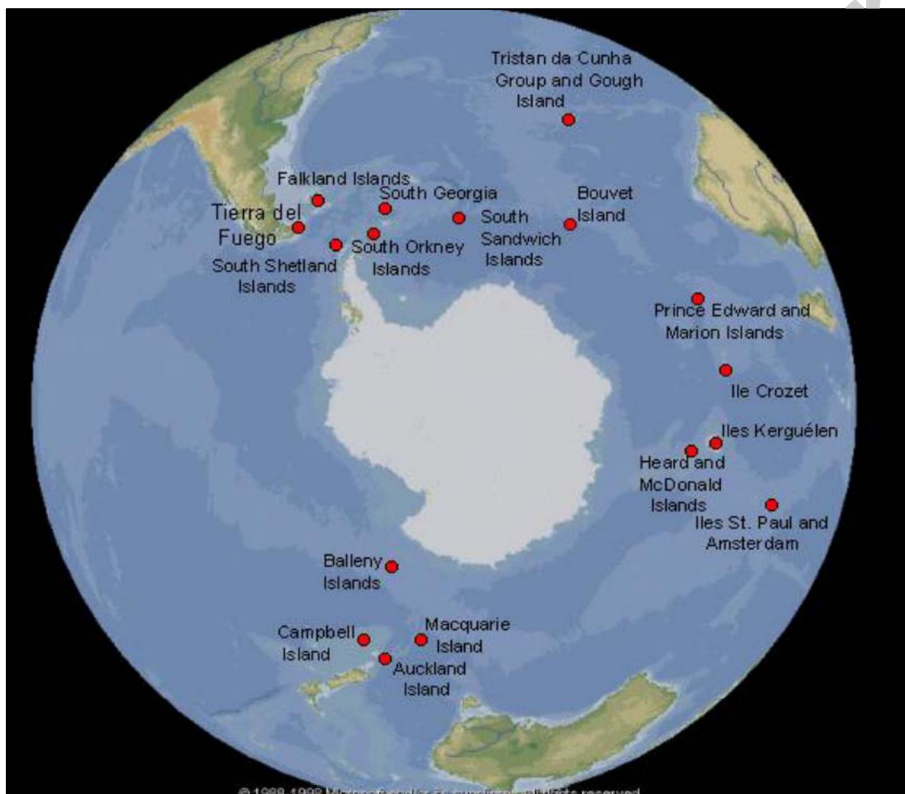
The Agulhas Bank, off southern South Africa, is an intermediate environment between the cool Benguela Current in the west and the warm Agulhas Current in the east. The Agulhas Bank is shallower than 150 m in the east and slopes gently towards the south. Sea surface temperatures over most of the Agulhas Bank are generally 16–17 °C in winter and 20–21 °C in summer. Concentrations of nutrients over the Agulhas Bank are not as high as on South Africa's west coast but are sufficient to support a productive marine community. On the Agulhas Bank the conditions are generally less turbulent than off South Africa's west coast, providing a more stable environment for fish that spawn in the water column. As a result, many fish migrate to this region to spawn, including anchovy, sardine (pilchard), horse mackerel, hakes and linefish. This intermediate environment is an extremely important area for pelagic fish spawning, as eggs and larvae are swept westwards and northwards onto the West Coast shelf, which young fish utilise as a productive nursery area before returning to spawn on the Agulhas Bank. Seabirds breeding in this area include some of those that breed on the West Coast as well as more tropical species such as the roseate tern. The region is an important nursery and transit area for whales, such as the southern right and humpback whales, which migrate to South Africa from the Southern Ocean.

In 1948 South Africa annexed the Prince Edward Island Group which lies south-east of South Africa for strategic military reasons, primarily the protection of the East-West sea trade routes. The Prince Edward Island Group is westernmost of islands that form the Kerguelen Province, which also includes Îles Crozet, Îles Kerguelen (France) and Heard and McDonald Islands (Australia). Both Marion Island and Prince Edward Island are shield volcanoes that rise from depths of some 5 000 m. They are linked by a saddle, where the water depth is about 200 m. Sea surface

temperatures around the islands range from 4–7 °C. South Africa has jurisdiction over a considerable EEZ surrounding this area, comprising some 473 380 km².

The Prince Edward Island Group is a haven for large numbers of breeding seabirds and seals, some of which are considered globally threatened. There are four species of penguin, including the macaroni and the king which are the most abundant, five species of albatross, including 44% of the world's population of wandering albatrosses, and a suite of burrowing petrels. There are three species of seals: the southern elephant seal, sub-Antarctic and Antarctic fur seals. Fish include the Patagonian toothfish and various members of the family of notothenids or "antifreeze" fish. Crustaceans, especially euphausiids (krill), contribute substantially to the diets of some of the seabirds and some whales.

Map: Sub-Antarctic Islands of the Southern Ocean^{ix}



Many detailed studies have investigated marine biogeographic patterns around the coast of South Africa and the Prince Edward Island Group. These studies have generally shown little consensus regarding the names of biologically distinct areas, levels of dissimilarity between regions, regional boundaries and the existence of overlap zones.^x The studies highlight the need for an integration of all the spatial pattern and process information (living and non-living) currently available in order to arrive at a more definitive, comprehensive and integrated single description of the biogeography of South Africa's EEZ.

The complex current systems adjacent to South Africa result in a biodiversity complement and range that is unique and requires management and conservation prioritisation. The physical environment also presents South Africa with several economic opportunities such as mining, fishing, shipping and tourism. The national and global significance of the Southern African oceans also serves as a major attractor for scientific research programmes.

Summary Box: The South African Ocean Environment

Under international law South Africa exercises jurisdiction over its internal waters, territorial waters, contiguous zone, EEZ and continental shelf. Currently the extent of South Africa's EEZ is approximately 1 553 000 km² while a claim for an additional 1 137 000 km² adjoining South Africa's mainland EEZ and 1 200 000 km² adjoining the EEZ surrounding the Prince Edward Island Group has been lodged with the appropriate United Nations international authority. Comparatively, South Africa comprises 1 200 000 km² of terrestrial jurisdiction. Once South Africa's continental shelf extension claims have been processed, and if they are successful, South Africa will enjoy marine usage rights over an area of almost four million km². With the additional shelf claims South Africa will potentially exercise spatial jurisdiction over one of the world's largest EEZs.

Some 10 000 species of marine plants and animals have been recorded in South Africa, that is, almost 15% of the global marine species diversity. In broad terms, plants and animals are distributed according to the distinctive physical characteristics of the different regions. South Africa is privileged to have jurisdiction over a vast area of the world's ocean. South Africa's marine area represents a national asset of immense current and future value.

The ocean environment around Southern Africa is one of the most varied in the world. The strong oceanographic differences are reflected in the general division of South African marine biodiversity into three broad biogeographic regions (excluding the Prince Edward Island Group) namely, the cool temperate West Coast, the warm temperate South Coast and the subtropical East Coast.

The complex current systems adjacent to South Africa result in a biodiversity complement and range that is unique and requires management and conservation prioritisation. The physical environment also presents South Africa with several economic opportunities such as mining, fishing, shipping and tourism. The national and global significance of the Southern African oceans also serves as a major attractor for scientific research programmes.



SOURCE: ASHLEY NAIDOO

3. THE DEPARTMENT OF ENVIRONMENTAL AFFAIRS' OCEAN MANDATE

The management, conservation and protection of the environment of South Africa fall within the mandate and responsibilities of the DEA. This mandate is derived from the Constitution, domestic legislation, and relevant international agreements and extends to South Africa's terrestrial, coastal and ocean zones. The DEA currently describes its role of managing, conserving and protecting the environment through the vision of "a prosperous and equitable society living in harmony with our natural resources".^{xi} Environmental management approaches are aimed at protecting and preserving environmental integrity in order to ensure the availability of ecosystem services for current and future generations.

The DEA contributes both directly and indirectly to many of the rights contained in South Africa's Constitution. However, its primary responsibility is to give content to s24 of the Constitution which reads as follows:

"Everyone has the right:

- (a) to an environment that is not harmful to their health or well-being; and
- (b) to have the environment protected for the benefit of present and future generations, through reasonable legislative and other measures that:
 - (i) prevent pollution and ecological degradation;
 - (ii) promote conservation; and
 - (iii) secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development."

The inclusion of s24 in the Bill of Rights places the environmental right on a par with all other rights contained in the Bill of Rights. As one court judgement put it:

"By elevating the environment to a fundamental justiciable human right, South Africa has irreversibly embarked on a road which will lead to the goal of obtaining a protected environment by an integrated approach, which takes into consideration inter alia, socio-economic concerns and principles."^{xii}

The DEA bears the responsibility of leading South Africa's environmental initiatives with respect both to the conservation of the marine environment and the setting in place of strategies to ensure the sustainable development of marine resources. Historically, implementation of the DEA's environmental mandate has largely focused on the terrestrial areas of the country. The ocean and coastal ecosystems need to be managed at an equivalent level in order to effectively contribute to environmental integrity. The management of coastal spaces has now been addressed by the Integrated Coastal Management Act^{xiii}. The ocean environmental management policy is aimed at improving the sustainable development, conservation and protection of the living and non-living aspects of the ocean.

The absence of an effective environmental management approach has resulted in those sectors of the state and the economy that use the various marine goods and services self-regulating activities that are undertaken in the ocean environment. However, this is done with regard to their respective economic mandates and does not always adequately consider the environmental management mandate of conservation and protection, in particular with regards to the accumulated and aggregated human use impacts across sectors. At a global level, it is increasingly emerging that conservation, protection and sustainability of ocean environmental ecosystem services requires an improved management approach. The DEA supports sustainable development initiatives in the ocean by promoting the understanding of ocean systems and tracking potential changes in how these systems function. Such information is important to other departments and role-players that facilitate the strategic direction of ocean-based investments.

The development of a South African ocean management policy gives content to the minimum environmental standards contained in s24, which itself reflects the emergent international principles concerning environmental protection. Consequently the application of these principles has been taken into account when considering an appropriate approach to ocean management for South Africa.

The s24 Environmental right mirrors developing international environmental legal principles by including the term “ecologically sustainable development”. This wording directly references the international legal principle of “sustainable development”. South Africa’s courts have described sustainable development as:^{xiv}

“The fundamental building block around which environmental legal norms have been fashioned, both internationally and in South Africa, and is reflected in s24(b)(iii) of the Constitution. Pure economic principles will no longer determine in an unbridled fashion whether development is acceptable. Development which may be regarded as economically and financially sound will in future be balanced by its environmental impact, taking coherent cognisance of the principle of intergenerational equity and sustainable use of resources in order to arrive at an integrated management of the environment, sustainable development and socio-economic concerns.”

The DEA’s development of an ocean management policy for South Africa is being undertaken in accordance with the Constitutional imperative flowing from the s24 Environmental right. It further takes into account South Africa’s international obligations with respect to ocean management. South Africa has a host of binding domesticated international obligations with respect to the management of its marine environment. Annexure A contains a table of relevant instruments considered by the DEA in the formulation of this ocean policy. South Africa has embraced the goals of sustainable development and integrated planning when pursuing its ocean environmental management mandate.

South Africa’s ocean policy takes cognisance of the following principles articulated in international agreements:

- South Africa is responsible for implementing measures to address the sustainable use of resources in the marine area under its national jurisdiction (including the EEZ);
- South Africa is responsible for implementing measures to address the maintenance of biological diversity in the marine area under its national jurisdiction (including the EEZ);
- South Africa is responsible for implementing measures to undertake research on and the monitoring of the marine area under its national jurisdiction (including the EEZ);
- South Africa is responsible for the integrated management of its ocean environment by pursuing sustainable development and adopting a preventative and precautionary approach (including the EEZ);
- South Africa is responsible for implementing measures to respect international marine usage rules and to encourage research and monitoring of the High Seas, Southern Ocean and Antarctica;
- South Africa is responsible for implementing measures to address pollution of the ocean environment from land-, sea- and air-based sources; and
- South Africa is responsible for implementing measures to ensure international and regional cooperation in respect of marine management.

South Africa has passed legislation regulating the marine environment over many years. This domestic legislation was also considered for the purposes of this policy document. A list of the key pieces of legislation considered is contained in Annexure B to this document.

The following observations are relevant to the formulating of South Africa's ocean management policy:

- Prior to 1998 South Africa's domestic legislation with respect to its marine space was largely piecemeal. No integrated view was taken of an overall approach to ocean management. The legislation was largely sectoral in nature and developed by a particular Department that manages a specific economic sector in order to regulate the functions and activities of rights holders within the marine environment.
- While certain of the legislation overtly references international legal principles such as sustainable development, integrated ocean management and the preservation of ecosystem services, they generally fail to consider the cumulative effects of the totality of human activities within the marine environment.
- There is a multiplicity of role-players pursuing activities and/or tasked with responsibilities with respect to the marine environment. These include all three spheres of government, a significant number of state-owned enterprises and private companies. There does not appear to be a "central authority" tasked with exercising a general oversight of the marine environment in South Africa.
- Since 1998 South Africa has passed an ambitious suite of National Environmental Management Acts. This legislation demonstrates clearly the growing recognition of South Africa's international obligations and constitutional management role with respect to the environment. Currently the ocean area has not adequately been included in this suite of legislation.
- The suite of environmental legislation recognises that:
 - Environmental management must place people and their needs at the forefront of its concern, and serve their physical, psychological, developmental, cultural and social interests equitably.
 - Development must be socially, environmentally and economically sustainable.
 - Sustainable development requires the consideration of all relevant factors.
- Responsibility for the environmental health and safety consequences of a policy, programme, project, product, process, service or activity exists throughout its life cycle. The social, economic and environmental impacts of activities, including disadvantages and benefits, must be considered, assessed and evaluated, and decisions must be appropriate in the light of such consideration and assessment.
- There must be intergovernmental co-ordination and harmonisation of policies, legislation and actions relating to the environment.
- Global and international responsibilities relating to the environment must be discharged in the national interest.
- The environment is held in public trust for the people, the beneficial use of environmental resources must serve the public interest and the environment must be protected as the people's common heritage.
- The costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects must be paid for by those responsible for harming the environment.
- Sensitive, vulnerable, highly dynamic or stressed ecosystems, such as coastal shores, estuaries, wetlands, islands and similar systems require specific attention in management and planning procedures, especially where they are subject to significant human resource usage and development pressure.

In general, South Africa has passed appropriate domestic legislation and regulations which reflect its constitutional and international obligations. However, South African domestic legislation is premised on sectoral planning for the marine environment. A recognised failure of the historical management of marine areas by sovereign states has been the attempt to deal with sectoral pressures by silo. This approach ignores the cumulative effect of sectoral pressures to the marine ecosystem itself. Given increasing knowledge, sovereign marine nations are beginning to shift to a more

proactive system of ocean management. This shift further recognises that the global biosphere behaves as a single system, where the environmental impacts of each nation ultimately affect the whole. This reality has underpinned the formulation of a coordinated response from the community of nations. Coordinated international action is seen as essential to protecting earth's climate, preserving its biodiversity and managing its marine and other common resources.

Summary Box: Department of Environmental Affairs's Ocean Mandate

The environmental management, conservation and protection of South Africa's ocean fall within the primary mandate of the DEA. Traditionally sectors of government and the economy that use the various marine goods and services self-regulate activities that are undertaken in the ocean and coastal environments. However, this is done with regard to their respective economic mandates and does not always adequately consider the mandate of conservation and protection. It is increasingly emerging that conservation, protection and sustainability of ocean environmental integrity requires an appropriate management framework. This is a distinct function and management regime that is separate from the traditional economic sector approach to management.

For the purposes of the development of South Africa's ocean management policy the DEA has been mindful of its constitutional, domesticated international law objectives and domestic responsibilities. South Africa has embraced the notion of sustainable development and integrated planning when pursuing the protection and preservation of ocean environmental integrity.

South Africa's ocean policy therefore takes cognisance of the following high level principles:

- South Africa is responsible for implementing measures to address the sustainable use of resources in the marine area under its national jurisdiction (including the EEZ);
- South Africa is responsible for implementing measures to address the maintenance of biological diversity in the marine area under its national jurisdiction (including the EEZ);
- South Africa is responsible for implementing measures to undertake research on and the monitoring of the marine area under its national jurisdiction (including the EEZ);
- South Africa is responsible for the integrated management of its ocean environment by pursuing sustainable development and adopting a preventative and precautionary approach (including the EEZ);
- South Africa is responsible for implementing measures to respect international marine usage rules and to encourage research and monitoring of the High Seas;
- South Africa is responsible for implementing measures to address pollution of the ocean environment from both land- and sea-based sources;
- South Africa is responsible for implementing measures to ensure international and regional cooperation in respect of marine management;
- There must be intergovernmental co-ordination and harmonisation of policies, legislation and actions relating to the environment; and
- Global and international responsibilities relating to the environment must be discharged in the national interest.

4. THE EVOLUTION OF INTERNATIONAL OCEAN GOVERNANCE

a. THE EMERGING GLOBAL OCEAN MANAGEMENT AGENDA

The concept of maintaining ocean environmental integrity is informed by evolving international law obligations aimed at meeting the growing need for sovereign states to include specific coordinated ocean environmental protection in domestic legal instruments. Specific coordinated ocean environmental protection is required to ensure the integrity of ocean ecosystems.

During the 1960s there was increasing international recognition that the global environment was under assault and was unlikely to be able to sustain itself without a change in human behaviour. Any such behavioural changes needed to be undertaken on a global level as the environment knows no human or state boundaries. This realisation raised the urgent need for international cooperation with respect to norm setting on acceptable and sustainable environmental practices. While many nations had already recognised and pursued state specific conservation policies and practices, these were seen to be necessary but not sufficient for the protection of the global environment. A shift from a national conservation approach to a coordinated international approach to environmental management occurred.

This shift was given impetus by the United Nations General Assembly convening the United Nations Conference on Human Environment held in Stockholm in June 1972. The conference resulted in the Stockholm Declaration which provided that, inter alia, "man has a fundamental right to freedom, equality and adequate conditions of life, in an environment where quality permits a life of dignity and well-being"^{xvi}.

The three primary achievements of the conference were:^{xvi}

- The Stockholm declaration which contained 26 guiding principles on environmental challenges;
- An action plan containing 109 recommendations for international action with respect to environmental management; and
- A framework for the establishment of an organisation to oversee the implementation of the action plan.

The Stockholm Conference saw the creation of the United Nations Environmental Programme ("UNEP"). UNEP's mission is to "provide leadership and encourage partnership in caring for the environment by inspiring, informing and enabling nations and peoples to improve their quality of life without compromising that of future generations".^{xvii} Perhaps the importance of the Stockholm Declaration was the creation of a high-level framework which promoted common environmental management principles, and that increasingly environmental rights are being recognised as fundamental human rights. Following the Stockholm Declaration the approach to environmental norm setting and protection increasingly took place on four different levels:

- Global (international conventions, treaties and protocols);
- Regional (continental conventions, treaties and protocols);
- Sub-regional (economic grouping conventions, treaties and protocols); and
- National (domestic legislation).

Following the Stockholm Conference there was recognition of the need for a legal framework to regulate humankind's use of the ocean. This contributed to UNCLOS being finalised in 1982 after 10 years of negotiation. Impetus was given to the initial negotiations by unregulated fishing activity by developed countries in the ocean adjacent to developing and island nations who lacked the resources to directly access these ocean benefits. UNCLOS established the international legal framework for countries to exercise control over a set of defined maritime zones ensuring equitable access of sovereign states to the marine resources within their jurisdiction. UNCLOS also established clear universal ocean management objectives for negotiation by sovereign states. The identification of these objectives was driven by the growing realisation of the need to preserve ocean environmental integrity due to its importance to the global environment.

"The dark oceans were the womb of life: from the protecting oceans life emerged. We still bear in our bodies - in our blood, in the salty bitterness of our tears – the marks of this remote past. Retracing the past, man, the present dominator of the emerged earth, is now returning to the ocean depths. His penetration of the deep could mark the beginning of the end for man, and indeed life as we know it on this earth: it could also be a unique opportunity to lay solid foundations for a peaceful and increasingly prosperous future for all people."¹

UNCLOS has established a comprehensive international legal framework for the conservation, protection and use of the ocean environment. This framework is predicated on conferring sovereign jurisdiction to the edge of the EEZ. UNCLOS has, however, struggled to adequately respond in providing a management framework for the ocean falling outside the sovereign jurisdiction of states. To bolster its application in the High Seas agreements such as the Code of Conduct for Responsible Fishing and the Agreement for the Conservation and Management of Straddling and Highly Migratory Fish Stocks were entered into. UNCLOS also established the International Seabed Authority to manage human activity occurring on the seabed in The Area (i.e. of the ocean outside of a state's marine jurisdiction).

Prior to and during the negotiation phases of UNCLOS several sector agreements were concluded which were aimed at managing identified environmental ocean pressures. Key amongst these agreements were the International Convention relating to Intervention on the High Seas in Cases of Oil Pollution Casualties 1969; the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter 1972; the International Convention for the Prevention of Pollution from Ships 1973; and the Convention on International Trade in Endangered Species of Wild Fauna and Flora 1973 ("CITES").

Concepts emanating from the Stockholm Conference together with ocean environmental objectives identified by UNCLOS required a global and integrated response to environmental and ocean management. This realisation led to the first United Nations Conference on Environmental Development in 1992 ("UNCED or Rio Conference") held in Rio de Janeiro. The Rio Conference resulted in the production of various documents including Agenda 21. Chapter 17 of Agenda 21 advocates an approach to the management of ocean environments by the identification of specified programme areas.

Agenda 21 set out a number of clear principles which expanded upon the right to a healthy and sustainable environment. These principles implicitly recognised the tension between the need to conserve the environment and the need to exploit it (utilise resources). The Conference recognised that the establishment of global norms and standards for the protection of the environment would be meaningless unless nations committed themselves to implementing and enforcing these undertakings at a domestic level. It further recognised that nations would be unlikely to implement norms and standards which undermined their economic activities.

Simultaneously to Agenda 21 the Convention for Biological Diversity ("CBD") was negotiated. At its highest level the CBD aims to conserve biological diversity, promote the sustainable use of its components and encourage equitable sharing of the benefits arising out of the utilisation of genetic resources. The convention parties meet every two years to negotiate and review progress made against established targets. The primary aspiration of the CBD is to halt or severely curtail the loss of species on the planet. The CBD objectives complemented the existing CITES provisions. CITES regulates international trade in identified endangered species. The listing of endangered species is an ongoing process and species are categorised according to the necessary levels of required protection.

Biodiversity and habitat conservation has driven the international call for sovereign states to establish a representative network of marine conservation areas under their jurisdiction. Cooperation is required with respect to developing management approaches to straddling stocks and highly migratory species which move between the jurisdictions of different coastal states.

There is also recognition that the development of a representative network of marine conservation areas in the High Seas should be established. International law has yet to develop a legal framework in terms of which these networks can be established. A similar challenge is posed when attempting to adopt a coherent approach to rebuilding depleted fish stocks occurring in the High Seas.

Increasingly international instruments began speaking the language of sustainable development. The four recurring elements of sustainable development in international law have been described as¹:

1. The principle of intergenerational equity which holds that natural resources must be preserved for the benefit of future generations;
2. The principle of sustainable use which holds that natural resources should only be exploited (utilised) in a sustainable, prudent or rational or wise or appropriate manner;
3. The principle of equitable use which holds that the exploitation of natural resources must be undertaken in an equitable manner so that exploiting states take into consideration the needs of other states; and
4. The integration principle which holds that environmental considerations should be integrated into economic and other development plans, programmes and projects as well as that development needs should be taken into consideration when environmental objectives are applied.

Ten years after Agenda 21 the World Summit on Sustainable Development was held in Johannesburg. The Summit produced the Johannesburg Plan of Action which emphasised an ecosystem approach to protecting and preserving ocean environmental integrity. It described the earth as a functioning system and highlighted the importance of ocean integrity in building resilience to climate change. The Plan of Action defined specific environmental management targets for ocean and coastal spaces with regard to, inter alia, land-based sources of pollution, alien invasive species, biodiversity and the sustainable use of living and non-living marine resources.

These principles are contained in both Agenda 21 and the Johannesburg Declaration on Sustainable Development. These instruments overtly encourage a global model of sustainable development. The notion of sustainable development is increasingly being recognised in binding treaty law^{xviii}. These emergent legal principles are also being used in conflict resolution fora as well as in supporting the integration of laws and policies at the intersection of international environmental, social and economic law.

b. INTERNATIONAL OCEAN GOVERNANCE FRAMEWORKS AND RESPONSIBILITIES

Major intergovernmental organisations such as UNEP, the United Nations Development Programme (“UNDP”) and specialised United Nations agencies and commissions, such as the International Maritime Organisation (“IMO”), the World Meteorological Organisation and the Intergovernmental Oceanographic Commission (“IOC”), bear responsibility for coordinating marine environmental policy at an international level. They pursue an international agenda aimed at environmental protection and the promotion of sustainable development. The foundation for this agenda can be seen as UNCLOS, which 159 nations and the European Union have ratified. Of the major marine nations, only the United States of America (“USA”) and Turkey have not as yet done so. A recommendation of the recent USA Presidential Inter-Agency Ocean Policy Task Force was that the state should immediately undertake the ratification of UNCLOS. It is UNCLOS that confers on South Africa the rights to use the marine resources contained in its EEZ, as well as the responsibility to conserve and protect this marine environment.

South Africa is responsible under international law to pursue regional planning initiatives in a number of areas, for example, highly migratory fish stocks, straddling stocks and pollution control. South Africa mostly does this through regional economic blocks such as the Southern African Development Community. South Africa also enters into bi-lateral and multi-lateral agreements with neighbouring states on certain identified subject matter. A recent example of this is the negotiations with respect to the Benguela Current Commission involving Angola and Namibia. The ocean environment surrounding South Africa is of international research significance due to the global impact of its warm and cold regimes mixing over large areas. As such South Africa is well positioned to play an active role as a regional and global centre of ocean and marine research excellence and leadership.

A contributing factor to South Africa’s existing marine research capabilities has been the fact that South Africa was one of the original 12 signatories of the Antarctic Treaty and enjoys freedom of scientific investigation and cooperation in the Antarctic. Meetings of the parties are held to further the objectives of the Treaty. The Treaty gives the parties the right to exchange scientific personnel, observations and results. South Africa has maintained a permanent research station in Antarctica for the past 50 years. South Africa has also ratified a number of protocols to the main agreement. One of the protocols deals with environmental protection, while affirming the status of Antarctica as a special conservation area and enhancing the protection of this environment together with its dependant and associated ecosystems. A second instrument caters for the protection of Antarctic fauna and flora while a third protocol covers the conservation of marine living resources in Antarctica. These treaties and protocols have been incorporated into domestic legislation by the Antarctic Treaties Act 60 of 1996.

The DEA bears responsibility for the implementation, monitoring and enforcement of these international and domestic obligations. South Africa is in a privileged position with respect to the ability to pursue research in Antarctica, which can directly improve scientific knowledge into ecosystem functions and services. Increased scientific knowledge directly benefits South Africa’s approach to ocean and environmental management and allows South Africa to fulfil its international, continental and regional leadership potential. It is expected that Antarctica and the seas around it will play an increasingly significant geo-political role in the coming century.

Ecosystem degradation and climate change have triggered a fundamental shift in international ocean management strategies in recent years. Sovereign states are increasingly moving towards an integrated management approach premised on the regulation of all sectoral activities within their marine environment. This approach is based on the relationship between the totality of human resource usage and its associated cumulative impacts on the marine environment. The adoption of an ecosystem-based ocean management approach will greatly enhance South Africa’s ability to manage and effectively respond to existing ecosystem degradation or change and improve the sustainable use of South Africa’s rich marine ecosystem services.

Summary Box: The Evolution of International Ocean Governance

The concept of maintaining ocean environmental integrity is informed by evolving international law obligations aimed at meeting the growing need for sovereign states to include specific coordinated ocean environmental protection in domestic legal instruments. Specific coordinated ocean environmental protection is required to ensure the integrity of ocean ecosystems.

Concepts emanating from the Stockholm Conference together with ocean environmental objectives identified by UNCLOS required a global and integrated response to environmental and ocean management. This realisation led to the first UNCED or Rio Conference held in Rio de Janeiro in 1992. The Rio Conference resulted in the production of various documents including Agenda 21. Chapter 17 of Agenda 21 advocates an approach to the management of ocean environments by the identification of specified programme areas.

Ten years after Agenda 21 the World Summit on Sustainable Development was held in Johannesburg. The Summit produced the Johannesburg Plan of Action which emphasised an ecosystem approach to protecting and preserving ocean environmental integrity. It described the earth as a functioning system and highlighted the importance of ocean integrity in building resilience to climate change. The Plan of Action defined specific environmental management targets for ocean and coastal spaces with regard to, inter alia, land-based sources of pollution, alien invasive species, biodiversity and the sustainable use of living and non-living marine resources.

Ecosystem degradation and climate change have triggered a fundamental shift in international ocean management strategies in recent years. Sovereign states are increasingly moving towards an integrated management approach premised on the regulation of all sectoral activities within their marine environment. This approach is based on the relationship between the totality of human resource usage and its associated cumulative impacts on the marine environment. The adoption of an ecosystem-based ocean management approach will greatly enhance South Africa's ability to manage and effectively respond to existing ecosystem degradation and improve the sustainable use of South Africa's rich marine ecosystem services.



SOURCE: ASHLEY NAIDOO

5. OCEAN ECOSYSTEM SERVICES AND SUSTAINABLE USE

a. THE OCEAN AND EARTH SYSTEM

The international trend towards developing responsible ocean management policies was fuelled, in part, by the recognition of the need to coordinate different uses and user groups of ocean resources as well as recognising the increasing scientific evidence relating to the importance of the ocean environment in the natural and physical functioning of the planet. This evidence raised awareness that the ocean environment plays significant roles in earth systems functioning and the mitigation of climate change. Climate change is likely to increase potential ocean threats to coastal communities and investments (such as harbours) through exaggerated natural phenomena such as storm surges and sea level rising.

“The ocean plays a complex role in South Africa’s climate system. It stores most of the sun’s energy that reaches the earth and acts as the earth’s most significant global heat buffer. In fact, at least one quarter of earth’s anthropogenic (of human origin) surface warming has been absorbed by the ocean, thereby postponing the consequences of our actions, delaying more severe climate change impacts, and buying us time to develop mitigation and adaptation strategies.

The ocean also acts as a giant heat distribution unit, pumping massive amounts of warm water and air toward the poles and cold water and air back to the tropics. These patterns heat places like Europe and New Zealand and cool places like southern California and coastal Peru. The consistency of ocean currents keeps these regions from experiencing large climatic and seasonal swings that they might otherwise experience. Instabilities in the ocean currents caused by climate change could lead to major shifts in regional climate and weather patterns and associated human migrations in the future. Furthermore, the ocean plays a major role in wind and precipitation patterns. Cloud formation (evaporation), cloud movement (wind), and rain/snow (condensation) are all linked to the ocean.

The enormous volume of the ocean allows it to act as a giant reservoir for carbon, soaking up carbon dioxide (CO₂) from the atmosphere. The ocean acts as a buffer for earth’s climate. The oceanic uptake of CO₂ has somewhat mitigated the effect of global warming by reducing its concentration in the atmosphere. However, this continual absorption of CO₂ changes the ocean in ways that have potentially dangerous consequences for humans and for marine biodiversity.”^{xix}

The ocean is the largest collector of solar energy on earth as it covers more than 70% of the planet’s surface. The sheer size of the ocean gives it the ability to absorb large amounts of heat without a proportionate increase in seawater temperature. The ocean’s ability to store and release heat plays a central role in the stabilisation of earth’s climate system. Sea surface temperature is important because it determines how much CO₂ can be dissolved into seawater. Seawater which is cold can hold more CO₂ than warmer seawater. It is estimated that 40% of global CO₂ absorption by seawater occurs in the Southern Ocean. Ocean warming holds out the likelihood that the uptake of CO₂ by the ocean may decrease. This may lead to an increase in the acidity of the ocean which will ultimately result in it becoming more corrosive. This in turn will place greater pressure on the ocean’s ability to act as a global earth system and climate change buffer.

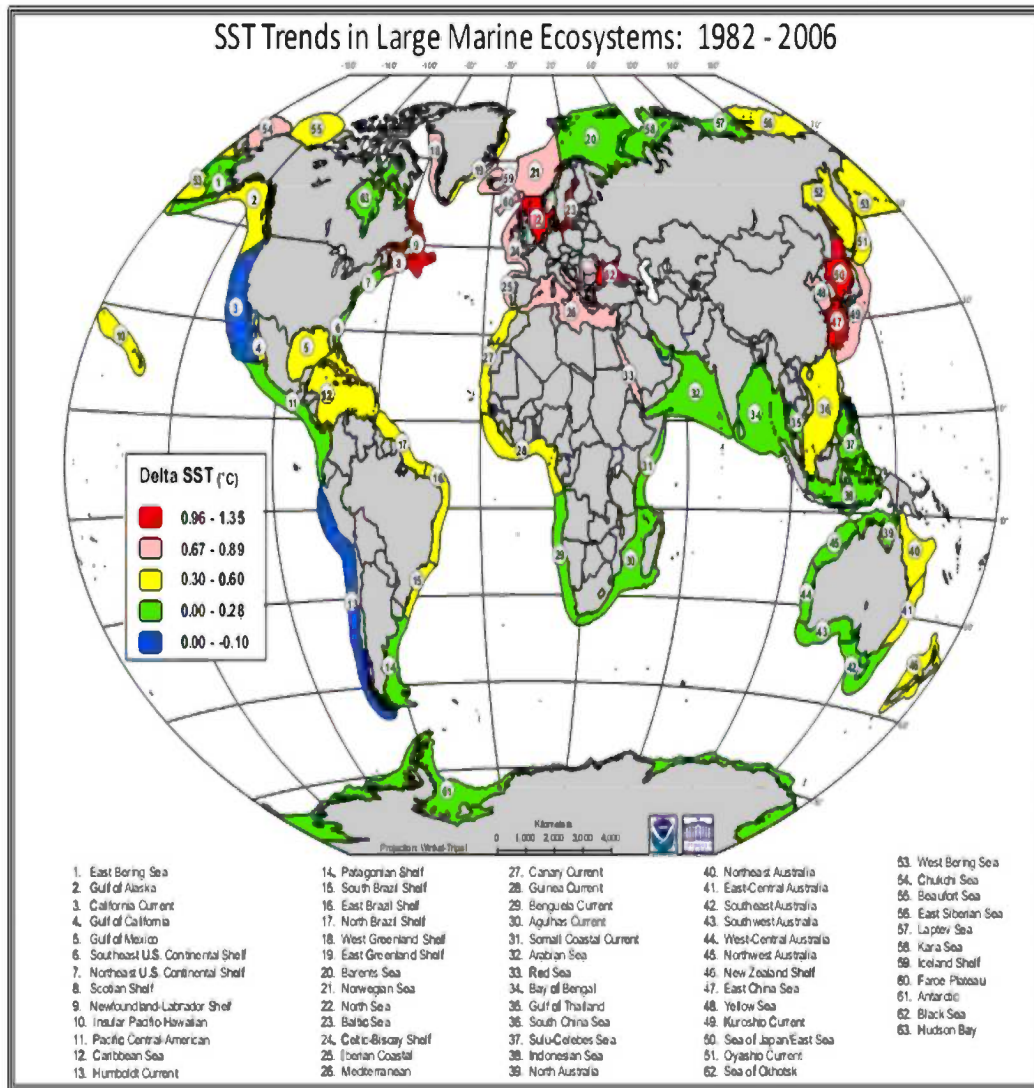
Emergent science is increasingly regarding the earth as a holistic system, which is integrated and self-regulating. Earth science sees the earth as comprised of four major systems or spheres namely: the geosphere, the hydrosphere, the atmosphere and the biosphere. The geosphere comprises all of the cold, hard, solid rock of the planet’s crust (surface), the hot semi-solid rock that lies underneath the crust, the hot liquid rock near the centre of the planet, and

the solid iron core (centre) of the planet. The hydrosphere contains all of the planet's solid, liquid, and gaseous water. The biosphere contains all of the planet's living organisms and the atmosphere contains all of the planet's air. Research into the interaction between these four spheres has indicated the following:

- The earth system, in many respects, functions as a self-regulating system with complex interactions and feedbacks between the spheres;
- Human activities are significantly impacting earth's environment. The impact of anthropogenic activity on the earth's land surface, ocean, coasts, atmosphere, biological diversity, water cycle and biogeochemical cycles are undeniable. Many of these events are increasing and further harm is likely;
- Human driven changes cause effects that cascade through the earth system in complex ways. The effects of human activity on the environment can be difficult to understand or predict;
- Human activities can trigger environmental changes with severe consequences for the earth's environment and inhabitants;
- Key environmental parameters indicate that the earth system has moved outside the range of natural variability exhibited over the last 500 000 years. The scale of change is unprecedented and poses significant risk to the environment.^{xx}

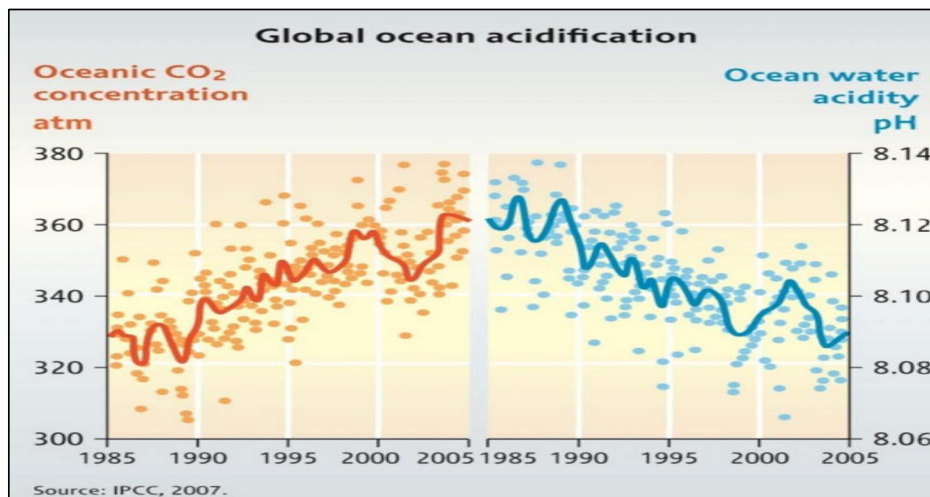
Two widely used indicators which highlight the effects of climate change on the marine environment are physical and chemical properties of the ocean: ocean warming and ocean acidification. The ocean surface generally is in a state of equilibrium with the atmosphere with respect to carbon dioxide and heat. Changes in this equilibrium have consequences. Ocean warming leads to ice sheet melting and sea level rises. It also increases the frequency of extreme weather events such as coastal storms. This contributes to the possibility that ocean currents may be impacted, causing changes in regional climate systems. South Africa's ocean has not escaped this warming. With increasing sea surface temperatures, marine species are expected to shift their distribution patterns in response to the changing temperature regimes.

Map: Global Ocean Sea Surface Temperatures 1982 – 2006^{xxi}



Ocean acidification refers to increasing levels of dissolved carbon dioxide in the ocean. This holds out the possibility of significant impacts on both marine biodiversity and ecosystems. It diminishes the ocean's capacity to act as the earth's biggest carbon sink and renders vulnerable the atmosphere and terrestrial ecosystems.

Diagram: Global Ocean acidification 1985 – 2005^{xxii}



South Africa's climate change policy notes that:

"Marine ecosystems and species are at risk from changes in water temperature, ocean acidification and from changes in ocean currents such as West Coast upwelling and Agulhas current strengthening. Change in South Africa's marine and coastal environment is already being observed and this change has already had significant impacts on the fisheries sector and on the local economy of small-scale and subsistence fishing communities along the West Coast."^{xxiii}

The Climate Change Policy requires role-playing departments to be mindful of a number of key principles when formulating new policies, programmes or strategies which deal with aspects of environmental regulation. These principles require state bodies to pursue strategies that:^{xxiv}

- Strengthen biodiversity management and research institutions so that they can monitor, assess and respond effectively to existing anthropogenic pressures together with the additional pressures that climate change presents.
- Conserve, rehabilitate and restore natural systems that improve resilience to climate change impacts or that reduce impacts.
- Prioritise impact assessments and adaptation planning that takes into account the full range of possible climate outcomes, in conjunction with plausible scenarios of other stresses.
- Prioritise climate change research into marine and terrestrial biodiversity and ecosystem services, and institute effective monitoring to enhance the understanding and forecasting of critical future threats. Monitoring efforts at national and sub-national scale, supported by experimental studies that quantify future risks to biodiversity and that improve projections of impacts, will help to design and refine adaptation responses.
- Enhance existing programmes to combat the spread of terrestrial and marine alien and invasive species, especially in cases where such infestations worsen the impacts of climate change.

- Expand the protected area network (in line with the National Protected Area Expansion Strategy) where it improves climate change resilience, and manage threatened biomes, ecosystems, and species in ways that will minimise the risks of species extinction.
- Encourage partnerships for effective management of areas not under formal protection, especially freshwater ecosystem priority areas, critical biodiversity areas, ecological support areas and threatened ecosystems.

South Africa's ocean environmental management policy contributes to the global necessity to preserve marine ecosystems. Internationally ocean management regimes include strategies to research, mitigate and adapt to the realities of climate change.

"Climate change will compound the pressures on already stressed ecosystems that have resulted from the unsustainable use and inadequate management of many of South Africa's ecosystems and so potentially reduce the quantity and quality of the services that ecosystems currently provide. These critical services underpin South Africa's socio-economic activities. Stressed ecosystems will compromise one of the key responses available to the country to adapt to climate change: using ecosystem services to help society adapt to climate change, known as 'ecosystem-based adaptation'."^{xxv}

b. OCEAN ECOSYSTEMS

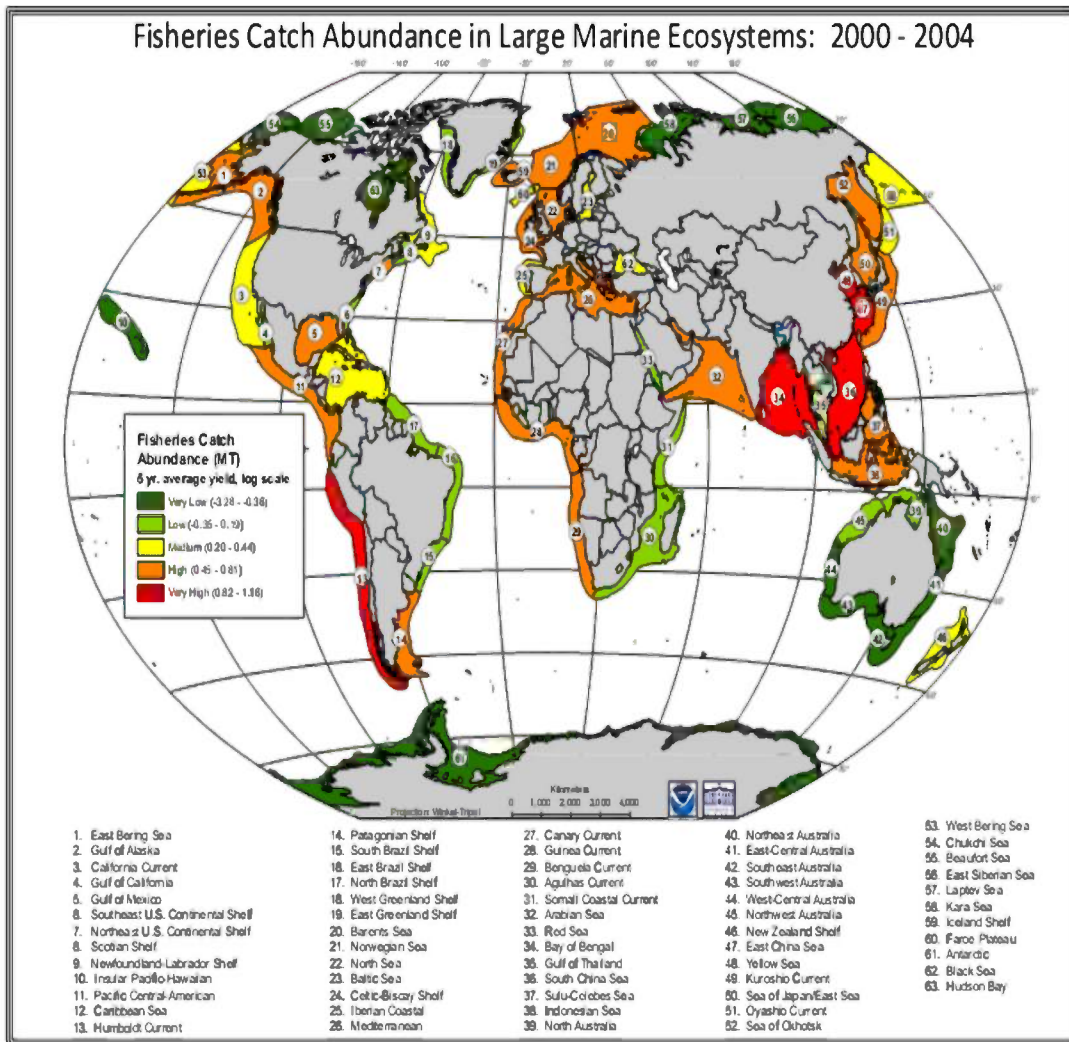
The planet's ocean can be viewed as a linked organisation of marine ecosystems. Ecosystem-based ocean management "is intended to improve ecosystem health and services by planning human uses in concert with the conservation of important ecological areas, such as areas of high productivity and biological diversity; areas and key species that are critical to ecosystem function and resiliency; areas of spawning, breeding, and feeding; areas of rare or functionally vulnerable marine resources; and migratory corridors."^{xxvi}

The increase of human activity in the marine environment in recent times has resulted in considerable pressure being placed on the ocean. This pressure needs to be understood both in the context of sectoral economic activities and its impact on the ocean as a functioning ecosystem. An ecosystem is a functional unit comprising all the organisms in a particular place interacting with one another and with their environment, and interconnected by an ongoing flow of energy and a cycling of materials. Ecosystems may be defined by size. The whole earth may be regarded as one giant ecosystem. On a smaller scale the UNEP has divided the earth's coasts and oceans into 64 Large Marine Ecosystems ("LME"s), of 200 000 km² or greater. These LMEs are associated with 95% of the fish and shellfish yield of the world and represent significant ecosystems in terms of biodiversity and physical ocean dynamics

Two of the 64 LMEs identified by UNEP form part of South Africa's mainland ocean environment, namely the Benguela Current LME and the Agulhas Current LME. The Benguela Current LME extends from 27 degrees east longitude to the northern boundary of Angola. It encompasses the total EEZ of Angola and Namibia and part of South Africa's EEZ. As has already been described, this ecosystem is complex and highly variable. The Benguela Current LME, with its distinct bathymetry, hydrography, chemistry and food webs, is one of the most productive marine areas of the world. The high level of primary productivity supports an important global reservoir of biodiversity and biomass of crustaceans, fish, seabirds and marine mammals.^{xxvii}

The Agulhas LME encompasses the continental shelves and coastal waters of mainland states Mozambique and eastern South Africa as well as the archipelagos of the Comoros, Seychelles, Mauritius and Reunion. At the centre of the Agulhas LME is Madagascar. The dominant large-scale oceanographic feature of the LME is the Agulhas Current. The coastal zones of both mainland and island states are characterised by a high faunal and floral diversity. At least 12 of the 38 marine and coastal habitats recognised as distinct by UNEP are found in this LME.^{xxviii}

Map: Large Marine Ecosystems: Fisheries Catch Abundance 2000 - 2004 ^{xxix}



South Africa’s ocean environmental management policy aims to achieve sustainable development of South Africa’s marine environment by focussing effort on methods which contribute to Habitat and Biodiversity Conservation; Marine Ecosystem Conservation; and Earth System Conservation:

- The effective coordination, management and regulation of human activities impacting on marine habitat and species will directly contribute towards the sustainability of marine ecosystem functioning.
- The effective coordination, management and regulation of human activities impacting on marine ecosystems will directly contribute towards the improvement of the contribution of marine ecosystem services to the earth system itself.

The value of this approach to ocean management is supported by the findings of the Millennium Ecosystem Assessment which analysed the state of the earth’s ecosystems and provided summaries and guidelines for decision

makers. Key findings and recommendations relevant to the South African ocean environmental management policy include: ^{xxx}

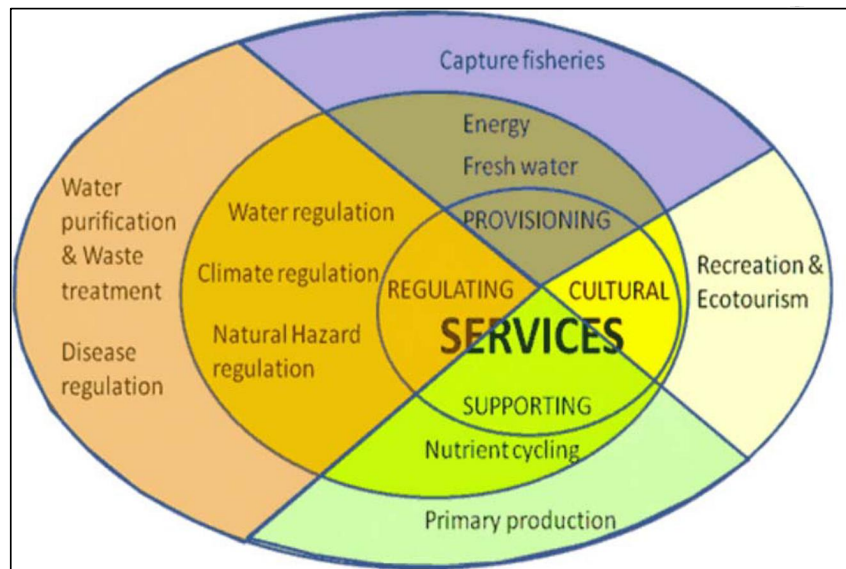
- Biodiversity benefits people through more than just its contribution to material welfare and livelihoods. Biodiversity contributes to security, resiliency, social relations, health, and freedom of choices and actions.
- Changes in biodiversity due to human activities were more rapid in the past 50 years than at any time in human history, and the drivers of change that cause biodiversity loss and lead to changes in ecosystem services are either steady, show no evidence of declining over time, or are increasing in intensity.
- Many people have benefited over the last century from the conversion of natural ecosystems to human-dominated ecosystems and from the exploitation of biodiversity. However, these gains have been achieved at growing costs in the form of losses in biodiversity, degradation of many ecosystem services, and the exacerbation of poverty for other groups of people.
- The most important direct drivers of biodiversity loss and ecosystem service changes are habitat change, climate change, invasive alien species, overexploitation, and pollution.
- Improved valuation techniques and information on ecosystem services demonstrate that although many individuals benefit from biodiversity loss and ecosystem change, the costs borne by society of such changes are often higher.
- To achieve greater progress toward biodiversity conservation to improve human well-being and reduce poverty, it will be necessary to strengthen response options that are designed with the conservation and sustainable use of biodiversity and ecosystem services as the primary goal.
- Short-term goals and targets are not sufficient for the conservation and sustainable use of biodiversity and ecosystems. Given the characteristic response times for political, socioeconomic, and ecological systems, longer-term goals and targets are needed to guide policy and actions.
- Improved capability to predict the consequences of changes in drivers for biodiversity, ecosystem functioning, and ecosystem services, together with improved measures of biodiversity, would aid decision-making at all levels.
- Science can help ensure that decisions are made with the best available information, but ultimately the future of biodiversity will be determined by society.

An ecosystem-based approach to ocean management will of necessity need to take into account existing marine resources use, potential future marine resources use, sectoral use conflicts and current management approaches. The policy therefore needs to consider typical human use pressures which have a potential impact on habitat and biodiversity conservation in South Africa's marine environment. It further needs to take into account how ocean interactions at local and planetary scales impact on human livelihood in order to improve planning and adaptation responses.

c. OCEAN ECOSYSTEM SERVICES

Historically ocean benefits were narrowly defined in categories that linked uses with direct exploitation such as fishing or shipping. More recently the benefits from the environment, including oceans, have been categorised to include broader concepts of ecosystem and earth system functions. Earth system functions include those ecosystem level processes that contribute to the wellbeing of humans and the planet. Beneficial ecosystem functions are called ecosystem services and the ocean accounts for about two-thirds of the value of ecosystem services on a global basis. Ecosystem services can be broadly divided into provisioning, cultural, supporting and regulating services. Ecosystems are important for coastal and ocean management.^{xxxii}

Diagram: Schematic representation of ecosystem services identified by UNEP^{xxxii}



Ocean management provides a balance between maintaining productivity of the ecosystem and optimising the yield of marine resources. Considerable scientific effort has demonstrated that unbridled economic use of marine resources can have significant impact on the functioning of ecosystems. The protection of ecosystems has emerged as crucial for the promotion of human wellbeing. It is therefore necessary to consider current and predicted human marine resource use in South Africa's ocean.

d. EXISTING OCEAN RESOURCE USAGE

Historically the two prevalent human uses of South Africa's ocean environment have been the harvesting of marine living resources and marine transport. The Southern Cape coast contains archaeological remains such as shell middens, rock art and fish traps, which demonstrate clearly that marine resources have been exploited for a long time. Important archaeological sites such as Klasies Cave and Pinnacle Point have achieved international renown. Shell middens have provided evidence that shell fish formed part of the diet of our early ancestors and some scholars believe that shells were used as early forms of ornamentation. Many fish traps (vywers) are still to be found along the Southern Cape inter-tidal zone. Traditional fish traps are also actively used by coastal communities along the Northern KZN coast.

The importance of the ocean adjacent to South Africa as a marine transport route has been demonstrated from as early as the fifteenth century by the Portuguese voyages of exploration. There is also some evidence of Arab and Chinese seafaring traders to the region that pre-dates this. Attempts were made to establish a trade route between Europe and the Indies. The eventual establishment of this trade route underpinned the European colonisation of South Africa. Until the opening of the Suez Canal in 1869, the most viable sea route between Europe and the markets and colonies of the East was the ocean of Southern Africa. The significance of this route is demonstrated by the more than 2 700 identified historical ship wrecks off the coast. These wrecks include vessels from 37 different nations.

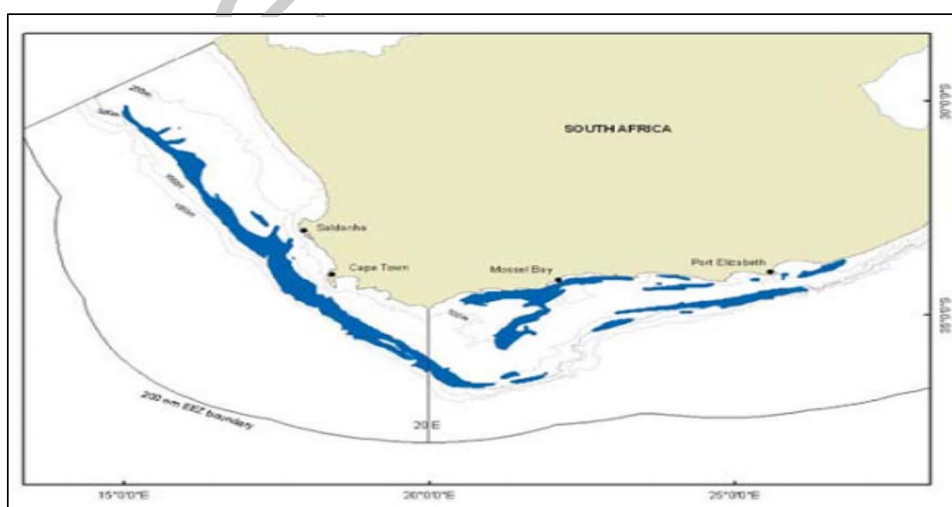
The 20th century saw an exponential growth in both the intensity and range of exploitation of the marine environment. While the consumption of marine living resources and marine transport remain significant modern uses of the ocean environment, other new uses have emerged. These include the extraction of minerals, oil and gas, eco-tourism, increased deep-water fishing and innovative methods of energy production. Coastal states like South Africa increasingly have economies which are almost completely dependent on accessing import and export sea trade routes.

□ Harvesting of Ocean Living Resources

The South African fishing industry is well established and is a net exporter of fishery products. Most of South Africa's fisheries are considered to be fully utilised and high value fisheries such as abalone, rock lobster and line fish are seen as overexploited. South Africa's commercial fishery industry directly employs approximately 20 000 people and harvests in excess of 600 000 tonnes of fish annually. The catch usually varies between 600 000 and 800 000 tonnes per year. The industry has an annual turnover of about 80 billion rand and contributes 0.5% to the South African gross domestic product ("GDP"). Given the current status of wild fisheries stocks, South Africa has identified aquaculture as an area which could provide significant potential for economic growth. It is estimated that aquaculture production could increase from the current 3 543 tonnes (worth R218 million) to more than 90 000 tonnes (worth R2.4 billion) over the next ten to twenty years.^{xxxiii} Currently there are 2 601 rights holders targeting 21 different fisheries using 1 788 vessels.^{xxxiv}

South African commercial and recreational fishers are reported to catch over 250 marine species, although fewer than 5% of these are actively commercially targeted. The targeted species comprise approximately 90% of the total commercial catch. The pelagic purse-seine fishery, seeking predominantly sardine and anchovy, supplies the greatest tonnage of fish landed per annum (538 000 tonnes in 2002).^{xxxv}

Map: Total trawl (inshore and offshore) effort distribution around the South African coast^{xxxvi}



The deep-sea hake fishery lands the highest value catch, contributing 44% to the total revenue of South African fisheries. In the 1960s, the demersal trawl fishery contributed as much as 90% of South Africa's overall fish landings by value. The hake catches have significantly declined from landings of over 300 000 tonnes to just over 150 000 tonnes annually. This lower level of catch has shown no sign of increase over the last ten years.

The west coast rock-lobster (crayfish) fishery of South Africa is considered to be one of the oldest fisheries of the country, dating back to at least 1875 when the first commercial processing plant was established. The annual commercial landings of rock lobster have decreased since the 1960s, indicating that the high landings during earlier years were not sustainable. The 2011/2012 total allowable catch ("TAC") is 2 260 tonnes. Currently the South African harvestable rock-lobster biomass is estimated to be approximately 5% of pre-exploitation levels and the spawning biomass approximately 20% of pre-exploitation levels.^{xxxvii}

The abalone (perlemoen) resource is presently facing a severe crisis and management measures have been implemented in an attempt to prevent the targeted species from becoming commercially extinct. The abalone fishery is an example of a resource crisis that is significantly impacted by poaching. In an attempt to address this crisis, the commercial abalone fishery has been faced with significant TAC reductions from 500 tonnes in 1999/2000 to 237 tonnes in 2004/2005. The 2011/2012 TAC is 150 tonnes.

Aquaculture of marine species commenced in the 1950s and has continued to grow within South Africa, with the successful farming of the introduced alien black mussel in Saldanha Bay, oysters in Knysna and abalone along the West Coast. Aquaculture permits have also been issued for prawns and seaweeds. Research indicates that certain fin fish species (e.g. salmon and dusky kob,) are ideal candidates for successful aquaculture ventures and experimental farming of Norwegian salmon and turbot has been undertaken.^{xxxviii}

There is evidence that shows that early fishing effort targeted the most accessible, appealing and plentiful species, without having due regard to a particular species' resilience and role in the food web. Initially pressure was directed at higher levels of the food web and resulted in the depletion of certain predators. Fishery effort was then redirected to lower levels of the food web, which included prey species. The continuation of this cycle has had the unintended consequence that global human fishing effort has impacted on higher and lower levels of the food web and significantly altered ocean ecosystems.^{xxxix}

□ Ocean Transport

An estimated 7 000 vessels pass around South Africa's coastline annually, of which many are laden tankers carrying in excess of 30 million tonnes of crude oil. Additionally over 9 000 ships visit South Africa's ports annually. 98% of South Africa's exports are conveyed by sea. The turnover from South Africa's harbour activities in the 2009/10 financial year was R12.6 billion. South Africa recently acquired and installed 19 new container handling cranes in its ports. South Africa's commercial ports handle over 430 million tonnes of varied cargo types each year. Richard's Bay is South Africa's largest cargo volume port handling in excess of 80 million tonnes of cargo annually. Durban is South Africa's largest port in terms of value of cargo handled as well as the number of vessels docking per year.^{xl} Container traffic is predominantly routed through Durban, with 2.5 million twenty foot equivalent units ("TEUs") passing through the port. Cape Town moved just below 700 000 TEUs and Port Elizabeth almost 400 000 TEUs in the 2008/09 financial year. During the early 1990s the South African merchant marine register was composed of about 120 ships. However, by 2010, the South African Maritime Safety Authority ("SAMSA") marine register recorded no South African flag vessels.

Table: Key Commodities Throughputs across the South African Port System 2008/09^{xii}

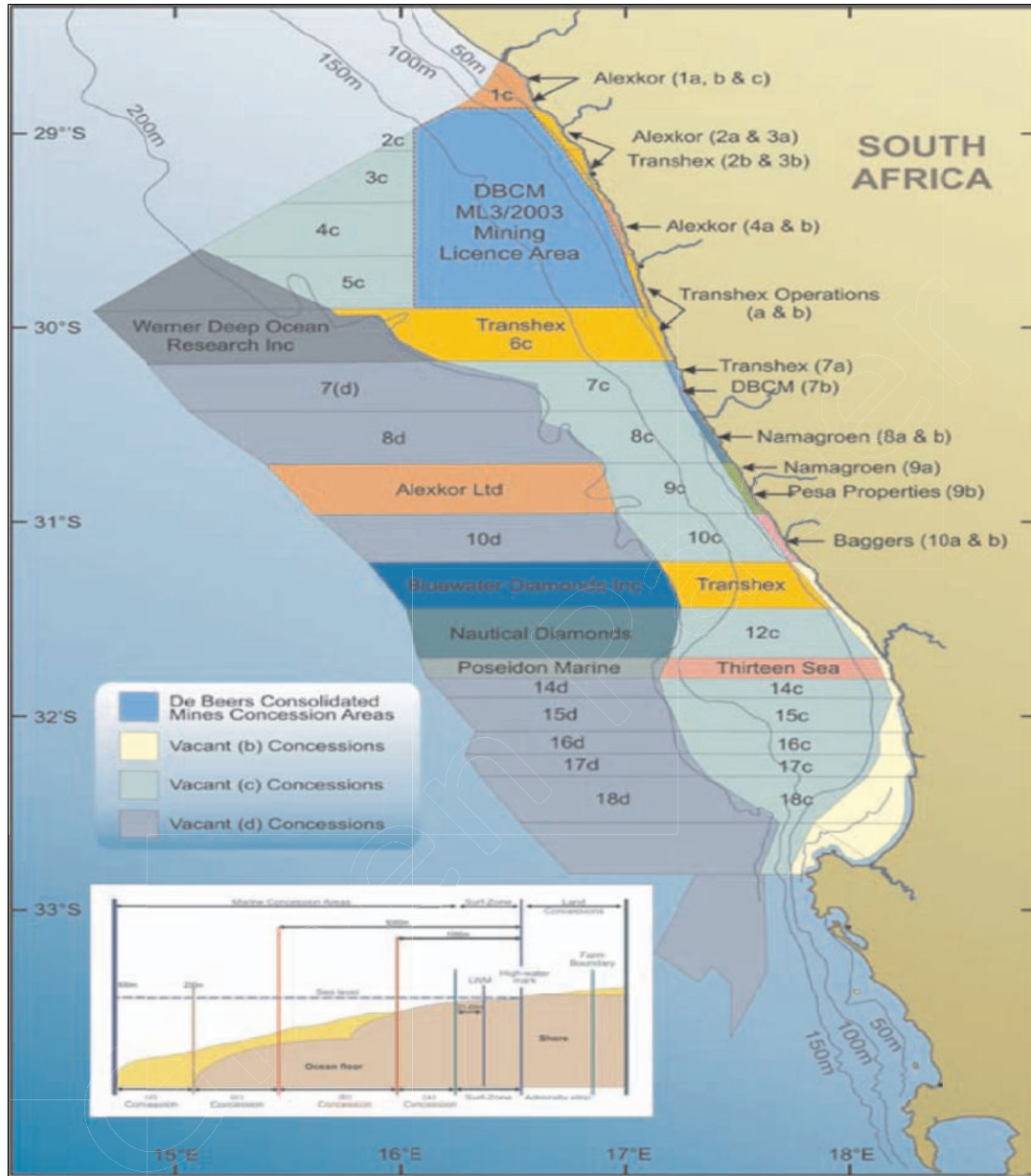
Cargo/Commodity Description 2008/9 ACTUAL TONNAGE	DURBAN	EAST LONDON	MOSSSEL BAY	PORT ELIZABETH	SALDANHA	RICHARDS BAY	CAPE TOWN	ALL PORTS
Dry Bulk Handled per commodity:								
15 WHEAT & PRODUCTS THEREOF	1,053,918	70,960					112,720	1,237,598
18 AGRIC PROD/SEAWEED NOT SPECIFIED	775,733	34,615					286,630	1,096,978
37 MANGANESE ORE	727,289			2,721,997		1,005,886		4,455,172
38 IRON ORE	-				32,975,052			32,975,052
39 CHROME ORE	-					1,268,389		1,268,389
41 SULPHUR	-					838,988		838,988
46 ALUMINA	40,239					1,534,085		1,574,324
47 TITANIUM SLAG	-					774,136		774,136
62 FERTILIZER & PRODUCTS THEREOF	726,361						218,055	944,416
68 WOOD CHIPS	544,640			14,774		2,473,508		3,032,922
94 COAL	1,575,365				85,806	66,075,421		67,736,392
TOTAL DRY BULK HANDLED:	7,719,993	425,076	-	2,736,771	33,591,374	74,747,008	807,223	120,027,445
Liquid Bulk Petroleum Handled:								
61 PETROL AND PETROLEUM GAS	24,421,625	870,857	1,781,660	1,011,321	15,714,073	259,978	1,744,595	45,804,109
TOTAL LIQUID BULK PETROLEUM HANDLED:	24,421,625	870,857	1,781,660	1,011,321	15,714,073	259,978	1,744,595	45,804,109
Other Liquid Bulk Handled per Commodity (Excl. Petroleum):								
26 ANIMAL/VEGET OIL/FATS & PROD THEREOF	727,123						46,752	773,875
64 ACIDS	3,354					613,384		616,738
66 CHEM & PRODUCTS THEREOF NOT SPEC.	1,117,009					828,597	1,017,881	2,963,487
TOTAL OTHER LIQUID BULK HANDLED:	2,059,766	-	-	-	-	1,592,044	1,079,329	6,661,073
Breakbulk Vehicles Handled:								
88 VEHICLES ON OWN WHEELS (RO-RO ONLY)	3,594,636	511,632		70,199				4,176,467
TOTAL VEHICLES HANDLED:	3,594,636	511,632	-	70,199	-	-	-	4,176,467
Breakbulk Handled per Commodity (Excl. Vehicles):								
6 CITRUS FRUIT	316,647			97,726			74,805	489,178
40 GRANITE & PRODUCTS THEREOF	51,227				17,505	320,300		389,032
67 WOODPULP	219,871							219,871
80 FERRO ALLOYS	3,005					2,090,301		2,093,306
82 STEEL & PRODUCTS THEREOF	1,029,285	31,293		108,958	573,353	416,822	24,070	2,183,786
TOTAL BREAKBULK HANDLED:	2,267,352	126,683	70,263	306,846	977,317	3,749,300	327,244	9,915,480
TOTAL TEUS HANDLED:	2,560,450	56,767	0	398,707	0	0	694,737	3,710,661

□ Ocean Mining

In 1908 diamonds were discovered along the southern Namibian coast. In 1925 diamonds were discovered near Port Nolloth. In 1926 rich deposits were discovered near Alexander Bay and the then South African government commenced mining operations along this coast. In the early 1950s prospecting for off-shore diamonds commenced. Today off-shore mining of diamonds along the South African West Coast is an important industry. In 1997, alluvial and marine diamonds comprised approximately 10% of South Africa's total diamond yield with marine diamonds specifically comprising 0.35% (nearly US\$6 million). Marine diamond mining contributes 0.0026% to South Africa's annual GDP.^{xiii} In 1994, the then South African Department of Minerals and Energy established a grid network of marine mineral concession zones on the West Coast of South Africa (from the Orange River mouth to just south of Saldanha Bay, extending from the high-water mark seawards to 500 m depth.

Internationally the off-shore exploration for hard minerals is on the increase and it is to be expected that the exploitation of South Africa's non-living marine resources will also increase. Deposits of two minerals important for the production of fertiliser (potassium and glauconite) are widely found in South Africa's EEZ. Currently the costs of extraction remain prohibitive in the context of similar terrestrial resources. However, as terrestrial resources diminish and technology improves these deposits may become economically viable.

Map: South African ocean diamond mining concession areas ^{xliii}

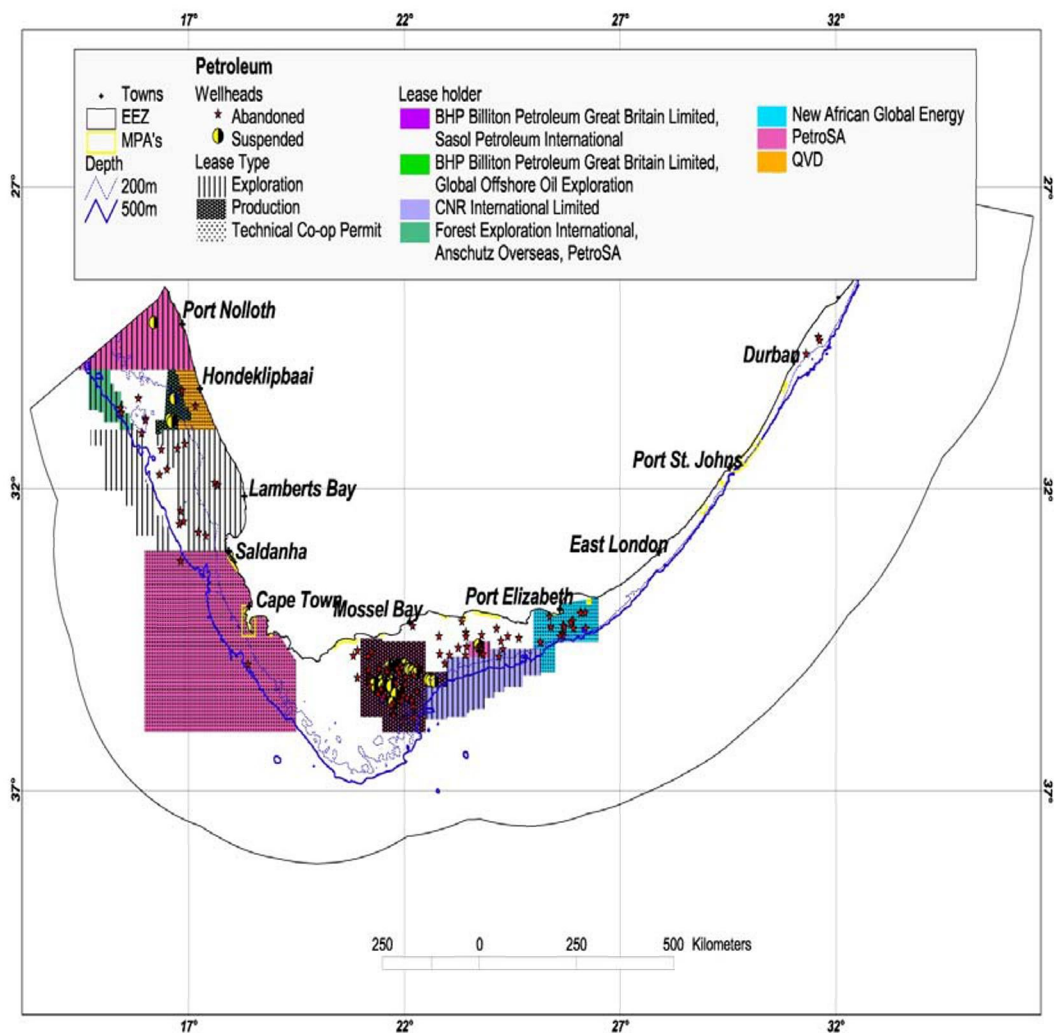


□ **Ocean Fossil Fuels**

The Geological Survey of South Africa conducted the first organised search for fossil fuels in South Africa in the 1940s. Initially all searches were land based. The first off-shore well was drilled in 1969 and gas and condensate was discovered in the Pletmos basin (between Plettenberg Bay and Mossel Bay). Currently the Pletmos basin contains two undeveloped gas fields and a further six gas discoveries. The Bredasdorp basin has been the focus of most seismic and drilling activity since 1980. The South African part of the Orange bank and shelf also contain oil and gas deposits that

have not yet been developed. More recently, in 2012, an application for exploration rights in an area located between Saldanha Bay and Kleinsee 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 ⁱ and approximately 360 million litres of mixed effluent on a daily basis. ⁱⁱ

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. ⁱⁱⁱ 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. ⁱⁱⁱ 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. ^{iv} Diving is another popular recreational activity, as are sunbathing, 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. ^{iv}

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.

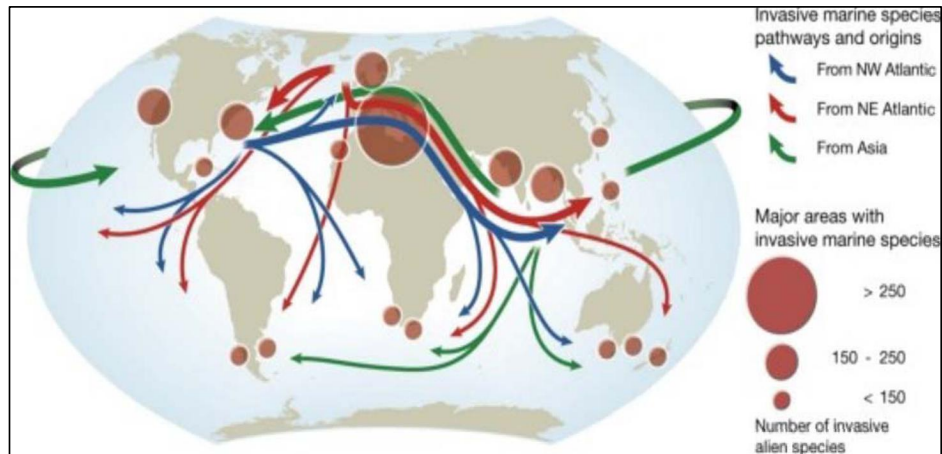
South Africa has the right under UNCLOS to enforce domestic pollution laws on foreign vessels. UNCLOS further requires South Africa to establish measures preventing the introduction of alien or new species into the marine environment. This obligation is mirrored in the CBD which obliges South Africa 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.

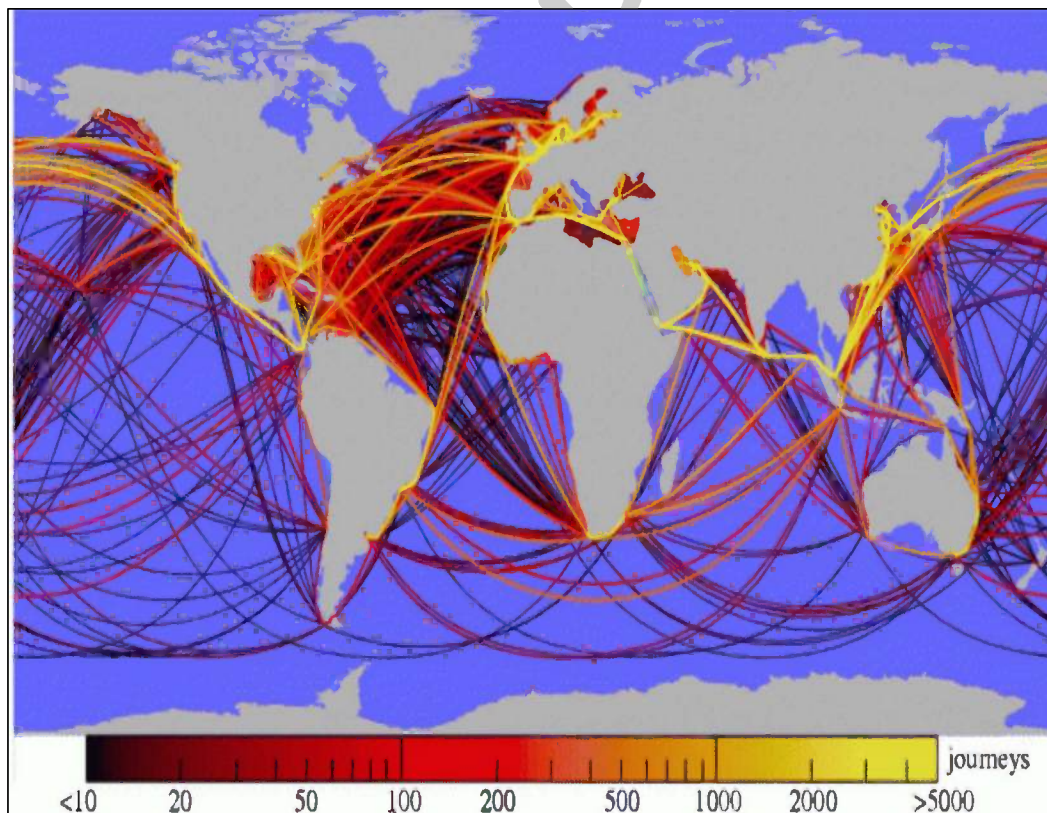
The International Convention on Oil Pollution Preparedness requires states to ensure that its offshore units and oil handling facilities have an oil pollution emergency plan. It also gives South Africa the right to inspect the oil pollution plans of ships in waters under its jurisdiction. The International 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 ^{ix}



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 environmental 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.^{lxiii}

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-dioxide 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

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.

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 management 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*

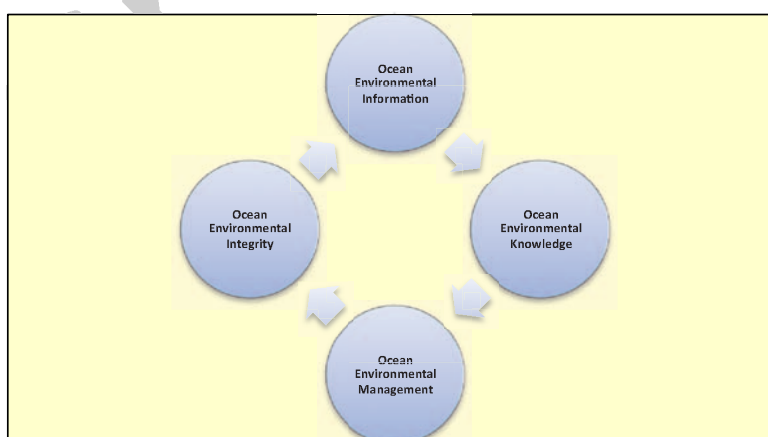
This objective aims to provide stakeholders with appropriate access to information required to understand the status and trends of the ocean and coastal environments and their components. This information will contribute directly to informing stakeholders of the value and sustainable use potential of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

commonly agreed goals. Data and information accumulated from research efforts will be maintained in the planned central repository of marine environmental information.

Policy Statement 1.2.2: The unique complexity and global importance of ocean ecosystems adjacent to South Africa attracts national and international research interest. South Africa has permanent research bases at Marion Island and Antarctica and has a track record of research excellence in specialised areas. These nodes of excellence will be supported by investment in further capacity and infrastructure. Towards enhancing this capacity, South Africa has in 2012 taken delivery of a technologically advanced polar research and supply vessel. The DEA will increase the number of South African science and engineering graduates in ocean-related studies and provide opportunities for them to contribute to ocean knowledge, management and beneficial use. Particular attention will be paid to promoting more science and engineering graduates who reflect broadly the racial and gender composition of South Africa.

Policy Statement 1.2.3: South Africa's ocean jurisdiction and the territory under the Extended Continental Shelf Claim remain largely unexplored and the ability to monitor its ocean environment is resource constrained. DEA will consider and implement innovative methods of monitoring South Africa's extensive marine area including the use of ship-based systems, satellite observation, monitoring buoys and other emerging technologies. In addition to gathering information on ocean systems, innovative use of such technologies can also enhance compliance efforts in the EEZ.

Objective 2: Ocean environmental knowledge for sustainable development decision making

Sustainable development decision making is constrained by the present limited knowledge of the ocean environment. This frustrates efforts both to develop and conserve the marine environment. The DEA will undertake the collation, analysis and interpretation of the increasing amount of marine environmental information obtained under Objective 1. In consolidating environmental information the DEA positions itself to promote rehabilitation, conservation and sustainable development by providing better services to role-playing departments. The provision of improved knowledge to enhance decision making by sectoral role-players is an important component in fostering better understanding of the roles and responsibilities of the relevant departments. Improving communication and cooperation in this manner is a necessary precursor for the active pursuit of a common set of marine conservation and development goals.

Policy Statement 2.1: Produce information tools to facilitate knowledge and understanding of the natural functioning of ecosystems and of human impact on the ocean environment.

Policy Statement 2.1.1: The DEA has identified that the production of a detailed spatial-mapping of biodiversity and natural physical processes of South Africa's marine area is a priority. This process will include mapping the distribution of biodiversity and ocean current dynamics within South Africa's EEZ. The information obtained during the spatial-mapping process will be complemented by additional internal and external data sources to produce a South African Ocean Information System. The South African Ocean Information System will enhance South Africa's ability to archive information, summarise data, generate scenarios and support informed decision making. Identified gaps in marine knowledge and data will be fed back into the ongoing marine research agenda pursued in Objective 1.

Policy Statement 2.1.2: The spatial-mapping process will inform the division of South Africa's marine environment into Large Marine Ecosystems ("LMEs") or bioregions to be used for management planning purposes. Such regions are capable of further division into spatial zones reserved for specific or mixed use such as development, control and protection, nature preservation and reserved zones, in consultation with roleplayers.

Policy Statement 2.1.3: The scientific effort used while developing the spatial-map and analysing existing ocean environmental data will be supplemented with the collection of other information in order to produce knowledge such as scenarios, predictions and trends. The DEA will provide role-playing departments with ongoing analyses of the aggregated environmental information. This information will be of great value in improving sustainable sectoral planning initiatives and environmental reporting both domestically and internationally.

Policy Statement 2.2: Establish, in consultation with role-players, ocean ecosystem thresholds for human health and biodiversity conservation.

Policy Statement 2.2.1: The knowledge products generated through spatial-mapping, improved environmental data analysis and other research and monitoring will assist the generation of a baseline assessment of the current environmental status of South Africa's marine environment. The establishment of this baseline assessment will provide a comprehensive inventory of living and non-living aspects of South Africa's ocean environment. It will provide the basis for dialogue with sectoral role-players in establishing a common set of marine ecosystem impact thresholds for the reporting indicators described in Objective 1 above. Impact thresholds may be defined per LME, bioregion or spatial zone. These agreed impact threshold indicators will provide the foundation for proactive and adaptive environmental planning. This planning approach facilitates sectoral alignment in the pursuit of functioning ecosystems for current and future generations.

Policy Statement 2.3: Provide knowledge to promote sustainable development whilst maintaining the resilience of the ocean.

Policy Statement 2.3.1: The inertia around developing the economic potential of the ocean exists in the lack of publicly accessible information and knowledge regarding most of the ocean space under South African jurisdiction. Spatial-maps, inventories and knowledge tools represent a considerable government investment in unlocking the economic and development potential of the South Africa's extensive EEZ. Increased scientific knowledge of South Africa's EEZ will make more apparent economic opportunities which are currently unknown and increased understanding of ecosystem functioning will directly contribute to sustainable development and job creation opportunities

Policy Statement 2.3.2: The establishment of commonly agreed LME, bioregion or spatial zone indicators and threshold limits will simplify and focus impact assessments. This will have the benefit of providing direction and reducing the cost and time of environmental assessments, facilitating economic investment in the ocean area.

Policy Statement 2.3.3: Technological innovation is required to efficiently research, monitor, explore and use the large ocean surface, water column and depths. The DEA will partner with the Department of Science and Technology and specialist tertiary educational institutes to stimulate innovation in technology that supports ocean-based science and industry.

Objective 3: Environmental management of South Africa's ocean

This objective seeks to identify the DEA's management responses to acting on the information and knowledge produced under Objectives 1 and 2. Increased knowledge of South Africa's ocean environment is likely to highlight existing and emerging challenges faced by ocean ecosystems and the earth system itself. The DEA will engage with role-playing departments to determine appropriate management responses to these environmental challenges and trends. The DEA also has at its disposal various existing environmental management tools including the establishment of protected areas and environments. This objective explains how the DEA will pursue its environmental mandate and seek to influence role-players in their ocean environmental management planning.

Policy Statement 3.1: Provide timeous information on trends and extremes in ecosystem and earth system functioning.

Policy Statement 3.1.1: The ocean monitoring and mapping efforts together with the other knowledge products developed in Objective 2 will allow the DEA to undertake forecasting, prediction and trend analysis within the marine environment as required by South Africa's Climate Change Policy.

Policy Statement 3.1.2: Long-term monitoring programmes will be enhanced to generate time series data that can be used to identify and track shifts in ecosystems functioning that contribute to or result from climate change. Climate change will likely alter the availability and delivery of ecosystem services including rainfall and its seasonal patterns. Changes in rainfall and its seasonal patterns will challenge the sustainability of existing agricultural crop selection and geographic locations. The areas of operation of fisheries may also be influenced. Without the necessary adaptation strategies being set in place South Africa's food security may be challenged. Climate change may also result in exaggerated weather phenomena along South Africa's coastline such as coastal storms and storm surges and impacts on biodiversity.

Policy Statement 3.1.3: The DEA will provide better trend and scenario planning services and reports to aid climate change mitigation and adaptation decision making by role-players. This will allow the DEA to inform national planning on how ocean human livelihood services will vary or change in the short, medium and long term at local, national, regional and global scales. Such services and reports will include variability of the ocean as a rainfall source; the magnitude of sea level rise and implications for coastal communities and improved predictability of exaggerated weather phenomena such as coastal storms and storm surges. Recent extreme weather events have demonstrated that poor communities are disproportionately affected by such phenomena. Understanding trends in ocean temperature and ocean atmosphere interactions will allow the DEA to provide timeous reporting to role-players and contribute to early warning.

Policy Statement 3.2: Ensure the conservation, protection and rehabilitation of ocean habitat and species.

Policy Statement 3.2.1: The DEA will seek to partner with role-playing departments to improve the implementation of conservation measures and increase the availability of ocean environmental data. This will be done by ensuring that the relevant management authorities of ocean use include targeted conservation and data collection responsibilities into the relevant permitting and licencing frameworks.

Policy Statement 3.2.2: The DEA will assume responsibility as the environmental regulatory authority for all unregulated and new human activity in the ocean environment. International trends suggest that these activities are likely to include carbon sequestration, ocean fertilisation, geo-engineering and deep sea exploration.

Policy Statement 3.2.3: The DEA will establish a representative network of marine conservation areas under South Africa's jurisdiction to promote conservation and thereby also contribute to the long-term sustainable use of living resources. The DEA recognises the significant contribution of islands to ocean ecosystem functioning. Islands will receive prioritised conservation status. Maximum conservation status will be afforded to the sub-Antarctic Prince Edward Island Group additional to the provisions of the Convention for the Conservation of Antarctic Marine Living Resources. There is also currently an international movement towards the establishment of a representative network of marine conservation areas beyond state jurisdiction. The DEA will support this initiative.

Policy Statement 3.2.4: The DEA will undertake and support actions aimed at the rehabilitation of degraded habitats, where necessary, and the protection of threatened species.

Policy Statement 3.2.5: The DEA will adopt internationally agreed conservation targets and practices, where appropriate, as the minimum necessary requirements for conservation.

Policy statement 3.2.6: The DEA will support international efforts aimed at the protection and conservation of habitats and species in the High Seas and in Antarctica.

Policy Statement 3.3: Establish ecosystem and biodiversity management plans in consultation with role-players.

Policy Statement 3.3.1: The DEA will, together with role-playing departments, develop and pursue uniformity of high-level ocean environmental norms and standards to inform sectoral planning efforts. These norms and standards are aimed at guiding environmental best practice in ocean sectoral use.

Policy Statement 3.3.2: The DEA will develop ecosystem and biodiversity management plans for the ocean environment to protect species and habitats. These management plans will offer maximum protection to key species, such as top predators, and habitats, such as unique benthic fauna and flora and endangered coral reefs and estuaries. The plans will provide guidance with respect to the setting of common objectives for the conservation and management of the ocean environment in collaboration with role-players.

Policy Statement 3.3.3: The DEA recognises the importance of ocean heritage relating to both geographic areas and species. The DEA will prioritise the protection and conservation of South African ocean heritage resources, such as coelacanths.

Policy Statement 3.3.4: The DEA will establish best practice guidelines governing the transport of harmful and noxious substances in the marine environment. The DEA will seek to influence planning aimed at

minimising the risk of environmental exposure to harmful and noxious substances including hydrocarbons, persistent organic pollutants and industrial waste.

Policy Statement 3.3.5: The introduction of untreated sewage and industrial waste into the ocean environment will remain prohibited and effort will be placed on encouraging coastal role-players to pursue efficient and affordable approaches to treatment.

Policy statement 3.3.6: The DEA will establish and enforce regulations controlling the introduction and beneficial use of alien marine species and minimise the threat of invasive species.

Objective 4: Ocean environmental integrity

Promoting ocean environmental integrity is reliant on coherent and rational approaches to the conservation, protection and sustainable use of South Africa's rich marine resources. It further supports South Africa's contribution to regional and global ocean management responsibilities. The importance of maintaining ocean environmental integrity lies in the preservation of ocean environmental goods and services for current and future generations of South Africans. This objective can only be achieved through effective partnerships and efficient cooperation. The EEZ represents a geographic space larger than the size of South Africa's land area. The State is the custodian of this large ocean space on behalf of the people of South Africa. The management of such a vast space is a complex undertaking involving various role-players at a national, regional and international level. The realisation of this custodianship responsibility demands cooperation in effort and investment by all State role-players to preserve ocean environmental integrity. The improvement of environmental information, knowledge and the management of South Africa's ocean environment provide the necessary platform for the achievement of this objective.

Policy Statement 4.1: Cooperate at a national, regional and international level to advance sustainable ecosystem-based management of the EEZ, High Seas and Antarctica.

Policy Statement 4.1.1: At a national level the DEA will drive the movement from a sectoral to an ecosystem-based bioregional ocean management planning approach. The ecosystem-based approach implies coordinated sectoral planning that pursues common ocean environmental objectives. It further underpins the eventual migration to integrated ocean management.

Policy Statement 4.1.2: The DEA will use the existing cluster cooperative governance mechanism to facilitate the improved coordination of ocean environmental management.

Policy Statement 4.1.3: At a regional level the DEA will seek to participate in programmes based in the LME management framework. Initially attention will be paid to the five African and the Antarctic LMEs. The DEA will promote cooperation and strengthen information exchange and management principles across these LMEs. The implementation of national ocean management objectives will be strengthened by aligning them with the regional LME structures, in particular the adjacent Benguela and Agulhas Current LMEs. This allows for the development of integrated regional ocean governance at the Southern African Development Community level, as well as active participation in and support for the Nairobi and Abidjan Convention structures.

Policy Statement 4.1.4: The DEA will continue to play a leadership role with respect to regional ocean governance underpinned by its ocean research and management capacity. Through leadership roles the DEA will secure alignment between national environmental management objectives and regional and international programmes.

Policy Statement 4.1.5: At an international level, attention will also be paid to improving channels of communication between South Africa's various central authorities established by international agreements. Currently central authorities, who bear international reporting responsibilities, are located within a variety of role-playing structures. The ability of central authorities to interact and communicate with one another is not optimum. Improved communication will allow South Africa to undertake its international responsibilities and reporting in a more harmonised manner.

Policy Statement 4.1.6: The DEA will support continuing engagement at international ocean governance fora to promote equitable access and benefit sharing of resources in the High Seas and Antarctica.

Policy Statement 4.1.7: The DEA will promote global ocean environmental protection in South Africa's national interests. South Africa is an original signatory of the Antarctic Treaty and exercises sovereignty over two sub-Antarctic islands. As such South Africa is well positioned to influence planning and management strategies in the Southern Ocean. The DEA exercises many of South Africa's international ocean responsibilities and intends to strengthen its interactions on global environmental management initiatives in an attempt to appropriately influence global strategies. The DEA will assist in furthering South Africa's ability to actively partner with Southern Hemisphere marine nations in particular and developing nations generally, such as the India Brazil South Africa partnership. Such partnerships are aimed at enhancing the economic and scientific resources available for the undertaking of large-scale research projects with the objective to increase knowledge of shared ocean dynamic processes. This knowledge will enable regional ocean environmental management planning and improved national adaptation decision making. The DEA will also support ongoing cooperation and collaboration with developed countries in the pursuit of global ocean environmental integrity.

The successful implementation of the policy objectives listed above will allow South Africa, in the next five years, to complete the move from sectoral ocean management planning towards coordinated sectoral environmental management. This shift is made possible by building better understanding amongst role-players of the benefits of improved environmental information and knowledge to inform environmental planning. Environmental spatial-planning relies on improved scientific knowledge of the South African ocean environment and is underpinned by the comprehensive spatial-map of the South African marine environment. It allows for a more informed strategic planning process to be undertaken, which seeks to advance sustainable development and conservation and protection of the ocean through an ecosystem-based management approach.

In the longer term it will be possible to undertake the move from coordinated sectoral environmental management to integrated environmental ocean management. International experience has shown that the undertaking of integrated ocean management planning cannot rely purely on principles of cooperative governance. It will be necessary to undertake the drafting of specific legislation such as an Ocean Act. The Ocean Act will need to establish clear political, reporting and administrative structures, set out an ecosystem-based ocean management approach, define the jurisdiction of the Act including linkages to existing legislation and provide for mechanisms to be followed during integrated spatial-planning. The achievement of the policy objectives will give effect to the ocean environmental management responsibilities articulated in s24 of the Constitution and DEA's responsibilities as contained in the National Environmental Management Act. It will further directly contribute to fulfilling South Africa's commitment to Chapter 17 of Agenda 21 (the Rio Declaration) and the Johannesburg Declaration on Sustainable Development, produced during the World Summit on Sustainable Development in 2002.

Summary Box: South Africa's Ocean Management Policy Statements

South Africa's ocean policy is comprised of four policy objectives and nine policy statements. These are:

Objective 1: Ocean environmental information

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

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

Objective 2: Ocean environmental knowledge for sustainable development decision making

Policy Statement 2.1: Produce information tools to facilitate knowledge and understanding of the natural functioning of ecosystems and of human impact on the ocean environment.

Policy Statement 2.2: Establish, in consultation with role-players, ocean ecosystem thresholds for human health and biodiversity conservation.

Policy Statement 2.3: Provide knowledge to promote sustainable development whilst maintaining the resilience of the ocean.

Objective 3: Environmental management of South Africa's ocean

Policy Statement 3.1: Provide timeous information on trends and extremes in ecosystem and earth system functioning.

Policy Statement 3.2: Ensure the conservation, protection and rehabilitation of ocean habitat and species.

Policy Statement 3.3: Establish ecosystem and biodiversity management plans in consultation with role-players.

Objective 4: Ocean environmental integrity

Policy Statement 4.1: Cooperate at a national, regional and international level to advance sustainable ecosystem-based management of the EEZ, High Seas and Antarctica.



SOURCE: ELZETTE HENSHILWOOD

9. CONCLUSION

The successful implementation of the policy objectives listed above will allow South Africa, in the next five years, to complete the move from sectoral ocean management planning towards coordinated sectoral environmental management. This shift is made possible by building better understanding amongst role-players of the benefits of improved environmental information and knowledge to inform environmental planning. Environmental spatial-planning relies on improved scientific knowledge of the South African ocean environment and is underpinned by the comprehensive spatial-map of the South African marine environment. It allows for a more informed strategic planning process to be undertaken, which seeks to advance sustainable development and conservation and protection of the ocean through an ecosystem-based management approach.

In the longer term it will be possible to undertake the move from coordinated sectoral environmental management to integrated environmental ocean management. International experience has shown that the undertaking of integrated ocean management planning cannot rely purely on principles of cooperative governance. It will be necessary to undertake the drafting of specific legislation such as an Ocean Act. The Ocean Act will need to establish clear political, reporting and administrative structures, set out an ecosystem-based ocean management approach and provide for mechanisms to be followed during integrated spatial-planning.

The achievement of the policy objectives will give effect to the ocean stewardship responsibilities articulated in s24 of the Constitution and DEA's environmental responsibilities as contained in the National Environmental Management Act. It will further directly contribute to fulfilling South Africa's commitment to Chapter 17 of Agenda 21 (the Rio Declaration) and the Johannesburg Declaration on Sustainable Development.



SOURCE: IAIN TEDBURY

ANNEXURE A: TABLE OF INTERNATIONAL INSTRUMENTS

Instrument	Status in SA Law	Date of document	Ratification	Accession	Entered into force	Enables
International Convention on the Regulation of Whaling	Domesticated International Obligation	02-Dec-46	05-May-48	n/a	10-Nov-48	Protocol to the International Convention for the Regulation of Whaling – ratification 25 April 1957, entry into force 4 May 1959.
The Antarctic Treaty	Domesticated International Obligation	01-Dec-59	21-Jun-60	n/a	23-Jun-61	Agreed Measures for the Conservation of Antarctic Fauna and Flora - 02 June 1964 Protocol to the Antarctic Treaty on Environmental Protection - 04 October 1991
Agreed Measures for the Conservation of Antarctic Fauna and Flora	Domesticated International Obligation	02-Jun-64	n/a	05-Oct-64	01-Nov-82	n/a
International Convention relating to Intervention on the High Seas in Cases of Oil Pollution Casualties	Domesticated International Obligation	29-Nov-69	n/a	01-Jul-86	29-Sep-86	Protocol relating to Intervention on the High Seas in Cases of Marine Pollution by Substances other than Oil acceded to on 25 September 1997 and entered into force on 24 December 1997
Convention on Wetlands of International Importance especially as Waterfowl Habitat	Domesticated International Obligation	02-Feb-71	12-Mar-75	n/a	21-Dec-72	n/a

Instrument	Status in SA Law	Date of document	Ratification	Accession	Entered into force	Enables
Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter	Domesticated International Obligation	29-Dec-72	17-Aug-78	n/a	06-Sep-78	Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter acceded to on 23 December 1998 and entered into force on 24 March 2006
Convention on International Trade in Endangered Species of Wild Fauna and Flora	Domesticated International Obligation	03-Mar-73	15-Jul-75	n/a	13-Oct-75	n/a
International Convention for the Prevention of Pollution from Ships	Domesticated International Obligation	02-Nov-73 17-Feb-78	n/a	28-Nov-84	28-Feb-85	n/a
Convention on the Conservation of Migratory Species of Wild Animals	Domesticated International Obligation	23-Jun-79	n/a	27-Sep-91	01-Dec-91	Agreement on the Conservation of African-Eurasian Migratory Water birds – date of document 16 June 1995, SA simple signature 29 October 1999. Interpretative value s39(1)(b) of the Constitution Agreement on the Conservation of Albatrosses and Petrels – date of document 19 June 2001, SA simple signature 6 November 2003, ratification 6 November 2003, entry into force 1 February 2004. “Binding Domestic International Obligation” s231(2) of Interim Constitution

Instrument	Status in SA Law	Date of document	Ratification	Accession	Entered into force	Enables
Convention on the Conservation of Migratory Species of Wild Animals	Domesticated International Obligation	23-Jun-79	n/a	27-Sep-91	01-Dec-91	Memorandum of Understanding Concerning Conservation and Management of Marine Turtles and their Habitats of the Indian Ocean and South East Asia – date of document 1 September 2001, SA simple signature 22 February 2005. Interpretative value s39(1)(b) of the Constitution
Convention on the Conservation of Antarctic Marine Living Resources	Domesticated International Obligation	20-May-80	23-Jul-81	n/a	07-Apr-82	n/a
Convention for the Co-operation in the Protection and Development of the Marine and Coastal Environment of the West and Central African Region	Domesticated International Obligation	23-Mar-81	16-May-02	n/a	15-Jul-02	Protocol Concerning Co-operation in Combatting Pollution in Cases of Emergency - date of document 23 March 1981, ratification 16 May 2002 and entry into force 15 July 2002.
United Nations Convention on the Law of the Sea	Customary International Law & Domesticated International Obligation	10-Dec-82	23-Dec-97	n/a	23-Jan-98	Agreement for Implementation of Part XI of UNCLOS of 10 December 1982, ratification 23 December 1997 and entered into force 22 January 1998.
						Agreement for the Implementation of the Provisions of UNCLOS of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks – Accession 14 August 2003 and entered into force 13 September 2003.

Instrument	Status in SA Law	Date of document	Ratification	Accession	Entered into force	Enables
Vienna Convention for the Protection of the Ozone Layer	Domesticated International Obligation	22-Mar-85	n/a	18-Jan-90	15-Apr-90	Montreal Protocol on Substances that Deplete the Ozone Layer - 16 September 1987 as amended on 10 August 1992, 14 June 1994, 1 January 1999, and 1 July 2002. SA has ratified all of these amendments.
Convention for the Protection, Management and Development of the Marine and Coastal Environment of the Eastern African Region	Domesticated International Obligation	21-Jun-85	16-May-03	n/a	14-Aug-03	Protocol concerning Protected Areas and Wild Fauna and Flora in the Eastern African Region - 21 June 1985 – SA not a party.
	Domesticated International Obligation					Protocol concerning Cooperation in Combating Marine Pollution in cases of Emergency in the Eastern African Region - 21 June 1985 – SA not a party.
Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal	Domesticated International Obligation	22-Mar-89	05-May-94	n/a	03-Aug-94	Basel Protocol on Liability and Compensation for Damage Resulting from Transboundary Movements of Hazardous Wastes and their Disposal – SA not a party to this protocol.
International Convention on Oil Pollution Preparedness, Response and Co-operation	Domesticated International Obligation	30-Nov-90	04-Jul-08	n/a	14-Oct-08	Protocol on Preparedness, Response and Cooperation to Pollution Incidents by Hazardous and Noxious Substances which has interpretative value.
Protocol to the Antarctic Treaty on Environmental Protection	Domesticated International Obligation	04-Oct-91	03-Aug-95	n/a	14-Jan-98	n/a

Instrument	Status in SA Law	Date of document	Ratification	Accession	Entered into force	Enables
United Nations Framework Convention on Climate Change	Domesticated International Obligation	09-May-92	29-Aug-97	n/a	27-Nov-97	Kyoto Protocol to the United Nations Framework Convention on Climate Change - date of document 11 December 1997, accession 31 July 2002 and entry into force 16 February 2005.
Agenda 21	Interpretative Value	Jun-92	n/a	n/a	n/a	n/a
Convention on Biological Diversity	Domesticated International Obligation	05-Jun-92	02-Nov-95	n/a	31-Jan-96	Cartagena Protocol on Biosafety to the Convention on Biological Diversity – Date of document 29 January 2000, SA accession 14 August 2003, entered into force 11 September 2003 “Binding Domestic International Obligation” s231(2) of Constitution.
International Convention on the Control of Harmful Anti-Fouling Systems On Ships	Domesticated International Obligation	05-Oct-01	n/a	02-Jul-08	02-Oct-08	Nagoya Protocol on Access to Genetic Resources and their Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity – Date of document 29 October 2010. SA signed this protocol on 11 May 2011, no ratification as yet. If ratified will be a “Binding Domestic International Obligation” s231(2) of Constitution - presently interpretative value s39(1)(b) of the Constitution.

Instrument	Status in SA Law	Date of document	Ratification	Accession	Entered into force	Enables
International Convention for the Control and Management of Ships' Ballast Water and Sediments	Interpretative Value	13-Feb-04	n/a	15-Apr-08	n/a	n/a
Johannesburg Declaration on Sustainable Development	Interpretative Value	Sep-02	n/a	n/a	n/a	n/a
Benguela Current Convention	Under negotiation	n/a	n/a	n/a	n/a	n/a

ANNEXURE B: TABLE OF DOMESTIC LEGISLATION

Legislation	Lead Department
Marine Living Resources Act 18 of 1998	Department of Agriculture, Forestry and Fisheries
National Heritage Resources Act 25 of 1999	Department of Arts and Culture
Electricity Regulation Act 4 of 2006	Department of Energy
Antarctic Treaties Act 60 of 1996	Department of Environmental Affairs
Dumping at Sea Control Act 73 of 1980	Department of Environmental Affairs
National Environmental Management Act 107 of 1998	Department of Environmental Affairs
National Environmental Management: Air Quality Act 39 OF 2004	Department of Environmental Affairs
National Environmental Management: Biodiversity Act 10 of 2004	Department of Environmental Affairs
National Environmental Management: Integrated Coastal Management Act 24 of 2008	Department of Environmental Affairs
National Environmental Management: Protected Areas Act 107 of 1998	Department of Environmental Affairs
National Environmental Management: Waste Act 59 of 2008	Department of Environmental Affairs
South African Weather Service Act 8 of 2001	Department of Environmental Affairs
World Heritage Convention Act 49 of 1999	Department of Environmental Affairs
The Hazardous Substances Act 15 of 1973	Department of Health & Department of Finance
Mineral and Petroleum Resources Development Act 28 of 2002	Department of Mineral Resources
Geoscience Act 100 of 1993	Department of Science and Technology: Schedule 3A Public Entity in terms of Public Finance Management Act 1 of 1999
Marine Pollution (Prevention of Pollution from Ships) Act 2 of 1986	Department of Transport
South African Maritime Safety Authority Act 5 of 1998	Department of Transport
The Marine Pollution (Control and Civil Liability) Act 6 of 1981	Department of Transport
The Marine Pollution (Intervention) Act 64 of 1987	Department of Transport
Marine Traffic Act 2 of 1981	Department of Transport
National Ports Act 12 of 2005	Department of Transport
National Water Act 36 of 1998	Department of Water Affairs
Maritime Zones Act 15 of 1994	not applicable

END NOTES

- ⁱ South African Navy – Chapter 2, The South African Maritime Environment at p14 available from or www.navy.mil.za/SANGP100/SANGP100_CH02.pdf.
- ⁱⁱ UNEP/GRID-Arendal (2009), *Continental Shelf: The Last Maritime Zone* at p32
- ⁱⁱⁱ Lombard, A.T., Strauss, T., Harris, J., Sink, K., Dr Attwood, C., and Dr Hutchings, L. South African National Spatial Biodiversity Assessment 2004, Technical Report Volume 4: Marine Component, at p19
- ^{iv} Ahlenius, H., UNEP/GRID-Arendal available at http://www.grida.no/graphicslib/detail/world-ocean-thermohaline-circulation-alternative-version_a4ba
- ^v Republic of South Africa, Department of Environmental Affairs and Tourism (2008), *South Africa's National Programme of Action for Protection of the Marine Environment from Land-based Activities*, First Edition, Cape Town at p2-4
- ^{vi} Peterson and Stramma, (1991), *Upper Level Circulation in the South Atlantic Ocean*, Prog. Oceanogr, vol 26
- ^{vii} South African Data Centre for Oceanography, available at <http://www.pbs.org/edens/namib/images/map2.gif>
- ^{viii} Op cit Lombard et al at p7
- ^{ix} Ashworth, A.C., Vestal, W.D., Hokanson, G., Joseph, L., Martin, M., McGlynn, K., Newbrey, M. G., Schlecht, N., Turnbull, J., White, A., Shukla, R., Mahodaya, R., Ashworth, H. and T. Zimmerman, (2010), available at <http://www.ndsu.edu/subantarctic>
- ^x Sink, Harris and Lombard (2004) Appendix 1: South African Marine Bioregions in appendices of National Spatial Biodiversity Assessment at p1
- ^{xi} Department of Environmental Affairs Strategic Plan 1 April 2011 to 31 March 2016 at p9
- ^{xii} BP Southern Africa (Pty) Limited v MEC for Agriculture, Conservation, Environment and Land Affairs 2004 (5) SA 124 (W) at p143
- ^{xiii} National Environmental Management: Integrated Coastal Management Act 24 of 2008
- ^{xiv} Op Cit BP Southern Africa at p144
- ^{xv} United Nations Conference on Human Environment held in Stockholm June 1972: UN doc A/Conf.48/14.rev, Chapter 1 (New York 1972)
- ^{xvi} Woolman et al, Chapter 50 van der Linde, M. and Basson, E. (2009), *Constitutional Law of South Africa* 2nd edition, revision service 1 at pp50-4
- ^{xvii} UNEP(DPDL)/GJS/1/3: UNEP's Environmental Law Activities: a 30-year Review (From Stockholm to Johannesburg) (2002) at p2
- ^{xviii} By way of example see UN Framework Convention on Climate Change, (1992), Articles 3 and 4 and UN Convention on Biodiversity, (1992), Articles 8 and 10
- ^{xix} Herr, D. and Galland, G.R. (2009). *The Ocean and Climate Change. Tools and Guidelines for Action*, IUCN, Gland, Switzerland at p12
- ^{xx} Detecting Regional Anthropogenic Trends in Ocean Acidification against Natural Variability, Friedrich, Timmermann, Abe-Ouchi, Bates, Chikamoto, Church, Dore, Gledhill, Gonzalez-Davila, Heinemann, Ilyina, Jungclaus, McLeod, Mouchet and Santana-Casiano, Nature Climate Change 2012
- ^{xxi} Available from http://www.lme.noaa.gov/index.php?option=com_content&view=article&id=171&Itemid=74

- xxii Riccardo Pravettoni, UNEP/GRID-Arendal available at http://www.grida.no/graphicslib/detail/global-ocean-acidification_162f
- xxiii The Government of the Republic of South Africa: National Climate Change Response White Paper, Document October 2011 at p19
- xxiv Ibid p20
- xxv Op Cit Climate Change White paper at p19
- xxvi Final Recommendations of the Interagency Ocean Policy Task Force, July 19, 2010, The White House Council on Environmental Policy at p44
- xxvii Heileman and O'Toole, *Benguela Current: LME number 29*, available at www.lme.noaa.gov
- xxviii Heileman, Lutjeharms and Scott, *Agulhas Current: LME number 30*, available at www.lme.noaa.gov
- xxix Available from http://www.lme.noaa.gov/index.php?option=com_content&view=article&id=171&Itemid=60
- xxx Millennium Ecosystem Assessment, (2005), *Ecosystems and Human Well-being: Biodiversity Synthesis*. (World Resources Institute, Washington, DC).
- xxxi UN Atlas of the Ocean: Ecosystems available at <http://www.oceansatlas.org/servlet/CDServlet?status=ND0yMzg1JjY9ZW4mMzM9KiYzNz1rb3M~>
- xxxii Schematic representation of the ecosystem services selected by UNEP, as categorized in the Millennium Ecosystem Assessment (regulating, provisioning, supporting and cultural services) available at <http://www.unep.org/ecosystemmanagement/Introduction/tabid/293/Default.aspx>
- xxxiii Department of Agriculture, Forestry and Fisheries, *South Africa Year Book 2010/11* at p70
- xxxiv Department of Agriculture, Forestry and Fisheries, *Annual Report 2009-10* at p7.
- xxxv Atkinson and Clark on behalf of the Department of Environmental Affairs and Tourism, (2005), *National State of the Environment Project: Marine and Coastal Ecosystems: Background Research Paper* produced for the South Africa Outlook Report at p3
- xxxvi Atkinson, L. & Sink, K. (2008), *User profiles for the South African offshore environment*, SANBI Biodiversity Series 10, (South African National Biodiversity Institute, Pretoria at p18).
- xxxvii Ibid pp6-7
- xxxviii Ibid p9
- xxxix Pauly, Christensen, Dalsgaard, Froese and Torres, *Fishing Down Marine Food Webs*, Science 6 February 1998 Vol 279, pp860-863,
- xl South Africa Year Book 2010/11 Chapter 23: Transport at pp530-535
- xli Economic Review of Participation in Ports Operation and Services in South Africa, Commissioned by South African Ports Regulator, August 2012 at p35
- xlii Op Cit Atkinson, L. & Sink, K. (2008), *User profiles for the South African offshore environment* at p11
- xliii Ibid p10
- xliv Petroleum Agency South Africa, History of exploration and production, available at <http://www.petroleumagency.com/Promotion/ExplorationHistory.aspx>
- xlv Sink K, Holness S, Harris L, Majiedt P, Atkinson L, Robinson T, Kirkman S, Hutchings L, Leslie R, Lamberth S, Kerwath S, von der Heyden S, Lombard A, Attwood C, Branch G, Fairweather T, Taljaard S, Weerts S, Cowley P, Awad A, Halpern B, Grantham H, Wolf T. (2012) (a). Draft unpublished National Biodiversity Assessment 2011: Marine and Coastal Component Report. (South African National Biodiversity Institute, Pretoria).

-
- ^{xlvi} Information obtained from www.bcb.uwc.ac.za/envfacts/facts/marinepollution.htm
- ^{xlvii} Op Cit South Africa's National Programme of Action for Protection of the Marine Environment at pp2-26
- ^{xlviii} Information obtained from www.bcb.uwc.ac.za/envfacts/facts/marinepollution.htm
- ^{xlix} Op Cit South Africa's National Programme of Action for Protection of the Marine Environment at pp2-31
- ⁱ Information obtained from www.bcb.uwc.ac.za/envfacts/facts/marinepollution.htm
- ⁱⁱ Information obtained from www.bcb.uwc.ac.za/envfacts/facts/marinepollution.htm
- ⁱⁱⁱ Op Cit South Africa's National Programme of Action for Protection of the Marine Environment at pp2-34
- ⁱⁱⁱⁱ Department of Environmental Affairs, *The value of the coast: sustainable coastal livelihoods programme*
- ^{liv} Martin and Nielsen, *Creation of a New Fisheries Policy in South Africa: The Development Process and Achievements*, , p1 available at <http://www.ifm.dk/reports/3.PDF>
- ^{lv} South Africa Year Book 2010/11 Chapter 8 Energy at p186
- ^{lvi} Bureau of Agricultural Research: Philippines available at <http://www.bfar.da.gov.ph/pages/Programs/program-seaweed.html>
- ^{lvii} Op cit Troell et al
- ^{lviii} Op Cit Atkinson, L. & Sink, K. (2008), *User profiles for the South African offshore environment* at p45
- ^{lix} Ahlenius, H. UNEP/GRID-Arendal available at http://www.grida.no/graphicslib/detail/major-pathways-and-origins-of-invasive-species-infestations-in-the-marine-environment_7eb0
- ^{lx} Data based on Lloyd's Register Fairplay and the Automatic Identification System, which tracks vessels using a VHF receiver and GPSL, available from <http://www.wired.com/wiredscience/2010/01/global-shipping-map/>
- ^{lxi} Op Cit Atkinson, L. & Sink, K. (2008), *User profiles for the South African offshore environment* at p12
- ^{lxii} *Ibid* p7
- ^{lxiii} Leary D.K., (2007), *International Law and the Generic Resources of the Deep Sea*, at pp157-8
- ^{lxiv} Intergovernmental Oceanographic Commission. National Ocean Policy. The Basic Texts from: Australia, Brazil, Canada, China, Colombia, Japan, Norway, Portugal, Russian Federation, United States of America. Paris, UNESCO, 2007. 280 pp. (IOC Technical Series, 75. Law of the Sea Dossier 1) at p2
- ^{lxv} Communication from the Commission to the Council, The European Parliament, The European Economic and Social Committee and the Committee of the Regions, Guidelines for an Integrated Approach to Maritime Policy: Towards Best Practice in Integrated Maritime Governance and Stakeholder Consultation, Commission of the European Communities 2008 at p5
- ^{lxvi} Statement of the European Union, delivered by H.E. Mr. José Antonio Yturriaga Barberán, Ambassador at large for the Law of the Sea (11 April 2002)
- ^{lxvii} Op Cit Intergovernmental Oceanographic Commission, National Ocean Policy at pp2-3

Printed by and obtainable from the Government Printer, Bosman Street, Private Bag X85, Pretoria, 0001
Publications: Tel: (012) 334-4508, 334-4509, 334-4510
Advertisements: Tel: (012) 334-4673, 334-4674, 334-4504
Subscriptions: Tel: (012) 334-4735, 334-4736, 334-4737
Cape Town Branch: Tel: (021) 465-7531

Gedruk deur en verkrygbaar by die Staatsdrukker, Bosmanstraat, Privaatsak X85, Pretoria, 0001
Publikasies: Tel: (012) 334-4508, 334-4509, 334-4510
Advertensies: Tel: (012) 334-4673, 334-4674, 334-4504
Subskripsies: Tel: (012) 334-4735, 334-4736, 334-4737
Kaapstad-tak: Tel: (021) 465-7531