Guidelines for Offshore Marine Protected Areas in South Africa

Kerry Sink & Colin Attwood

2008
SANBI
Biodiversity Series
9

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The South African National Biodiversity Institute (SANBI) was established on 1 September 2004 through the signing into force of the National Environmental Management: Biodiversity Act (NEMBA) No.10 of 2004 by President Thabo Mbeki. The Act expands the mandate of the former National Botanical Institute to include responsibilities relating to the full diversity of South Africa's fauna and flora, and builds on the internationally respected programmes in conservation, research, education and visitor services developed by the National Botanical Institute and its predecessors over the past century.

The vision of SANBI is to be the leading institution in biodiversity science in Africa, facilitating conservation, sustainable use of living resources, and human wellbeing.

SANBI's mission is to promote the sustainable use, conservation, appreciation and enjoyment of the exceptionally rich biodiversity of South Africa, for the benefit of all people.

SANBI Biodiversity Series will publish occasional reports on projects, technologies, workshops, symposia and other activities initiated by or executed in partnership with SANBI.

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Contents

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Kerry Sink [1,3] and Colin Attwood [6]

October 2007

A draft of this document was used as a background at a stakeholder workshop in June 2007. The following individuals provided feedback on the draft version of the guidelines, and the objectives and approach were finalized at the stakeholder workshop. It should be noted that this final version does not reflect the views of all contributors on all aspects:
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The Offshore Biodiversity Initiative promotes ecosystem-based management of South Africa's marine territory through the establishment of a network of offshore Marine Protected Areas and co-operative biodiversity management. Offshore industries and government are working together to secure the overall health of offshore marine ecosystems to meet the needs of present and future generations. The project was initiated with financial support from the WWF Greentrust.

Executive summary

The Offshore Marine Protected Areas (MPA) Project aims to facilitate the development of a representative offshore MPA network that has broad support from the various offshore marine use sectors and is based on the best available scientific information, for the conservation of South Africa's offshore biodiversity and the wise use of offshore marine resources. A proposal for an offshore MPA network is being developed jointly by the South African National Biodiversity Institute and the Department of Environmental Affairs and Tourism's Marine and Coastal Management Branch in consultation with the Department of Minerals and Energy, the Petroleum Agency South Africa, and stakeholders from commercial fishing, mining, petroleum and other maritime industries. This document outlines the rationale, objectives and proposed approach for the establishment of a representative system of offshore MPAs for the South African Exclusive Economic Zone (EEZ) and territorial waters. The intention of the guidelines is to communicate the proposed aims and project methods to interested and affected parties and in so doing stimulate debate and encourage participation in the development of an offshore MPA network through a consultative process. An earlier draft formed the background document that was refined at a stakeholder workshop in June 2007.

The development of offshore MPAs is South Africa's first attempt at area-specific conservation of offshore habitats and ecosystems. It addresses one of the priority actions from the National Spatial Biodiversity Assessment and contributes to a representative MPA network for South Africa. Offshore MPAs are needed to avert the progressive degradation of offshore environments and resources, contribute to sustainable resource use, allow recovery of impacted habitats and fish stocks and meet international biodiversity commitments. The project draws together for the first time, managers and stakeholders from several government departments and industry sectors. It represents an important step towards integrated ecosystem-based management for our EEZ, and maintaining future options for resource use.

South Africa's existing MPA network cannot be considered representative because it is biased towards inshore areas and the east coast. Several bioregions and habitat types are without any form of protection, while others fall short of the targets set for protection. The South African government has international and national commitments to protect marine biodiversity, ecological integrity and ensure the sustainable use of resources. These obligations have been ratified under several international conventions and agreements and are embedded in local legislation and policy. Representative MPA networks are recognized as a critical component of commitments related to the Convention on Biological Diversity (CBD), the World Summit for Sustainable Development (WSSD) and the World Parks Congress. MPA networks are an important part of the global movement towards a more holistic management approach that considers entire ecosystems, multiple sectors and many management objectives. South Africa's current EEZ extends to 200 nautical miles off the coastline but only 0.16 % is presently protected in MPAs.

The agreed objectives of the Offshore MPA project are the establishment of an ecologically representative network of effectively managed MPAs that include all marine habitat types in all bioregions of South Africa:

- to contribute to the long-term persistence of offshore biodiversity and its underlying processes;
- to contribute to sustainability of fisheries and ecosystem-based management of resources;
- to provide undisturbed areas for scientific study and long-term monitoring;
- to advance integrated spatial planning and management arrangements for the EEZ;
- to promote appropriate non-consumptive use of the offshore marine environment.

It is emphasized that MPAs should be seen in the context of a set of complementary and integrated conservation and industry management mechanisms. It is recognized that MPA planning should be integrated with the management of fisheries and other maritime industries.

The South African EEZ provides considerable economic opportunities and supports many commercial activities. The project has undertaken a review of existing activities in our EEZ to provide

profiles for various offshore sectors in support of the planning phase of the Offshore MPA Project. These include petroleum, diamond mining, fishing, maritime transport, waste disposal, submarine communications, science and marine defence sectors.

The proposed project approach recognizes and addresses the problems associated with previous attempts to secure protection for offshore habitats.

Key elements in the project methodology include:

- 1, systematic planning based on the best available, existing scientific and socio-economic research;
- 2, an integrated spatial planning framework with shared spatial data between sectors and collaboration between and within government departments;
- 3, application of other experience of MPAs and spatial planning;
- 4, stakeholder involvement in the planning and implementation process;
- 5, consideration of appropriate trade-offs among the interests of biodiversity and different user groups;
- 6, raising awareness of MPA benefits, design and supporting science;
- 7, identifying and addressing implementation and management concerns including compliance and monitoring for offshore MPAs;
- 8, ongoing alignment with policy and legislation.

Systematic conservation planning is a branch of conservation planning that identifies and evaluates areas for *in situ* conservation. The inclusion of available scientific knowledge to guide the design of an MPA network has been identified as a critical component of this methodology. We recognize that offshore biodiversity in South Africa is poorly understood but a flexible approach to planning that can adapt with increasing knowledge is proposed. The project will draw from current research focused on offshore biodiversity pattern, processes (such as research on spawning, larval distribution, nursery areas and critical feeding or breeding areas), and impacts of commercial activities in the EEZ. We expect that offshore industries could contribute to the auditing of biodiversity, ground-truthing of habitat types, testing of biodiversity surrogates and identification of vulnerable habitats. The sharing of spatial information by the governance sectors for biodiversity conservation, fisheries, mining, petroleum activities, maritime transport, submarine communication and defence will facilitate co-ordinated planning.

The project plans to draw from experience in the design and implementation of MPAs and spatial plans and to identify and address implementation and management concerns. A legislative review has been commissioned to examine legal constraints and opportunities. Effects of MPAs on commercial exploitation will be considered and the project depends on meaningful stakeholder involvement in the planning process and the consideration of social and economic factors. Opportunities for direct stakeholder participation are identified.

Introduction

South Africa is familiar with the concept of Marine Protected Areas (MPAs) and approximately 9 % of our coastline is conserved within fully protected MPAs and a further 14 % within MPAs zoned for use. Our offshore environment however, is not well represented in MPAs, with only 0.16 % of our Exclusive Economic Zone protected. Inclusion of offshore habitats within an MPA network was highlighted as a priority action by South Africa's National Spatial Biodiversity Assessment (Lombard *et al*. 2004; Driver *et al.* 2005).

The Offshore MPA project aims to facilitate the establishment of an offshore MPA system with broad support from the various offshore sectors. The MPAs will be designed with the best available scientific information, for the persistent conservation of South Africa's offshore biodiversity and the wise use of offshore marine resources. A proposed network is being cooperatively identified by the South African National Biodiversity Institute (SANBI) and the Department of Environmental Affairs and Tourism's Marine and Coastal Management Branch in consultation with the Department of Minerals and Energy, the Petroleum Agency South Africa, and stakeholders from commercial fishing, mining, petroleum and other maritime industries. For the first time, this project draws managers from several government departments and therefore represents an important step towards integrated ecosystem-based management for the EEZ.

The SANBI-WWF Offshore MPA project is a three year project with the first year (2007) constituting a planning phase. Implementation is expected to take place in stages from 2008 onwards. The OMPA project will

- develop broadly accepted objectives and guidelines for the establishment of offshore MPAs;
- collate scientific data and other information to support the establishment of offshore MPAs;
- identify priority areas for the protection of offshore biodiversity and resources.

This document specifically addresses the first action. The remaining actions are planned to be undertaken by October 2009 with initial proposed priority areas identified and reviewed during 2008. The establishment of a full network of MPAs is a medium-term objective that will continue after the project has ended. The Offshore MPA project is funded by the WWF Marine Program and SANBI.

These guidelines outline the rationale, objectives and proposed approach for the establishment of a representative system of offshore Marine Protected Areas (MPAs) for South Africa. The purpose of this document is threefold:

- to communicate the need for Offshore MPAs and the proposed methodology for their establishment;
- to trigger feedback on the proposed objectives and approach;
- to engage stakeholders with a view to obtain spatial inputs into planning frameworks.

The target audience includes government departments (including the Department of Environmental Affairs and Tourism, Marine and Coastal Management, Department of Minerals and Energy, Petroleum Agency South Africa, South African Maritime Safety Authority, National Ports Authority, South African Navy, South African National Biodiversity Institute, South African National Parks), industry stakeholders (Fishing, Aquaculture, Mining, Petroleum, Shipping, Undersea Communications, Defence, Waste disposal, Research) and the general public. The objectives of the Offshore MPA network are discussed and the key elements of the planning approach are explained.

The development of offshore MPAs represents South Africa's first attempt at area-specific conservation of offshore habitats and ecosystems.

What are Marine Protected Areas (MPAs)?

The Convention on Biological Diversity defines an MPA as:
'any defined area within or adjacent to the marine environment, together with its overlaying waters and associated flora, fauna and historical and cultural features, which has been reserved by legislation or other effective means, including custom, with the effect that its marine and/or coastal biodiversity enjoys a higher level of protection than its surroundings.'

In South Africa, no-take MPAs (no marine living resource extraction is permitted) represent the highest level of protection that can be applied in the marine environment. By definition in the Marine Living Resources Act, MPAs can exclude fishing, removal of any living organisms, mining, dredging, pollution, construction and any other activities that may adversely impact on the ecosystems of that area. Legally, the only exceptions are activities permitted by the Minister for the purposes of proper management of the MPA. The Marine Living Resources Act specifies that MPAs are proclaimed for three purposes:

(a) for the protection of fauna and flora or a particular species of fauna or flora and the physical features on which they depend;

(b) to facilitate fishery management by protecting spawning stock, allowing stock recovery, enhancing stock abundance in adjacent areas, and providing pristine communities for research;

(c) to diminish any conflict that may arise from competing uses in that area.

The major functions of MPAs therefore include:

- exclusion of threats and provision of refuge areas for marine life;
- preservation of representative communities in their natural state;
- provision of undisturbed sites for research and monitoring;
- contribution to sustainability of fisheries.

MPAs can also help to reduce user-conflict and may be important for education and tourism, and the popular and financial support of biodiversity conservation (Attwood *et al.* 1997; Roberts & Hawkins 2000; Salm *et al*. 2000; Gell & Roberts 2003; Secretariat of the Convention on Biological Diversity 2004).

MPAs are widely regarded as one of the most effective mechanisms for protecting marine biodiversity. However, MPAs should be seen in the context of a set of complementary and integrated conservation and management mechanisms. Other mechanisms for marine conservation include:

- species-specific management measures;
- ecosystem approaches to management of fisheries;
- effective environmental management plans for mineral and petroleum activities;
- reduction and management of marine pollution;
- the declaration and management of other marine-managed areas.

Rationale

The offshore environment is an area of considerable economic, social, and scientific importance. The marine environment of South Africa is a diverse and complex seascape that supports rich biological communities and includes resources of enormous potential benefit. The warm Agulhas and cold Benguela Current systems respectively support subtropical and temperate communities that include unique assemblages of marine life. Consequently, South Africa hosts many endemic marine taxa, which occur only in South Africa and it is therefore our sole responsibility to secure the future of these species. The EEZ constitutes an important basis for economic growth and development. Offshore biodiversity provides essential goods and services and is the basis of several commercial fisheries.

Globally, pressure on offshore resources is increasing with technological advances and diminishing inshore resources resulting in the expansion of activities into deeper water (Davies *et al.* 2007). There is a growing recognition of the impacts of offshore activities on the sea bed and entire marine ecosystems with many studies demonstrating long-term impacts on biodiversity (Neff *et al*. 1987; 1989; Hyland *et al.* 1994; Markussen 1994; Olsgard & Gray 1995; Goñi 1998; Jennings & Kaiser 1998; Watling & Norse 1998; Gislason *et al*. 2000; Roberts 2002; Kaiser *et al*. 2003; Ministry of Environment, New Zealand 2005; Kaiser *et al*. 2006; Queiros *et al*. 2006). There is also an emerging awareness of the social and economic costs of the failure to manage ecosystems in a sustainable manner. In many areas, offshore resources are overexploited and the global status of fish stocks

is of concern. Climate change has introduced further uncertainty and highlights the need to secure resilience by maintaining biodiversity at genetic, species and ecosystem levels. Action is needed to avert the progressive decline of offshore environments and resources, allow recovery of impacted habitats and stocks and to prevent economic, social, scientific and biodiversity losses that would reduce options for future use.

There is a global movement towards a more holistic management approach that considers entire ecosystems, multiple sectors and many management objectives. MPAs and other spatial management measures are important tools in ecosystem-based management and in the advancement of a multisectoral approach towards integrated management. Representative MPA networks have been identified as a critical component of offshore biodiversity conservation and sustainable offshore resource use (ANZECC 1999; United Nations 2002; Secretariat of the Convention on Biological Diversity 2004). MPAs can play an important role in the maintenance of marine biological diversity, including the capacity for ecological change, and ecological processes. They are essential in the protection of ecosystem components that are not protected by other forms of fisheries or environmental management. MPAs also complement traditional fisheries management measures and have provided benefits to fisheries in many cases (Gell & Roberts 2003). MPAs are often considered to be robust in the face of resource assessment uncertainty, management errors and ecological, climatic and social change. Without MPAs, proper assessment of human impacts, monitoring of change and understanding of marine biodiversity is very difficult if not impossible (Secretariat of the Convention on Biological Diversity 2004).

There are many studies that demonstrate the benefits of MPAs. These include increased abundance, body size, biomass and reproductive output of some harvested species, increased biodiversity, recovery of impacted habitats, social and economic benefits and an improved understanding of marine biodiversity (Roberts & Hawkins 2000; NRC 2001; Halpern & Warner 2002; Gell & Roberts 2003; Halpern 2003; Secretariat of the Convention on Biological Diversity 2004). These benefits have been demonstrated for many types of biota with different life history, movement and behavioural characteristics, for different habitats and different geographic regions (Gell & Roberts 2003). MPAs are effective in the conservation of vulnerable offshore habitats such as cold-water coral reefs (Davies *et al*. 2007). There are fewer well-documented case studies of offshore MPA benefits for fished species but some research does show stock recovery for some species (Murawski *et al*. 2000, 2004, 2005; Fisher & Frank 2002). However, in most cases, benefits cannot be ascribed to MPAs alone as other management measures (e.g. effort reduction) were instituted simultaneously. It is further recognized that unplanned and poorly considered MPAs may not achieve the benefits listed above, and in some cases may exacerbate existing problems (Parrish 1999). This underlines the need for careful evaluation.

International and national context

South Africa is committed to the protection of marine biodiversity, ecological integrity and the sustainable use of resources. These commitments have been ratified under several international conventions and agreements and are embedded in national legislation and policy.

Convention on Biological Diversity (CBD) 1992

South Africa is a signatory of the CBD which requires member states to establish a system of protected areas or areas where special measures need to be taken to conserve biological diversity and to develop guidelines for the selection, establishment and management of these areas. The Offshore MPA Project aims to fulfil these international obligations for South Africa's EEZ. A specific protected area target of 10 % of the world's ecoregions effectively conserved within MPAs by 2012 was set at the CBD (Secretariat of the Convention on Biological Diversity 2004).

World Summit on Sustainable Development (WSSD) 2002

South Africa hosted the 2000 WSSD and publicly committed itself to the Johannesburg Plan of Implementation that included a number of global targets for the management of our oceans. This includes the implementation of the ecosystem approach in managing fisheries and the establishment of representative marine protected area networks by 2012 (United Nations 2002). Offshore MPAs in South Africa are not only essential in meeting protected area targets but are also recognized as a critical component of ecosystem-based management.

World Parks Congress 2003

The 2003 World Parks Congress, also hosted in South Africa, built on the international commitment made by the WSSD Plan of Implementation and set a specific goal as to the amount of area that needed to be set aside in MPAs. The World Parks Congress recommended that at least 20–30 % of each habitat type should be included within a global system of effectively managed, representative networks of marine and coastal protected areas by 2012.

Other international commitments and opportunities

In terms of the United Nations Convention on the Law of the Sea, South Africa has the responsibility of protection and ecologically sustainable management of the area within our Exclusive Economic Zone (EEZ) on the basis of best available scientific information. South Africa also has obligations under other ocean-related conventions and cooperative arrangements dealing with fisheries, pollution, shipping, metereology, and the conservation of migratory species. Fulfilment of our international obligations in the protection and sustainable use of our marine habitats and resources is also important in meeting the requirements of reputable eco-labelling schemes for fisheries products. Eco-labelling is increasingly becoming the norm for access to the most developed markets and in order to maintain market options for South African fisheries products; eco-labelling requirements should also be considered in MPA planning.

National law and policy

The Offshore MPA project team has conducted a legal review to guide the proclamation and implementation of an effectively managed offshore MPA network. This review includes the following:

- reviews all Acts and regulations (including relevant international law) that could be used to accomplish complete or partial protection of offshore habitats in South Africa's EEZ from environmental impacts associated with the fishing, mining and oil and gas industries;
- describes each legal mechanism in terms of the goal of the legislation, the underlying policy, the jurisdiction over each marine activity, the strength and generality of protection, the powers of the minister(s) and departmental officials, procedural requirements (including consultation, rights to appeal, reporting), the competency of exemptions, the implications for funding and other relevant information;
- considers whether alternate mechanisms are mutually exclusive, or complementary, and considers the extent to which existing plans, policies, declarations or holding of rights precludes or affects the application of any mechanism.

The key legislation that has been considered in the planning phase of the Offshore MPA project includes The Marine Living Resources Act, The Protected Areas Act and the Biodiversity Act.

The Marine Living Resources Act of 1998

Existing MPAs, closed areas and other protected marine habitats have been proclaimed under the Marine Living Resources Act (MLRA). This legislation exists to provide for the conservation of the marine ecosystem, the long-term sustainable utilization of marine living resources and the orderly access to exploitation, utilization and protection of certain marine living resources in a fair and equitable manner to the benefit of all the citizens of South Africa. To date all MPAs have been proclaimed under section 43 of this Act although some MPAs have dual proclamation in other acts. World Heritage Sites and National Parks have also been proclaimed under the World Heritage Act and the Protected Areas Act respectively in addition to the MLRA. The MLRA also provides for closed areas and Fisheries Management Areas under Section 77 and 15 respectively. The former allows for the prohibition or restriction of fishing in these areas and the latter is designed for the management of particular species.

National Environmental Management: Protected Areas Act 57 of 2003

The Protected Areas Act provides for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes, for the establishment of a national register of all protected areas, for the management of those areas and for intergovernmental cooperation and public consultation in matters concerning protected areas. To date, no MPAs have been proclaimed under this Act but some management agencies of some existing MPAs have motivated for a dual proclamation under this act along with the MLRA.

National Environmental Management: Biodiversity Act 10 of 2004

The National Environmental Management: Biodiversity Act (hereafter referred to as the Biodiversity Act) governs the management of biodiversity and indigenous biological resources and gives effect to the ratified International Convention on Biological Diversity (CBD). South Africa has developed a National Biodiversity Framework (NBF) to:

- provide for an integrated, co-ordinated and uniform approach to biodiversity management;
- identify priority areas for conservation action;
- identify priority areas for establishment of protected areas (DEAT 2007).

This project addresses offshore components of South Africa's National Biodiversity Framework (currently in final draft form) and its supporting documents, the National Biodiversity Strategy and Action Plan (NBSAP) (DEAT 2005), and the National Spatial Biodiversity Assessment (NSBA) (Driver *et al.* 2005). The NBSAP is a twenty-year strategy, developed as part of South Africa's commitments to the CBD and has the overall goal of the conservation and management of terrestrial and aquatic biodiversity to ensure sustainable and equitable benefits to the people of South Africa, now and in the future (DEAT 2005). One of the five strategic objectives is to establish a network of conservation areas that conserves a representative sample of biodiversity and maintains key ecological processes across the landscape and seascape. The NSBA provides a spatial picture of the location of South Africa's threatened and under-protected ecosystems, and focuses attention on geographic priority areas for biodiversity conservation (Driver *et al.* 2005).

South Africa's first NSBA was published in April 2005 and will be updated every five years. The NSBA is based on the systematic approach to biodiversity planning (see page 11), which is driven by two principles: 1, the principle of *representation*, or the need to conserve a representative sample of biodiversity pattern, including ecosystems, habitats and species; and 2, the principle of *persistence*, or need to conserve ecological and evolutionary processes that allow biodiversity to persist.

The draft NBF sets a target of 20 % of South Africa's marine territory under protection by 2012. The marine component of the NSBA highlighted offshore protection as a priority action (Lombard *et al.* 2004). Limitations of the marine component of the 2005 NSBA included limited industry stakeholder input and insufficient existing information, time or funds to accurately map marine activities. Spatial information for ecological processes could also not be incorporated within the limited time frame. The SANBI WWF Offshore MPA project will address these gaps for offshore habitats.

Objectives

The broadly accepted objectives of the Offshore MPA project are the establishment of an ecologically representative network of effectively managed MPAs that include all marine habitat types in all bioregions of South Africa:

- to contribute to the long-term persistence of offshore biodiversity and its underlying processes;
- to contribute to sustainability of fisheries and ecosystem-based management of resources;
- to provide undisturbed areas for scientific study and long-term monitoring;
- to advance integrated spatial planning and management arrangements for the EEZ;
- to provide for appropriate non-consumptive use of the offshore marine environment.

The planning area

The planning area for the Offshore MPA project extends from the 30 m depth contour out to the 200 nautical mile boundary of the South African Exclusive Economic Zone (EEZ) (Figure 1). The EEZ area surrounding the Prince Edward Islands is not included, as a detailed biodiversity plan and proposed MPA network have been developed for that area (Lombard *et al*. 2007). Formally agreed lateral maritime boundaries with Namibia and Mozambique are still needed but will not delay this project, which will use the same boundaries as the National Spatial Biodiversity Assessment (Lombard *et al.* 2004). It is recognized that South Africa is preparing an Extended Continental Shelf claim that may increase marine territory off the west, south and east coast and the Prince Edward Islands. In these new areas, rights are limited to living and non-living resources on and under the sea floor. Planning for these areas will not be included in the Offshore MPA project but will be initiated after claims have been submitted in 2009/10.

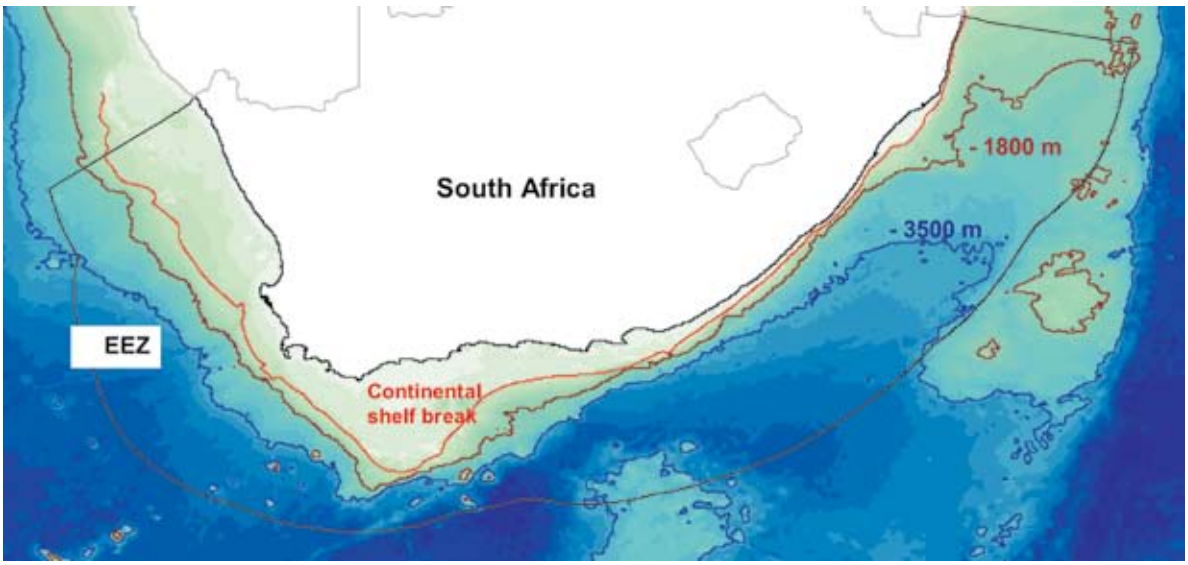

FIGURE 1.—The South African EEZ showing planning domain, Lombard *et al.* (2004).

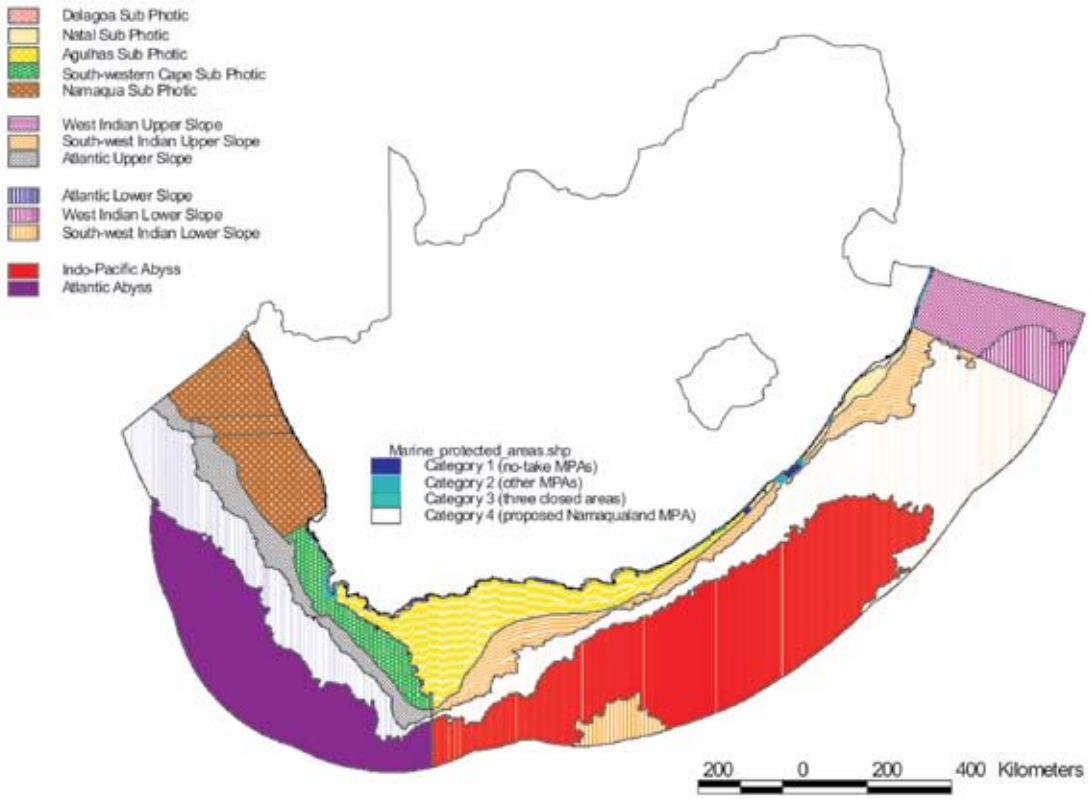

FIGURE 2.—Offshore biozones in South Africa as defined by the National Spatial Biodiversity Assessment. Figure derived from Lombard *et al.* (2004).

Offshore biozones, habitats and biodiversity

The offshore environment of South Africa was classified into 13 biozones in the National Spatial Biodiversity Assessment (Figure 2). This reflects the biogeography of South Africa and the different depth strata of the offshore environment. South Africa has high biological diversity in the marine environment because of the diverse large-scale oceanographic and topographic setting. Our EEZ spans the Agulhas and Benguela Current systems with cool and warm temperate and tropical bioregions. Three main topographic environments occur offshore: the shelf, the slope and the abyss. The shelf is divided into several other substrata including the intertidal, shallow sub-photic (to a depth of 10 m), deep photic (10–30 m) and the sub-photic zone. The sub-photic component of the shelf is the area from the 30 m contour to the shelf break. The shelf break is the division between the continental shelf and the continental slope which occurs at different depths in different areas as it is defined by the slope angle. It varies from about 400 m in the Namaqua bioregion, to 200 m in the Agulhas bioregion, 100 m off Natal, and is as shallow as 50 m in the Delagoa bioregion. The upper and lower slope separate at 1 800 m and the abyssal zone extends from a depth of 3 500 m and below (Lombard *et al.* 2004). Biologically, more homogeneity was assumed around the South African coast at the greater depth, and consequently fewer bioregions were defined further offshore. The shelf and slope may

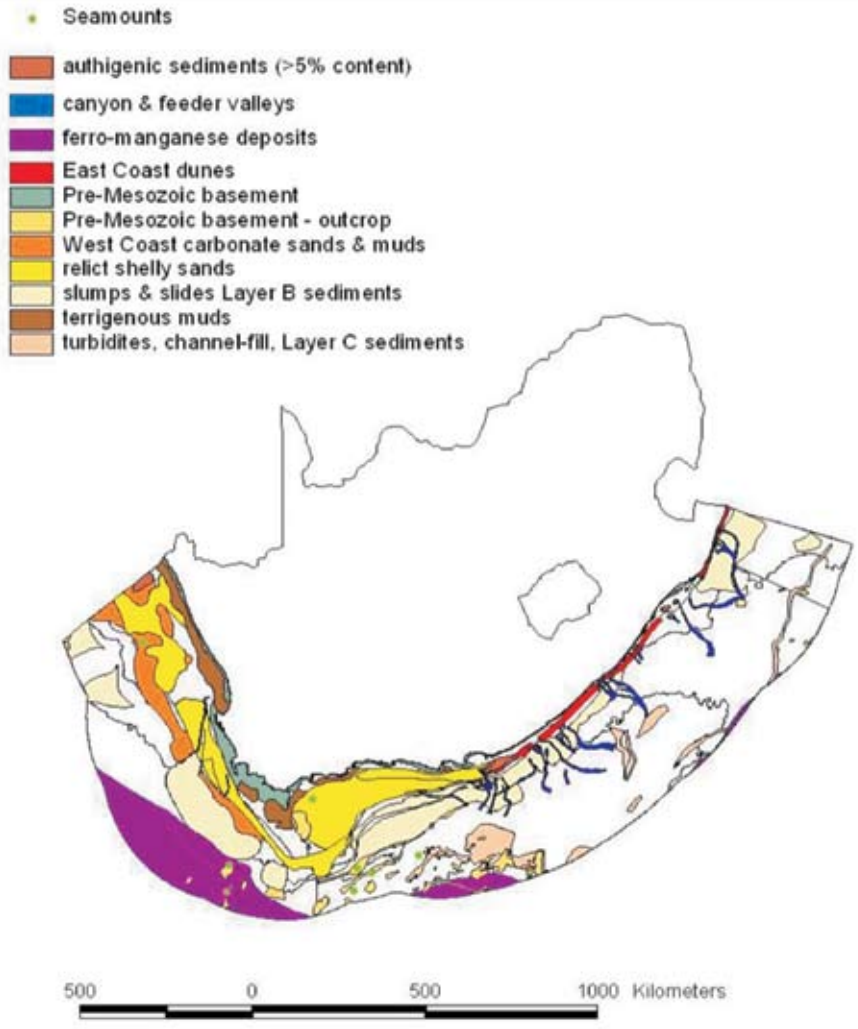

FIGURE 3.— Offshore habitat types mapped at a finer scale than biozones in the National Spatial Biodiversity Assessment. These habitats were assumed to act as biological pattern surrogates with each habitat assumed to support distinct biological assemblages. Most habitats received a target of 20 % of their total area in biodiversity plan. Some habitats had higher targets due to assumed higher biodiversity. Authigenic sediments, terrigenous muds and untrawlable grounds on Agulhas Bank received a target of 30 % and submarine canyons were targeted at 50 % of their area within each bioregion. Figure derived by Kerry Sink from Dingle *et al*. (1987).

need to include other depth strata that may support distinct biodiversity.

The offshore environment of South Africa has a complex geology. Offshore habitats in the EEZ include shelf habitats such as deep reefs, banks that support deep-water coral and sponge communities and unconsolidated sediments of sand, gravel, mud and various intermediate and mixed sediments (Figure 3). The shelf break represents a distinct habitat and in areas the shelf is incised by submarine canyons that appear to constitute a distinct habitat type. There are several seamounts both within and outside (high seas) the EEZ. The offshore environment has significant mineral and petroleum resources including diamonds and oil and gas condensates. The latter are converted to petrol, diesel, paraffin and petrochemicals.

Different offshore habitat types support unique assemblages of marine life and in many cases species of considerable commercial importance. These habitats were assumed to act as biological pattern surrogates with each habitat assumed to support distinct biological assemblages. Most habitats received a target of 20 % of their total area in biodiversity plan. Some habitats had higher targets due to assumed higher biodiversity. Authigenic sediments, terrigenous muds and untrawlable grounds on Agulhas Bank received a target of 30 % and submarine canyons were targeted at 50 % of their area within each bioregion.

Muddy areas of the shelf support sole fisheries and the shelf break on the west and southern Cape coasts support trawl and demersal longline fisheries. These sectors target the Cape hakes and a bycatch that includes kingklip, monk, jacopever, angelfish and other species. The deep reefs are the habitat of many commercial linefish species including several endemic and overexploited species. Rocky areas of the upper slope support rock lobster trap fisheries and muddy offshore banks on the east coast support a crustacean trawl fishery. Seamounts are productive habitats that support diverse fish communities that include valuable commercial species such as Orange Roughy. Swordfish move between deep rocky areas and the surface areas of the open ocean. The pelagic environment supports fisheries for sardine, anchovy, horse mackerel and tuna.

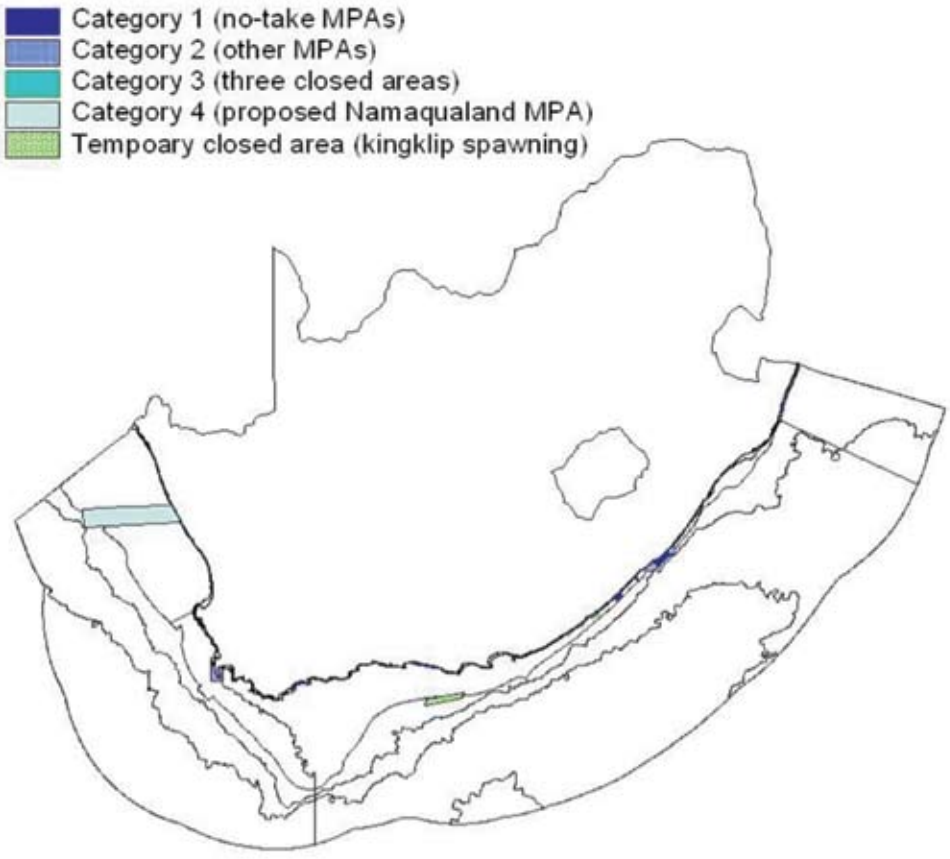

FIGURE 4.—South Africa's existing and proposed MPA network. Offshore habitats are poorly represented. Figure derived from Lombard *et al.* (2004).

Activities in the offshore environment of South Africa

The South African EEZ provides considerable economic opportunities and supports several commercial activities. The EEZ connects South Africa to the rest of the world both through shipping and undersea telecommunication cables. Living and non-living resources provide economic and social benefits through fishing, mining and petroleum activities. Offshore environments have also been used for dumping of spoil, refuse and even ammunition. Emerging offshore activities elsewhere include offshore aquaculture, alternative energy generation projects such as offshore wind farms and mining for resources that are diminishing on land. An overview of existing activities in our EEZ has been undertaken to provide profiles for various offshore sectors in support of the planning phase of the Offshore MPA Project (Atkinson & Sink 2008).

The following sectors are being engaged in the Offshore MPA project:

- Shipping
- Submarine cables
- Petroleum activities
- Mineral prospecting and mining: diamonds, phosphate, titanium and manganese nodules
- Commercial fishing: hake deep-sea trawl; hake inshore trawl; hake long-lining; hake handline; traditional linefish; tuna pole; large pelagics; small pelagics; midwater trawl; squid; crustacean trawl; West Coast rocklobster (offshore); South Coast rocklobster trap fishery; Natal deep-water rocklobster; exploratory fishing; recreational fishing; dumping of waste
- Naval activities
- Scientific research
- Non-consumptive activities such as bird and shark tourism

The status quo: current spatial protection of marine biodiversity in South Africa

South Africa's current EEZ extends to 200 nautical miles off the coastline. South Africa has 19 MPAs and three closed areas that are currently under consideration for proclamation as MPAs (Figure 4). The following categories of MPAs were used in the National Spatial Biodiversity Assessment and are reflected in Figures 4 and 5:

Category 1: no-take MPAs (MPAs in which no marine living resource extraction is permitted);

Category 2: other MPAs (MPAs in which some extraction is permitted);

Category 3: closed areas;

Category 4: proposed MPA (the proposed Namaqualand MPA).

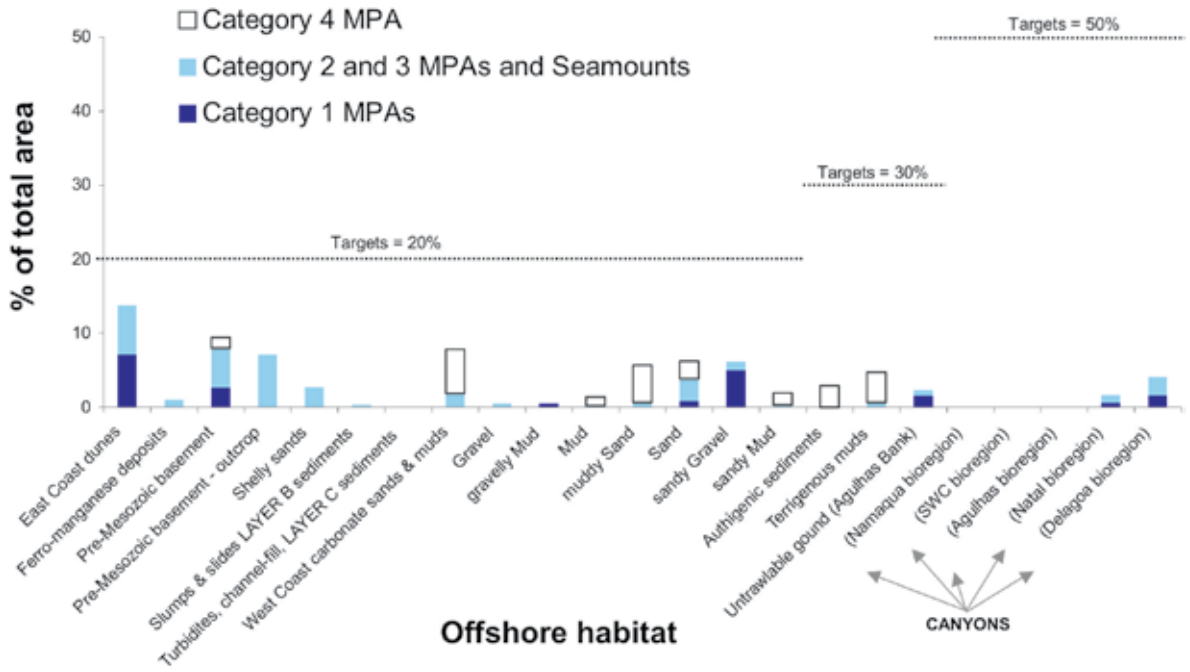

FIGURE 5.—Representation of offshore habitat types in South Africa's current and proposed MPAs. Figure from Lombard et al. (2004).

The National Spatial Biodiversity Assessment showed that only 0.16 % of South Africa's current EEZ is fully protected in MPAs. The report highlighted that entire depth strata (the lower slope and abyss), one bioregion (Namaqua) and 11 biozones are without any form of protection (Lombard *et al*. 2004 and Figure 4).

The east coast is better represented in the MPA network than the west coast with the entire Namaqua bioregion failing to be included within any MPAs (Figure 4). The proposed Namaqualand MPA would have been the first MPA in the Namaqua bioregion but this MPA was contested because of diamond, oil, gas and commercial fishing interests in the area. Many stakeholders called for participation in the MPA planning process. Most MPAs extend between 500 m and three nautical miles from the high tide mark. The exceptions are three MPAs in the Eastern Cape; the Dwesa-Cwebe and Hluleka MPAs extend to six nautical miles seawards of the high-water mark and the Pondoland MPA extends to the 1 000 m isobath. There is one temporary closed area on the shelf of the Agulhas bank. This protects seasonal spawning aggregations of kingklip but does not protect benthic biodiversity. The proposed Namaqualand MPA was planned to extend to the 1 000 m contour.

Many offshore marine habitat types are not represented anywhere in the current South African system of MPAs and for those that are represented in MPAs, all are below the proposed targets set for protection (Figure 5). The east coast bias and lack of offshore protection means that South Africa's existing MPA network cannot be considered to be a truly 'representative MPA network' as stipulated by the CBD, the World Summit for Sustainable Development (WSSD) Plan of Implementation, and the World Parks Congress recommendations. As such, the development of an Offshore MPA network will contribute greatly towards South Africa meeting its international obligations and commitments under the CBD, the WSSD Plan of Implementation and the World Parks Congress, as well as national commitments under the Biodiversity Act.

The lack of any fully protected offshore habitats has hampered scientific studies aimed at assessing impacts of offshore activities on benthic habitats and offshore ecosystems. This has affected studies and impact assessments in the fishing, mining and petroleum sector. Offshore MPAs have also been identified as an important component of the ecosystem approach to fisheries management, and spatial management is a requirement for some eco-labelling initiatives to certify fisheries products from well-managed, sustainable fisheries. Offshore MPAs should be designed to provide benefits to offshore fisheries, contribute to the ecosystem approach to fisheries management, facilitate eco-labelling opportunities for South African fisheries products, safeguard offshore biodiversity and serve as scientific reference points.

Our planning approach

The implementation of an effective, representative protected area network is a medium-term objective of the Department of Environmental Affairs and Tourism. International commitments have been set for 2012. In South Africa, offshore biodiversity is poorly known and poorly protected. A systematic deep-water survey was identified as a priority action in the National Spatial Biodiversity Assessment. Biodiversity patterns from the NSBA will be refined and current research on offshore biodiversity (Charlie Griffiths, John Field and students, University of Cape Town), will drive our planning process. Surrogates for biodiversity pattern may still be used, such as sediment type, depth zones and bioregional differences. We expect that offshore industries could contribute to the auditing of biodiversity, ground-truthing of habitat types, testing of biodiversity surrogates and identification of vulnerable habitats.

The systematic planning approach is flexible and can be adapted, as understanding of offshore biodiversity patterns and the processes that underlie and maintain this biodiversity improve. Initial steps will be focused on priority areas identified in the NSBA. As an example, the Namaqua bioregion has no protection of marine and coastal habitats and has been flagged for urgent conservation action. Other priorities include the Agulhas bank and offshore areas in the Western Cape. Initial closures will be monitored both in terms of impact on industry and recovery of biodiversity. The lessons learned from these early actions will inform the long-term approach. Opportunities to boost offshore protection in the short term include the extension of some existing MPAs further offshore, protection of heavily impacted habitats to allow recovery and protection of known spawning, breeding, nursery, or critical feeding areas of important species.

Key elements of our planning approach include:

- 1, systematic planning based on best available existing scientific and socio-economic research;

- 2, integrated spatial planning framework with shared spatial data between sectors and collaboration between and within government departments;
- 3, application of other experience of MPAs and spatial planning;
- 4, stakeholder involvement in the planning and implementation process;
- 5, consideration of appropriate trade-offs among the interests of biodiversity and different user groups;
- 6, raising awareness of MPA benefits, design and supporting science;
- 7, identifying and addressing implementation and management concerns including compliance and monitoring for Offshore MPAs;
- 8, ongoing alignment with policy and legislation.

1. Systematic planning based on best available existing scientific and socio-economic research

Systematic biodiversity planning is a branch of conservation planning that identifies options and priorities for conservation in a spatially explicit fashion (Pressey *et al.* 1993; Margules & Pressey 2000). This approach has been implemented to assess biodiversity status and identify priority areas for protection of terrestrial and aquatic ecosystems in South Africa (Figure 6). The systematic planning approach is entrenched in our National Biodiversity Framework, national strategic plans and national and provincial biodiversity assessments and plans. This approach (Pressey *et al.* 1993; Margules & Pressey 2000; Driver *et al.* 2003; Lombard *et al.* 2007) involves several steps that are outlined below.

1.1. **Biodiversity patterns** are mapped so that areas with similar (or distinct) biodiversity are spatially defined. Biodiversity is classified with respect to biogeography and physical habitat. Biodiversity pattern maps usually represent a combination of bioregions, habitats and species ranges. The NSBA presented the first national classification of marine habitats (Lombard *et al*. 2004).

1.2. **Ecological processes** that maintain biodiversity also need to be incorporated into biodiversity plans. Processes that are often considered in terrestrial biodiversity plans include resilience to climate change, pollination and migration corridors. In the ocean, important processes that need to be taken into account include oceanographic features such as upwelling cells, areas where fish or marine mammals are known to aggregate for breeding or feeding, fish nursery areas and migration routes. Important migration routes in South Africa include whale migration paths and the sardine run. Incorporation of processes in our plan is very important if MPAs are to deliver benefits to fisheries. The NSBA did not incorporate any process data or targets.

1.3. A key step in the systematic biodiversity planning process is the setting of **targets**, design criteria and spatial configurations for the biodiversity plan. Targets should be set for biodiversity patterns and ecological processes. Targets usually include percentages of bioregions or habitats, a number of features (such as reefs, canyons or seamounts) and the maintenance of particular processes. Design criteria and spatial configurations are set to constrain the planning design within an implementation framework. They can include physical, social and economic criteria such as simplifying MPA boundaries to fit in with existing spatial boundaries, minimizing impacts on users where there are options to meet biodiversity targets and minimizing the area required to meet targets. We note that specific targets can be difficult to defend on scientific grounds; but they have practical and political value.

1.4. The next step is to identify and map **activities** that may place pressures on biodiversity in the planning area. In terrestrial systems, agriculture, development and mining are examples of pressures on biodiversity. In the marine environment, key activities include different types of fishing, mining, pollution and climate change.

1.5. Systematic biodiversity plans use a spatial framework to **overlay activities on biodiversity patterns and processes**. We attempt to meet targets for patterns and processes in areas where there are no competing pressures.

1.6. The final step involves the **identification of spatial and other management interventions** to ensure target achievement (Figure 6).

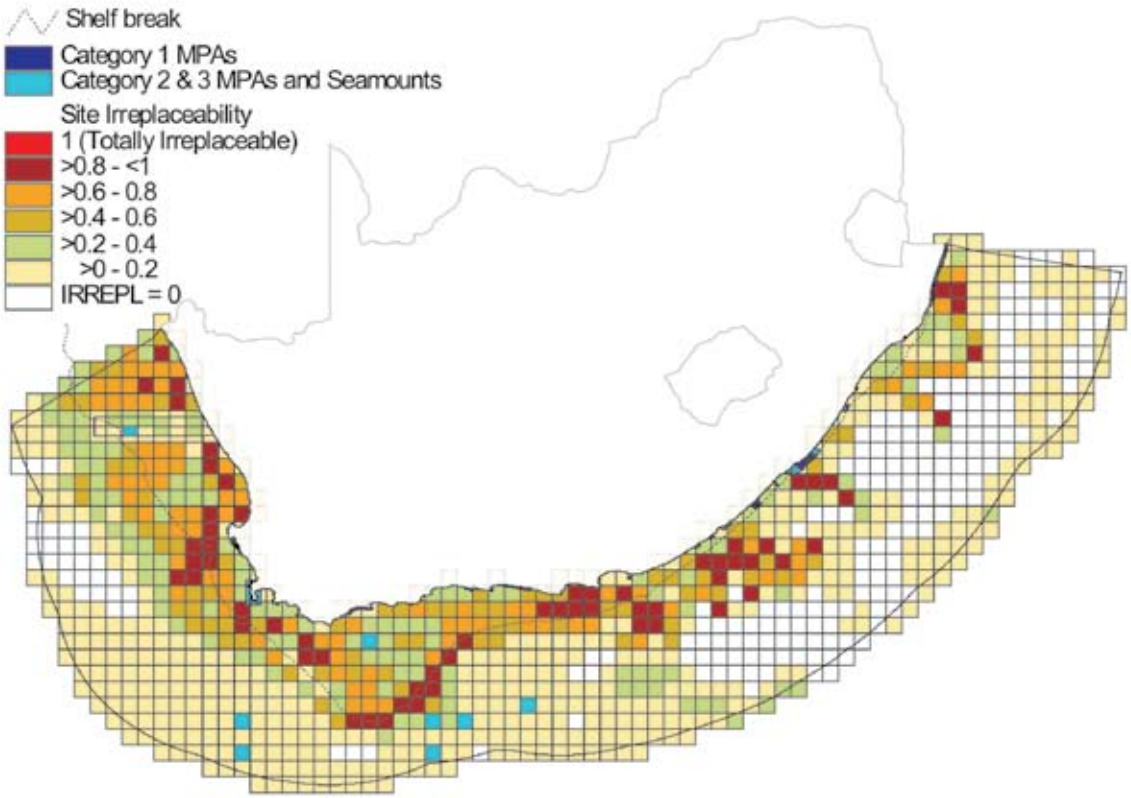

FIGURE 6.—An example of an output from a biodiversity planning analysis. This example is from the National Spatial Biodiversity Assessment (Lombard *et al*. 2004). Proposed priority areas for spatial protection are shown in dark brown (high irreplaceability) and existing MPAs and seamounts (proposed for protection) are shown in blue. This analysis used targets of 20 % for most habitat types but 30 % for muds, 50 % for canyons and 100 % for seamounts. The 20 minute commercial fishing grid was used as a planning framework.

The inclusion of available science to guide the design of an MPA network has been identified as a critical component of the planning process. The effectiveness of any systematic biodiversity plan will rely on accurate data inputs grounded in the best available science. The Offshore MPA project team intends to draw extensively from existing and current research initiatives. A scientific workshop will be held to collate existing and new scientific information about offshore biodiversity pattern and process. Current initiatives with relevance to offshore MPA planning include studies on offshore biogeography, research focused on the impact of demersal trawling, studies on larval distribution, fish movement studies, work on the reproductive output of fish, and oceanographic studies with relevance to larval transport.

Key considerations for planning of MPAs with benefits for fisheries (Salm *et al*. 2000; Warner *et al*. 2000; Botsford *et al.* 2001; Beck 2003; Gell & Roberts 2003; Secretariat of the Convention on Biological Diversity 2004; Fernandes *et al*. 2005; Lundquist & Granek 2005; Botsford *et al.* 2007; Martin *et al.* 2007) include:

- dispersal of early life history stages of all marine taxa affected by fisheries;
- movement of later life stages;
- habitat configuration and habitat use by focal species;
- patterns of fishing and expected re-distribution of effort;
- distributional aspects of social costs and benefits;
- connectivity and networking between conservation areas.

2. Integrated spatial planning framework with shared spatial data between sectors and collaboration between and within government departments

The EEZ is an important area for many sectors and adequate planning is needed for future economic development and biodiversity conservation. Collaboration between and within different governance sectors is critical in the planning process. Fractured governance cannot achieve multiple management objectives and an integrated approach is essential in the advancement of ecosystem-based man-

agement. This project will use a Geographic Information System (GIS) with shared shape files that overlay spatial information from all sectors. This standard spatial information will be shared by the governance sectors for biodiversity conservation, fisheries, mining, petroleum activities, maritime transport and defence. This will ensure a more co-ordinated planning approach and will facilitate a more integrated spatial planning and management approach within our EEZ. Other assessments of MPAs in South Africa motivated for this type of approach (Attwood *et al.* 1997; Hauck & Sowman 2003; Lemm & Attwood 2003). Integrated management has been recognized as the most suitable framework for addressing human impacts on marine and coastal biological diversity (Secretariat of the Convention on Biological Diversity 2004).

3. Application of other experience of MPAs and spatial planning

In the last two decades, many countries have recognized the need to establish MPAs either for basic conservation goals and/or to support the management of dwindling fish resources. There has been a wide variety of approaches and experiences in the application of MPAs and other forms of spatial management. Many lessons from these initial attempts are now described in scientific literature and technical guides and these provide a valuable resource for planning South Africa's protection of offshore resources (Roberts & Hawkins 2000; Salm *et al*. 2000; Gell & Roberts 2003; Secretariat of the Convention on Biological Diversity 2004). MPAs are not new to South Africa, and many local lessons have been learnt from conservation in the coastal zone (Attwood *et al.* 1997; Lemm & Attwood 2003). Whereas some of these experiences are useful for offshore planning, the engagement of big industry in the protection of poorly known habitats provides a new challenge.

We have drawn from international and local expertise during this initial project development phase. A literature review is under way to assess experiences in the design and successes and failures of MPAs and other spatial regulatory mechanisms in the offshore environment.

Key lessons for successful MPA design and implementation (ANZECC 1998; Salm *et al*. 2000; Beck 2003; Fernandes *et al.* 2005; Lundquist & Granek 2005; Secretariat of the Convention on Biological Diversity 2004; Field *et al*. 2006; Botsford *et al.* 2007; Martin *et al*. 2007; Pomeroy *et al.* 2007) include:

3.1. broad agreement from stakeholders and government that spatial protection is required;

3.2. recognition of shared responsibilities by stakeholders and a willingness to share benefits and absorb MPA impacts in an equitable manner;

3.3. clear goals and objectives for any MPA;

3.4. good science, a long-term perspective and application of the precautionary principle;

3.5. equality in planning and the consideration of impacts on stakeholders;

3.6. a competent, strong and willing government;

3.7. enabling policy and legislation;

3.8. harmonizing MPAs with existing fishery management approaches (such as stock assessments, effort management and rights allocations);

3.9. securing sufficient financial, legal and human resources for effective management;

3.10. adequate evaluation of effectiveness and adaptive management.

Our experience in South Africa is that many of these recommendations have not been applied in the past and that a revision of our approach to designing and managing protected areas is required. In particular there has been very little consistency in the way that stakeholders were consulted (Attwood *et al.* 1997; Beaumont 1997). Another concern for the present project is the difficulty of ensuring effective interdepartmental collaboration at the level of decision-making. Other aspects that need to be addressed are the provision of adequate resources to ensure that protected areas can attain their objectives. Weaknesses with existing MPAs in South Africa almost always include inadequate managerial capacity, poor awareness amongst stakeholders and poor compliance (Lemm & Attwood 2003). It is clear that a multisectoral approach by government that includes better communication, participatory approaches and improved surveillance and enforcement needs to be assured.

4. Stakeholder involvement in the planning and implementation process

A key element in successful MPA design is early involvement and adequate participation by both governance and industry stakeholders (Beck 2003; Lundquist & Granek 2005; Martin *et al*. 2007; Pomeroy *et al.* 2007). A stakeholder or stakeholder group is 'any individual or group who may be involved in,

affected by, or express a strong interest in, the management of a particular resource or area' (Claridge & Claridge 1997). The Offshore MPA planning team is committed to the provision of sufficient information to all stakeholders to allow informed input on MPA identification and implementation. Stakeholder input is critical to the MPA planning process and stakeholder objectives, ideas and concerns need to be understood from the outset of the project. Involving all stakeholders in the planning phase forms the basis for collaborative implementation.

We invited stakeholders to submit comments on our proposed objectives and approach. A stakeholder workshop was held on 22 June 2007 to finalize the broadly accepted guidelines presented in this document. It is important that stakeholders engage constructively in the identification of design criteria and identify spatial configurations that may need to be considered later in the project. Stakeholders can also give valuable input into the mapping of offshore biodiversity and the understanding of the processes that maintain this diversity. Vulnerable habitats, areas in need of recovery, and key areas of unique biodiversity need to be identified. If MPAs are going to have fishery and other biodiversity benefits, it is particularly important that key process areas such as feeding, breeding and nursery areas are included in the biodiversity plan. In addition, stakeholders can work towards identifying key areas for potential protection and areas that may have less impact on their industry. In many cases, industry has better information about offshore biodiversity and ecological processes than scientific or biodiversity sectors. This project represents an opportunity for offshore industries to demonstrate their commitment to biodiversity conservation.

Other planned opportunities for stakeholder input will include:

- a scientific workshop on 27 July 2007 to collate scientific information relevant to offshore MPA design;
- biodiversity and process mapping interviews and workshops in different bioregions;
- target-setting activities such as workshops, meetings and correspondence;
- a stakeholder workshop in 2008 to review project progress.

Further proposed future opportunities for stakeholder comment may include:

- review of report on management planning for Offshore MPAs in 2008/9;
- review of draft Offshore MPA project final report in October 2009;
- written submissions after government notices of intention to declare new MPAs;
- engagement with biodiversity planners for National Spatial Biodiversity Assessment 2010.

In addition, stakeholders may request support documents or other information from the project team and may attend workshops and planning meetings. Other documents in preparation include two support documents: User profiles for offshore industries; and A legislative review for establishing offshore marine protected areas within the South African EEZ.

5. Consideration of appropriate trade-offs among the interests of biodiversity and different user groups

A key element in the Offshore MPA project is consideration of the effect of MPAs on stakeholders and the inclusion of socio-economic information (Pomeroy *et al.* 2007). This has relevance to all offshore sectors and underpins the stakeholder engagement process. Industry sectors are likely to have the best information for identifying priority areas for offshore activities as well as areas of less commercial interest. This is important in the consideration of MPA impacts on industry and in identifying areas of least impact on stakeholders. Where options exist for biodiversity conservation, planning software can be programmed to minimize impacts on users. A key recommendation of marine biodiversity planners is to invest effort in finding areas of low conservation cost without compromising biodiversity (Beck 2003). Industry can also put forward both design criteria and configurations for inclusion in the systematic biodiversity plan.

6. Raising awareness of MPA benefits, design and supporting science

It has long been recognized that stakeholder support may be contingent upon the understanding of the scientific rationale behind MPAs and their design and access to scientific information that reflects the benefits and impacts of MPAs. The importance of raising awareness of this type of information was discussed at the stakeholder workshop and led to the inclusion of a deliberate strategy to

inform, educate and learn from industry sectors throughout the duration of the Offshore MPA project. The project team will make this kind of information available by undertaking and distributing reviews of relevant research, by making presentations at associations and other fora and by on-the-ground engagement with industry and recreational stakeholders.

7. Identifying and addressing implementation and management concerns including compliance and monitoring for Offshore MPAs

For effective implementation of a network of Offshore MPAs, implementation constraints and opportunities should be considered from the outset. The project team has commissioned a legislative review as described earlier. Management considerations also need to be taken into account during the planning phase. A separate body of work will be undertaken to examine constraints and opportunities to the management of Offshore MPAs and work towards Offshore MPA Management Plans. This will be initiated once the objectives and proposed approach have been agreed upon with stakeholders. We recognize that the proposed MPA network needs to be nested within a broader management framework for the South African EEZ. Management planning is likely to consider generic aspects of offshore MPA management and will focus on compliance and monitoring. At the first stakeholder workshop, several sectors made it clear that their support for MPAs is not unconditional and that planning for proper MPA enforcement and management is the most important factor in securing stakeholder participation. Fisheries stakeholder support is particularly dependant upon effective compliance planning and implementation for MPAs. This emerged in feedback from the demersal trawl, demersal longline, pelagic longline, tuna pole, linefish and squid sectors. Effective monitoring was identified as a further key element in the approach with a recommendation that adequate monitoring of the consequences of MPAs should be explicitly addressed.

8. Ongoing alignment with policy and legislation

Stakeholders agreed with the need for a legislative review, particularly government and industry representatives from the mining sector, who feel that MPAs should be proclaimed under the Protected Areas Act. The Marine Living Resources Act does not recognize mineral rights and the mining sector argues that it is therefore not appropriate for proclamation of MPAs that exclude mining activities. At the stakeholder workshop, several participants referred to the need for over-arching ocean policies such as the Oceans Policy of Australia. There was a recognition that the Offshore MPA project needed to move ahead but that it may contribute to or draw from the development of more cross-cutting marine policies when they develop. Alignment with new legislation and policies was therefore added to the MPA planning and implementation approach.

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