

DRAFT MANAGEMENT PLAN
FOR NAMQUA FOSSIL
FOREST MARINE PROTECTED
AREA (V2)

July 2020

Prepared by: _____

In collaboration with: _____

For: _____

Funded by: _____

July 2020

Authorization page

This Integrated Management Plan for the Namaqua Fossil Forest Marine Protected Area was drafted and recommended by:

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Approved by the Minister of Environment, Forestry and Fisheries

This Integrated Management Plan (2021-2031) for the Namaqua Fossil Forest Marine Protected Area, is approved in accordance with the National Environment Management: Protected Area Act, 2003 (Act 57 of 2003) and the Public Finance Management Act, 1999 (Act 1 of 1999).

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Draft Management Plan

NAMAQUA FOSSIL FOREST MPA

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Acknowledgements

Acronyms and Abbreviations

AIS	Automatic Identification System
CBD	Convention on Biological Diversity
DDG	Deputy Director General
DEA	Department of Environmental Affairs
DEFF	Department of Environment, Forestry and Fisheries
DMRE	Department of Mineral Resources and Energy
EBSA	Ecologically and Biologically Significant Area
EEZ	Exclusive Economic Zone
FAO	Food and Agriculture Organisation
IMO	International Maritime Organisation
LME	Large Marine Ecosystem
MCS	Monitoring Control and Surveillance
METT	Management Effectiveness Tracking Tool
MIMS	Marine Information Management System
MLRA	Marine Living Resources Act,
MPA	Marine Protected Area
MSC	Marine Stewardship Council
NEM: PAA	National Environmental Management: Protected Areas Act
NPAES	National Protected Area Expansion Strategy
OCIMS	Ocean and Coastal Information Management System
SAEON	South African Environmental Observation Network
SAPS	South African Police Service
VMS	Vessel Monitoring System

1. Introduction

With the current rate of global development, human well-being in both the developing and developed world is increasingly dependent upon the ability of marine and coastal ecosystems to provide a range of ecosystem services. Unless these uses are managed sustainably, the users of marine ecosystems can threaten, change and destroy the very ecosystems and services upon which they depend. In recent years there has been increasing recognition of the threats to marine species and ecosystems, and a growing focus on the conservation of marine biodiversity. The establishment of Marine Protected Areas (MPAs) is one of the key strategies by which the biodiversity and ecosystems of the world's oceans are effectively managed. MPAs can help protect marine habitats, species and representative communities as well as ecological systems and processes. MPAs can also assist in restoring the productivity of marine and coastal habitats, reduce further degradation and mitigate the impacts of climate change. In some cases, MPAs can also contribute to the socio-economic welfare of coastal communities. In recognition of the importance of the sustainable management and protection of marine and coastal ecosystems the Convention on Biological Diversity (CBD) Strategic Action Plan for Biodiversity 2011-2020 encourages all signatory nations to ensure that 'by 2020, 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well connected systems of protected areas.....' (Aichi Target 11).

Poor offshore protection levels were raised as a key concern in South Africa's first National Spatial Biodiversity Assessment (Driver et al. 2005). With a view to expanding the protected area estate of South Africa generally, the former Department of Environmental Affairs (DEA, now the Department of Environment, Forestry and Fisheries – DEFF) developed a National Protected Area Expansion Strategy (NPAES 2008), approved in 2009 and updated in 2016, which highlighted the lack of offshore MPAs. The offshore expansion of South Africa's MPA network was identified as a national priority and a collaborative five-year Offshore Marine Protected Area project was undertaken to support the identification of a network of potential offshore spatial management measures including MPAs. Using systematic conservation planning, ten priority focus areas were identified for offshore biodiversity protection (Sink et al. 2011). In 2014 the Marine Protection Services and Ocean Governance Lab of the Government's Operation Phakisa identified an urgent need for the protection of the ocean environment, and the offshore priority areas provided the basis for a proposed expanded MPA network consisting of 22 mainly offshore MPAs, which were gazetted for public comment in February 2016 (Operation Phakisa 2014). After stakeholder engagement and the public participation process, 20 of the 22 proposed MPAs defined in the Phakisa process were finally declared in May 2019, moving South Africa closer to the CBD Aichi 11 target of 10% marine protection. South Africa now has 42 MPAs, 41 within the ocean territory of mainland South Africa, and one very large MPA, the Prince Edwards Islands MPA in the Southern Ocean territory. Approximately 5.4% of the mainland's EEZ is now formally protected under MPA designation (Sink et al. 2019a).

The Namaqua Fossil Forest MPA was one of the 20 MPAs proclaimed in May 2019. The MPA lies south-west of Port Nolloth about 28 km offshore, in the 120 – 150 m depth range (Figure 1). It is one of South Africa's smaller offshore MPAs with an area of approximately 500 km² and provides protection to a unique fossilised yellowwood forest, habitat forming sponges and cold water corals.

It is a requirement of the National Environmental Management: Protected Areas Act (NEM:PAA, Section 39(2)) that each Protected Area has a management plan to guide the development and management of the area to meet the purpose for which it was declared. The purpose of the Namaqua Fossil Forest Draft Management Plan developed below is to ensure that the Namaqua Fossil Forest MPA has clearly defined management objectives and proposed activities to direct the protection and sustainable use of its natural resources over a ten year time horizon. The Draft Management Plan indicates where the MPA management authority should focus its efforts in the next ten years, providing a medium-term operational framework for the prioritized allocation of resources and capacity in the management, use and development of the MPA. The drafting of the Management Plan follows the Guidelines for Development of a Management Plan for a Protected Area in terms of NEM: PAA, and the Norms and Standards for the Management of Protected Areas in South Africa.

2. Legal Status

The Namaqua Fossil Forest MPA was proclaimed in 2019 in terms of sections 48A(2) and 86(1)(a), (b), (c) and (d) of the National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003), in Notice R767 of Government Gazette 42479. It was initially proposed and gazetted for public comment in February 2016 as a result of Operation Phakisa (2014).

2.1 Co-Management Agreement

The Namaqua Fossil Forest MPA has only recently been declared and currently there are no co-management arrangements in place. DEFF will need to engage with stakeholders to discuss any proposed co-management arrangements.

2.2 Location and total area

The Namaqua Fossil Forest MPA is located on the mid-shelf south-west of Port Nolloth about 28 km offshore in the 120 – 150 m depth range (Figure 1). It consists of a single rectangular block with dimensions of about 24 km x 20 km. The total area of the MPA is approximately 495 km² (Sink et al. 2019a). The area of the MPA includes the substrata, seabed, subsoil and water column within the boundaries defined in Section 7 (Zoning).

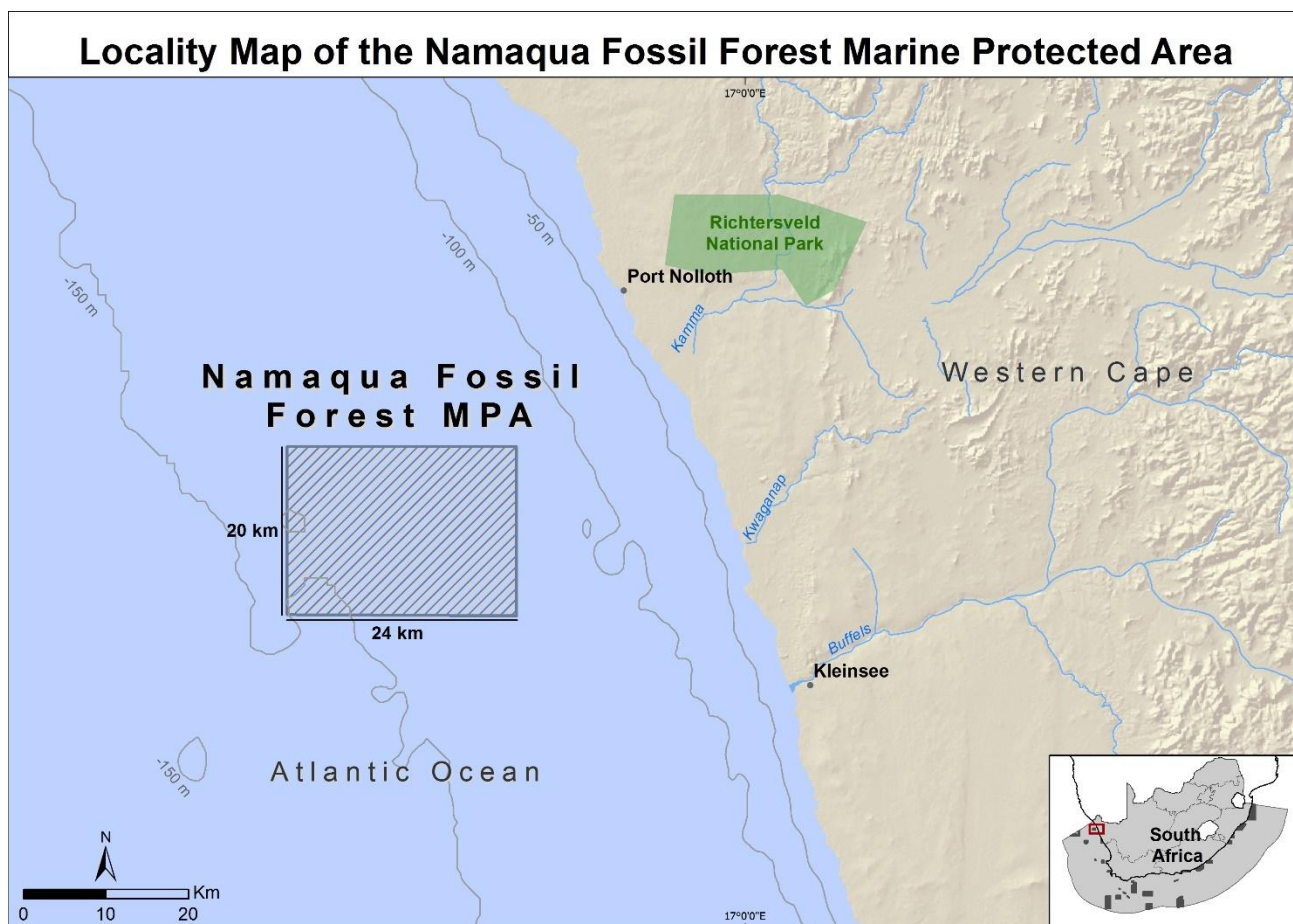


Figure 1. Location of Namaqua Fossil Forest MPA.

2.3 Contractual Agreements

The management of the marine environment and its living resources is a national responsibility undertaken in the first place by the Minister of the Department of Environment, Forestry and Fisheries (DEFF) who is mandated to give effect to Section 24 of the Constitution (a healthy environment, conserved and used sustainably). The Minister may delegate the management of the environment and protected areas to provincial or municipal authorities but with regard to the management of the Namaqua Fossil Forest MPA, management remains with the Department through its Branch Oceans and Coasts. Oceans and Coasts (OC) deals with the promotion, management and strategic leadership on oceans and coastal management in South Africa. The implementation of awareness, compliance as well as the management plan will be the responsibility of the Chief Directorate Specialist Monitoring Services. The Chief Directorate Monitoring Control and Surveillance (MCS) and the Directorate Fisheries Protection Vessels will play key roles in the management of the Namaqua Fossil Forest MPA.

The management authority will need to consult regularly with the Namaqua Fossil Forest Stakeholder Forum (see Section 4) or a broader multi-MPA equivalent to maintain an effective consultative management programme. An annual protected area management effectiveness audit would determine the state of management effectiveness and would inform any changes to the management plan.

2.4 Municipal Areas

The Namaqua Fossil Forest MPA is situated about 28 km offshore and has no municipal affiliations.

2.5 International Listing

The MPA is located within the proposed new boundaries of the Namaqua Fossil Forest ecologically or biologically significant marine area (EBSA) that covers 832 km². A smaller area that included only a small part of the southern edge of the MPA was previously recognised by the CBD Conference of the parties in 2014. Proposed revisions to the EBSA including boundary changes are currently under review (MARISMA Project 2020). The main justifications for the EBSA, in terms of scientific criteria established by the CBD, are the Uniqueness and Rarity of the area, with its fossilized yellowwood forest and cold water corals, its Vulnerability, fragility, sensitivity or slow recovery (presence of very slow growing cold water corals and habitat forming sponges) and its Naturalness (has not been mined, is in good ecological condition and is not subject to fishing).

3. Policy Framework

International laws and agreements as well as National Acts and Policies underpin the proclamation of Marine Protected Areas and direct the planning and operational management activities in the MPA. Section 41 of the NEMA: PAA requires that management plans be located within the context of a Coordinated Policy Framework. The legislative instruments outlined below provide the policy framework for Management Planning in the marine environment.

3.1 Global Legal Instruments

The United Nations Law of the Sea (UNCLOS) is a binding agreement which provides a comprehensive framework for the governance of the oceans and their resources. States have a general obligation to protect and preserve the marine environment. Coastal States can, with the consent of International Maritime Organisation (IMO) and without hampering the freedom of navigation of foreign vessels, adopt special measures to reduce the risk of ship-based pollution in specific designated areas.

The International Convention for the Prevention of Pollution from Ships (1973) and its 1978 Protocol together known as MARPOL 73/78) is the principal IMO treaty dealing with the threat of pollution from ships. In 1991 the IMO Assembly adopted Resolution A.720 (17), which allowed for the designation of *Particularly Sensitive Sea Areas* (PSSAs).

The Convention on Biological Diversity requires States to establish a system of protected areas, to develop, guidelines for the selection, establishment and management of protected areas and to develop national strategies, plans or programmes for the conservation and sustainable use of biological diversity.

South Africa is signatory to the *World Summit on Sustainable Development Plan of Implementation (2002)* and is thereby committed to establishing and implementing an ecosystem approach to fisheries (EAF) in the country by 2010.

The 2003 World Parks Congress set specific goals as to the extent of effectively managed, representative networks of marine and coastal protected areas.

The Agreement on the Conservation of Albatrosses and Petrels which South Africa has ratified, places obligations on states to protect habitats that are important for the survival of these species.

The FAO Code of Conduct for Responsible Fisheries is a voluntary instrument which sets international standards and behaviours for governments and other stakeholders to bring about responsible practices for the effective conservation, management and development of living aquatic resources.

The International Plan of Action to Prevent, Deter and Eliminate IUU Fishing is a voluntary instrument which that has been elaborated within the framework of the FAO Code of Conduct for Responsible Fisheries and provides a range of measures for combatting IUU fishing and promoting an integrated approach to address all impacts of IUU fishing.

The Global Record of Fishing Vessels, Refrigerated Transport Vessels and Supply Vessels is a compilation of certified information on vessels involved in fishing operations, providing a tool with which to combat IUU fishing.

The Port State Measures Agreement to which South Africa is a signatory includes all the internationally acceptable measures for port state control of fishing vessels in order to eliminate IUU fishing activities.

The African Integrated Maritime Strategy includes a plan of action to address IUU fishing and reinforces the call for cooperation across states, Regional Economic Communities and Regional Fisheries Management Organisations.

The Convention on International Trade in endangered Species of Wild Fauna and Flora (CITES) is an international agreement between Governments which ensures that the trade in wild plants and animals does not threaten their survival.

3.2 National legal instruments

The current legal framework that directs planning and operational management activities in MPAs is largely contained in the following legislation:

The Constitution of the Republic of South Africa Act, No. 108 of 1996. Section 24 provides the right to every person for a non-harmful environment and simultaneously mandates the government to protect the environment.

The National Environmental Management Act, No. 107 of 1998 (amended 2013) is the is the statutory framework to enforce Section 24 of the Constitution. It provides for co-operative, environmental governance by establishing principles for decision-making on matters affecting the environment.

The National Environmental Management: Biodiversity Act, No. 10 of 2004 (as amended 2014) provides for the management and conservation of South Africa's biodiversity within the framework of the National Environmental Management Act.

The National Environmental Management: Protected Areas Act, No. 57 of 2003 (as amended 2014) provides for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity. MPAs are declared under the National Environmental Management: Protected Areas Amendment Act, 2014.

The Marine Living Resources Act, No. 18 of 1998 (as amended 2014) provides for the conservation of the marine environment, the long-term sustainable utilisation of marine living resources and the orderly access to exploitation, utilisation and protection of certain marine living resources.

The National Heritage Resources Act, No. 25 of 1999 ensures that the national heritage is conserved and protected.

The Sea Birds and Seals Protection Act, No. 46 of 1973 provides for the protection of sea birds and seals.

The National Environmental Management: Integrated Coastal Management Act, No. 24 of 2008 establishes a system of integrated coastal and estuarine management in South Africa which includes norms, standards and policies, in order to promote the conservation of the coastal environment.

The Minerals and Petroleum Resources Development Act No 28 of 2002 (amended 2008) makes provision for equitable access to, and sustainable development of, the nation's mineral and petroleum resources.

The National Protected Areas Expansion Strategy (2016) seeks to achieve cost-effective protected area expansion for improved ecosystem representation, ecological sustainability and resilience to climate change.

The Disaster Management Act, No. 57 of 2002 provides for: an integrated and co-ordinated disaster management policy that focuses on preventing or reducing the risk of disasters.

The Marine Traffic Act 2 of 1981 empowers the Minister of Transport to make regulations that regulate marine traffic in the territorial and internal waters of South Africa.

The Maritime Zones Act 15 of 1994 asserts South Africa's right under the United Nations Law of the Sea Convention (LOSC) to a Territorial Sea (12 nautical miles from coast) and an Exclusive Economic Zone (EEZ) extending 200 nautical miles to sea from the coastal baselines.

The Marine Pollution (Prevention of Pollution from Ships) Act 2 of 1986 empowers the Minister of Transport to make regulations that give effect to the MARPOL 73/78 Convention.

The Marine Spatial Planning Act No. 16 of 2018 provides a framework for marine spatial planning in South Africa.

The Intergovernmental Relations Framework Act (IGRF) 13 of 2005 which establishes a framework for the national, provincial and local government to interact.

The Bioprospecting, Access and Benefit Sharing (BABS) Regulations, 2008 made under the National Environmental Management Biodiversity Act (NEMBA), Act 10 of 2004.

3.3 Other legislation, plans and policies

Local Municipal Integrated Development Plans, Provincial Growth and Development Strategies and other terrestrially and coastal focused legislation, plans and policies would not apply to offshore MPAs managed by DEFF.

4. Consultation

The NEM: PAA Section 33 requires the participation of civil society and other authorities in the governance of protected areas. Once a Draft Management Plan has been developed, a formally constituted Stakeholder Forum under the chair of the Chief Directorate of Oceans Conservation, should be responsible for guiding the ongoing development, review, evaluation, and updating of the components of the MPA management plan. The following should apply to the formation and functioning of the Stakeholder Forum:

- The different stakeholder groups to be represented on the Forum should be clearly defined.
- The Stakeholder Forum should be structured to ensure that a platform is not created in which specific stakeholder interests are perceived to dominate the functioning of the Forum.
- The size of the Forum should be contained to a manageable size. Preliminary proposals suggest an optimal number of 15 stakeholder group representatives
- Each stakeholder group representative should have a clear mandate to represent the interests of the stakeholders he/she represents and a mechanism to report back to their constituency
- In the first meeting of the Forum, the Forum's constitution should be discussed, developed and adopted
- DEFF should commit to actively providing administrative and logistical support in the functioning of the Stakeholder Forum
- The Forum should meet at least once a year but more frequently when issues of importance arise

The major stakeholders for the Namaqua Fossil Forest MPA and its immediate surrounds are:

- The Department of Environment, Forestry and Fisheries as the management authority
- The Department of Mineral Resources and Energy as the department promoting and regulating the minerals and mining sector and the development of the energy sector
- Petroleum Agency South Africa, Tosaco
- SA Commercial Linefish Association
- South African Pelagic Fishing Industry Association
- Belton Park Trading (Diamonds)
- Researchers (SAEON, SANBI, Universities)
- South African Police Service (SAPS) Marine Unit

In establishing the MPA, key stakeholder concerns focused on the overlap with mining concessions for diamond and other minerals leases and concerns raised by fisheries rights advocates to accommodate small scale fishing.

The management authority will need to consult regularly with the Namaqua Fossil Forest Stakeholder Forum to maintain an effective consultative management programme. An annual protected area management effectiveness audit would determine the state of management effectiveness and would inform any changes to the management plan.

5. Purpose and Vision

5.1 Purpose of the Namaqua Fossil Forest MPA

The gazetted purposes of the Namaqua Fossil Forest MPA are.

- a) To contribute to a national, regional and global representative system of marine protected areas by providing protection to the benthic ecosystems of the shelf in this region
- b) To conserve and protect fragile ecosystems including in-situ fossilised trees and their associated cold water corals, and habitat forming sponges
- c) To conserve and protect ecologically sensitive biodiversity and the ecological processes associated with these features
- d) To protect and provide an appropriate reference environment for research and monitoring, including climate change research; and also to promote and contribute to environmental education.

(Government Gazette No. 42478, May 2019)

5.2 Draft Vision for the Namaqua Fossil Forest MPA

To effectively manage the Namaqua Fossil Forest MPA with its unique fossil, coral and sponge features in a way that maintains its ecological integrity, conservation value and contribution to the sustainable management of key fisheries.

(Vision to be revised with stakeholders).

5.3 Key Determining Factors

Ecosystem type

The selection of the area that makes up the Namaqua Fossil Forest MPA was driven by the inclusion of a fossilised forest of yellowwood trees (Namaqua Mid Shelf Fossils). However, the MPA also protects a previously unprotected mid shelf mud ecosystem type (Namaqua Muddy Mid Shelf Mosaic) as well as Namaqua Muddy Sands and Namaqua Sandy Mid Shelf. All the ecosystem types are classified as Least Concern. Ecosystem types that are widely distributed and relatively un-degraded ecosystems are considered Least Concern (Sink et al 2019 b; c). To qualify as Least Concern, more than 50% of the ecosystem is estimated to be in good condition and it is anticipated that there has been little broad modification of ecosystem processes (IUCN 2016) An overview of the ecosystem types that have been identified within the MPA are listed in Table 5.1 and outlined in Figure 2.

Table 5.1. Overview of ecosystem types in the Namaqua Fossil Forest MPA. (Descriptions based on Sink et al. 2019a, b, c, d).

Ecosystem type	Description	Area protected (km ²)	Total extent (km ²)	Threat Status	Protection Level
Namaqua Mid Shelf Fossils	Rocky outcrops and associated highly productive pelagic habitat in -50 to -150 m on the mid shelf in the Namaqua ecoregion.	20 (99.00%)	20	Least Concern	Well Protected
Namaqua Muddy Mid Shelf Mosaic	Mosaic muddy and rocky seafloor in the highly productive zone (-50 to -150 m) on the mid shelf in the Namaqua ecoregion.	253 (2.15%)	11762	Least Concern	Poorly Protected
Namaqua Muddy Sands	River influenced muddy sand and associated turbid, productive pelagic habitat in the northern outer shelf (-150 to -350 m) of the Southern Benguela ecoregion.	78 (0.64%)	12169	Least Concern	Not Protected
Namaqua Sandy Mid Shelf	Sandy seafloor and associated productive pelagic habitat in -50 to -150 m on the mid shelf in the in the Namaqua region of the Southern Benguela Shelf Ecoregion.	142 (4.99%)	2853	Least Concern	Poorly Protected

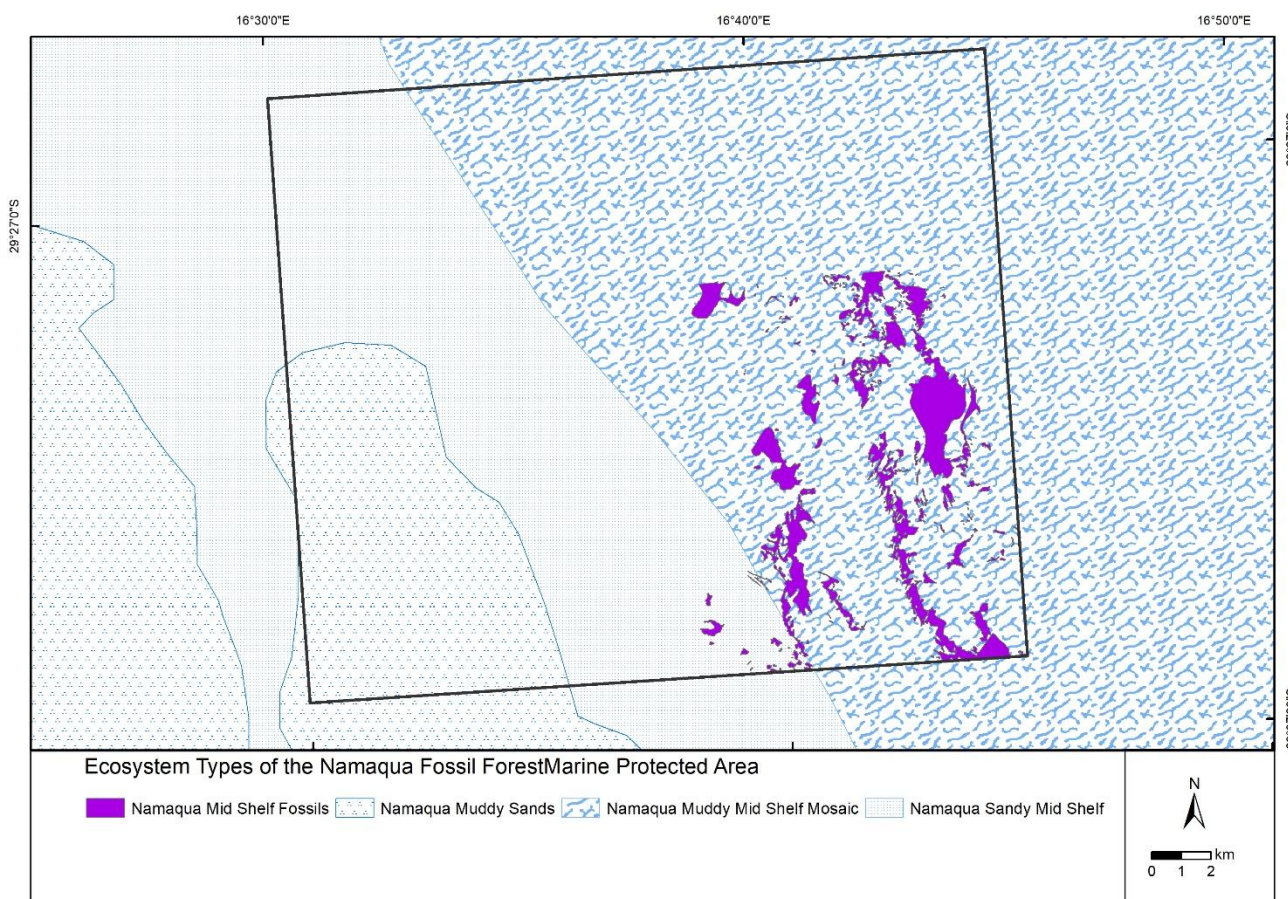


Figure 2. Map of ecosystem types in the Namaqua Fossil Forest MPA

Physical oceanographic features

The Namaqua Fossil Forest MPA lies approximately at the centre of the Benguela Current Large Marine Ecosystem (BCLME). The cold water Benguela Current which defines the LME originates as a part of the West Wind Drift in the Southern Ocean and is generally defined as the integrated equatorward flow in the upper layers of the ocean in the South-east Atlantic. The Benguela Current is between 200 km and 300 km wide, transporting 15 – 20 million m³.sec⁻¹ at average speeds of 15-20 cm. sec⁻¹ (Shannon 1985; BCLME TDA 1999). There is no information on local-scale oceanography for this area.

The Benguela is unique in terms of boundary currents in that it is a cold current bordered at both northern and southern ends by warm water systems - the Angola Current in the north and Agulhas Current in the south. These northern and southern boundaries of the Benguela are not fixed in space and in time, but are highly dynamic, moving up and down the coast, and their pulsing impacts on the ecosystem as a whole and on its resources. The southern boundary of the Benguela system can be considered as the Agulhas retroflexion area in the area of the Agulhas Bank and typically between 35° and 37°S. The western (offshore) boundary of the Benguela is fairly open ended but is generally taken as approximately the 0° meridian. The physical northern boundary of coastal upwelling is marked by the Angola-Benguela frontal zone at approximately the Angola/Namibian border, but this varies seasonally. Underlying the northward flowing Benguela is a slow south

flowing undercurrent which is thought to be often oxygen deficient, and which may occasionally reach the surface (BCLME TDA 1999).

Between 10% and 20% of Agulhas Current water leaks westward (the Agulhas Leakage) into the BCLME through the generation of large, warm Agulhas Rings, filaments. These rings, eddies and filaments have a significant influence on the mean state and mesoscale variability of the Benguela system. The leakage of warm saline Indian Ocean water into the South Atlantic around the southern tip of Africa is also an important factor in the global thermohaline circulation (Morris et al. 2017).

Bathymetry and Seafloor Characteristics

The Namaqua Fossil Forest MPA contains both hard and unconsolidated substrate types. The fossilised trees are a unique feature with substantial structural complexity that is highly vulnerable to benthic impacts. Unconsolidated sediments consist of both sand and mud and a muddy mid-shelf mosaic of hard grounds interspersed with mud, sand and muddy sand. Limited attempts to sample sediments have been undertaken in this area. The shelf in this area is very wide (± 200 km) as a result of the extensive Orange Basin sedimentary delta which underlies the entire continental shelf area between the Lüderitz Arch and the Olifants Valley submarine canyon (De Wet 2012). The inner shelf is relatively narrow (± 2 km) while the middle to outer shelf is wide, mainly featureless and gently sloping. On the inner part of the middle shelf is a thick, narrow mud belt which forms part of the muddy inner shelf mosaic ecosystem of the Namaqua Fossil Forest benthos. There is a double shelf break west of the MPA, the first between 200 – 300 m depth and 160 – 170 km offshore and the second at 470 – 570 m depth. West of the shelf break the continental slope is relatively gentle (De Wet 2012).

Key fauna

The chief features of the Namaqua Fossil Forest are the fossilised remnants of a yellowwood forest whose tree trunks have been colonised by fragile scleractinian cold water corals. Two species of fossil wood have been documented – *Podocarpus jago* and *P. umzambense*. A newly described habitat forming sponge *Suberites dandelini* is also present in the area. However, apart from these features little is known about the biodiversity and ecology of the area (Sink et al. 2012b; MARISMA Project 2020).

Ecological Processes

Little is known about the biodiversity and ecology of the area. The MPA is situated within the Southern Benguela ecosystem where upwelling processes drive high productivity and the Namaqua Fossil Forest marine environment is likely to be similarly productive (Lagabrielle 2009, Sink et al., 2012a; see Physical oceanographic features). The MPA may contribute to protection of a nursery area for hake.

Potential climate change impacts

Establishing the direct impacts of climate change on the BCLME is difficult because both tropical or sub-tropical regimes that delimit the northern and southern ends of the BCLME have a significant impact on the BCLME and there are many human impacts that affect the system (fishing, pollution, mining and exploration for and extraction of oil and gas), and these are superimposed on the inherent natural variability of the ecosystem. The

region is situated at the choke point in the “global ocean climate conveyor belt” where, on time scales of decades to centuries, warm surface waters from the Indo-Pacific pass around Africa into the Atlantic.

Although it is difficult to prove climate change impacts in the BCLME, oceanographic and ecosystem studies suggest that the following changes may have taken place.

- Components of the BCLME have been displaced poleward and eastward, indicated by changes in SST and changes in the abundance and distribution of several living marine resource species and marine predators.
- There has been an increased frequency of warm events in the northern Benguela, decreased upwelling in the north, changes in stratification, increased coastal upwelling on the west and south coasts in the southern Benguela, changes in the retroflexion area of the Agulhas Current and significant warming in this region.
- A “regime shift” appears to have taken place in the BCLME pelagic ecosystem, in which jelly fish now predominate in place of sardines and anchovy.
- There is a perception that there has been an increase in the scale of sulphur “eruptions” in the northern Benguela, which has had impacts at both local and ecosystem levels.
- There is a perception that hypoxia in the BCLME has increased resulting in a substantial decline in abundance of rock lobster.

Clearly, climate variability and change have the potential to alter the distribution and abundance of many Benguela species, cause the extinction of sensitive species, and negatively impact on fisheries and tourism (BCLME TDA 1999).

5.4 Strengths, Weaknesses, Opportunities and Threats

A draft SWOT assessment has been used to help guide the development of the Management Plan and the focus of the themes, objectives, activities and indicator deliverables for the Namaqua Fossil Forest MPA.

STRENGTHS
• Only protection for a unique fossilised forest heritage resource • Protection of rare cold water corals and habitat forming sponges • Contributes to fisheries habitat and bycatch management • First protection of Namaqua Muddy Mid Shelf Mosaic ecosystem type • Protection of soft ground sponge habitat supports MSC certification conditions for hake trawl by protecting vulnerable marine ecosystems • The MPA falls within the Namaqua Fossil Forest EBSA
WEAKNESSES
• Limited knowledge of cold water coral distribution and ecosystems • Offshore environment is difficult to monitor for compliance • Limited number of offshore patrol vessels. • No dedicated management budget at present • Relatively small size of the MPA • Lack of capacitated staff to undertake sophisticated VMS/AIS analysis

• Lack of staff for 24/7 VMS monitoring • Lack of cooperative arrangements with systems used by global surveillance providers • Environmental monitoring for offshore environments is difficult and expensive
OPPORTUNITIES
• Research potential DEFF, SAEON, SANBI/NMU and the University of Cape Town already involved in compiling relevant research deep water corals, sponges, fossilised trees • Potential for improved understanding of historical climate patterns from fossilised trees • Supports economic benefits through eco-certification • Potential to co-opt line fishing sector to assist with compliance monitoring
THREATS
• Gas and petroleum interests in the immediate area • Diamond mining interests in the area • Uncontrolled access to the MPA • Vulnerable to oil spills from oil and gas industry • Vulnerable to impacts of seismic surveys • Changes in water circulation patterns and productivity linked to climate change

6. Management Objectives Framework

6.1 Proposed Management Principles

The following principles underpin the management activities of the Namaqua Fossil Forest MPA as it moves towards realising its vision. These principles are reflected in the goals, objectives and activities described for each of the Key Management Themes detailed below which are designed to achieve compliance with the Norms and Standards for Protected Area Management. It is important to note that while these principles are intended to guide the management of the MPA, management is also subject to the principles and provisions of relevant international treaties and conventions, national legislation and policy, and any local contractual agreements.

Adaptive management: An adaptive management approach will be adopted in the implementation of the Namaqua Fossil Forest MPA in that the objectives and activities of the Management Plan will be constantly adapted to achieve greater conservation impact.

Ecosystem based approach: An ecosystem-based application that includes a multisectoral and multidisciplinary approach to the assessment and management of coastal and marine resources that will underpin the management of the Namaqua Fossil Forest MPA.

Prioritisation: The focus of the Namaqua Fossil Forest MPA Management Plan must be on the realistic attainment of specific objectives in line with national and regional priorities.

Consultation, Cooperation and Participation: The Namaqua Fossil Forest MPA Management Plan will seek to work co-operatively and in partnership with all stakeholders, to avoid and resolve potential conflicts; to protect aquatic resources and values; and to address mutual interests. Decision-making processes must be inclusive, fair and transparent, and subject to clear and consistent rules and procedures.

Transparency: The development and implementation of the Namaqua Fossil Forest MPA Management Plan will be undertaken in a transparent manner.

Accountability: The implementation of the Namaqua Fossil Forest Management Plan will seek to ensure that management activities are carried out efficiently and effectively, costs are controlled, and activities carried out in compliance with applicable national and international laws.

Diligence: The staff involved in the implementation of the Namaqua Fossil Forest MPA Management Plan will provide a dedicated service with full commitment in line with the objectives of the MPA.

Capacity: The authority responsible for the management of the Namaqua Fossil Forest MPA will seek to ensure that the implementation of Management Plan is adequately resourced to meet its objectives.

Empowerment: The implementation of the Namaqua Fossil Forest MPA Management Plan will seek to empower staff and stakeholders involved in management activities by promoting capacity building.

6.2 Management Objectives

The aim of the Management Objectives Framework is to break down the high level purpose statements for the MPA into lower level achievable management objectives. The purposes of the Namaqua Fossil Forest MPA as defined in the Declaration Notice (no. 765 of Government Gazette no. 42478, 23 May 2019), are outlined in Section 5 (Purpose and Vision). These purpose statements were taken into account in identifying Key Management Themes for the Namaqua Fossil Forest MPA and developing associated Goals and Objectives.

The following **Key Management Themes** frame the management of the Namaqua Fossil Forest MPA for the next ten years. A Key Management Theme is a priority area of management action for the MPA. Each Key Management Theme has a **Goal**. To achieve the Goal of each Key Management Theme a series of **Management Objectives** are defined. Each Management Objective will be achieved by undertaking a set of **Actions** within certain time frames. These actions are described for a 10-year timeframe and are linked to measurable deliverables, indicators and/or targets that help demonstrate the achievement of the action or objective.

The way in which each Theme and its Goal helps to achieve the purposes of the MPA is outlined in the Implementation Framework under the Strategic Plan (Section 11). The Key Management Themes and Objectives were developed on the basis of international best practice in protected areas management and an evaluation of existing national protected area management plans developed by the various conservation agencies in South Africa.

Management Objectives Framework	
KEY MANAGEMENT THEMES	MANAGEMENT OBJECTIVES
Theme 1: Governance Goal: To ensure effective governance and management of the MPA, in adherence with management principles. (Purpose a, b, c)	1.1 To establish and ensure the on-going involvement of a representative and functional MPA Stakeholder Forum to participate in and help in the management of the Namaqua Fossil Forest MPA 1.2 To reduce conflict among stakeholders of the Namaqua Fossil Forest MPA 1.3 To ensure sufficient and effective staff capacity to achieve management objectives 1.4 To improve management effectiveness through appropriate monitoring and evaluation 1.5 To adopt an ecosystem approach to management of the MPA
Theme 2: Biodiversity and Conservation Goal: To conserve and protect the ecosystems, ecological processes and biodiversity of the Namaqua Fossil Forest MPA. (Purpose a, b, c)	2.1 To conserve and manage the ecosystems and ecological processes in the Namaqua Fossil Forest MPA to ensure their long term persistence 2.2 To protect populations of vulnerable, threatened, rare, and endemic species
Theme 3: Socio-economic benefits - Natural Resource use, Recreation, Tourism, Heritage and Culture Goal: To ensure sustainable social and economic benefits from the Namaqua Fossil Forest MPA (Purpose b, c)	3.1 To protect the unique fossilised yellowwood forest heritage feature 3.2 To allow for controlled resource use in a manner and in areas permitted by the regulations and in a way that does not compromise the biological integrity of the MPA 3.3 To support eco-certification of the economically important hake trawl fishery
Theme 4: Compliance and Enforcement Goal: To ensure adherence to the regulations of the Namaqua Fossil Forest MPA (Purpose a-d)	4.1 To develop, implement and maintain an effective enforcement capacity that minimizes illegal activities and negative impacts in the MPA and deters transgressors 4.2 To develop an effective vessel tracking capacity and reporting protocols 4.3 To promote compliance among stakeholders and users of resources within and adjacent to the MPA

Theme 5: Disaster Management Goal: To provide for the safety of the biodiversity and human elements, and the continued functioning of the ecological processes of the MPA in the face of any environmental crisis (Purpose a-d)	5.1 To establish and maintain effective disaster management planning to minimise risk of pollution and other disaster events in the MPA and its vicinity and provide for the persistence of the biodiversity and ecological processes of the MPA in the event of an environmental crisis
Theme 6: Planning Goal: To integrate the management of the MPA with external developments, processes and impacts to ensure that the MPA objectives are not compromised by these issues (Purpose b, c)	6.1 To co-operate with relevant international and national government structures, industries, NGOs and communities insofar as their activities affect the MPA and to keep track of issues affecting the MPA and its proximity to ensure functional ecosystems are protected.
Theme 7: Engagement, Education and Public awareness Goal: To engage resource users, stakeholders and the general public on the attributes, function and benefits of the MPA including its contribution(s) to marine conservation and sustainable use (Purpose d)	7.1 To raise the profile of MPA and increase appreciation of its attributes, functions and benefits including its contribution(s) to marine conservation and sustainable use, with a focus on improving voluntary compliance with regulations
Theme 8: Monitoring, Research and Information management Goal: To realise the potential of the Namaqua Fossil Forest MPA for enhancing scientific knowledge and increasing the evidence base to inform ecosystem-based management (Purpose d)	8.1 To support research and monitoring that increases understanding of the ecosystems, biodiversity and benefits of the MPA including research on climate change and the impacts of human activities on habitats and biodiversity 8.2 To develop and maintain a monitoring programme that provides managers with accurate and timely information on the state of the MPA, the potential threats to meeting the MPA purposes, and which provides scientific reference points for management of ecosystem types 8.3 To collate and adequately manage data and information on the MPA, ensuring ease of access to support research and management decisions

7. Zoning Plan

7.1 Zoning

The Namaqua Fossil Forest MPA is situated off the west coast of South Africa on the continental shelf south-west of Port Nolloth. The MPA is made up of a single rectangular area which is bounded by a series of straight lines sequentially joining the coordinates: A, B, C and D and a straight line joining the first and last co-ordinate (Table 7.1; Figure 2). These areas include the substrata, seabed, subsoil and water column within these boundaries. The entire Namaqua Fossil Forest MPA is zoned as a “Controlled fishing zone” which allows limited fishing activities in the MPA.

Table 7.1. Geo-reference coordinates for the Namaqua Fossil Forest MPA

	Point	Latitude (Dec. Deg.)	Longitude (Dec. Deg.)
Namaqua Fossil Forest	A	-29.416667	16.5
Namaqua Fossil Forest	B	-29.416667	16.75
Namaqua Fossil Forest	C	-29.6000933	16.7504
Namaqua Fossil Forest	D	-29.6	16.5

7.2 Regulations

The regulations are contained in Government Gazette No. 42479 of 2019 (No. 786). The regulations impose restrictions on anchoring in the MPA (except under conditions of *force majeure*, or for vessels of the Department or other organ of state fulfilling their mandate), a prohibition on any kind of polluting activities in the MPA, and a requirement for the activation of a VMS transponder when entering or traversing the MPA if the vessel requirements stipulate a mandatory vessel tracking device. Only traditional line fishing from an unanchored vessel is allowed between sunrise and sunset, subject to permit conditions relating to effort, catches and seasons. Any fishing gear on vessels not permitted to fish inside the MPA must be appropriately stowed (i.e. in a manner that eliminates the likelihood of its immediate use) while the vessel is inside the boundaries of the MPA.

In the long term, a Zone of Influence and a Zone of Influence Policy should be developed for the MPA – essentially an area outside of the MPA where actions and agreements are taken to protect the integrity of the MPA from threats and edge effects.

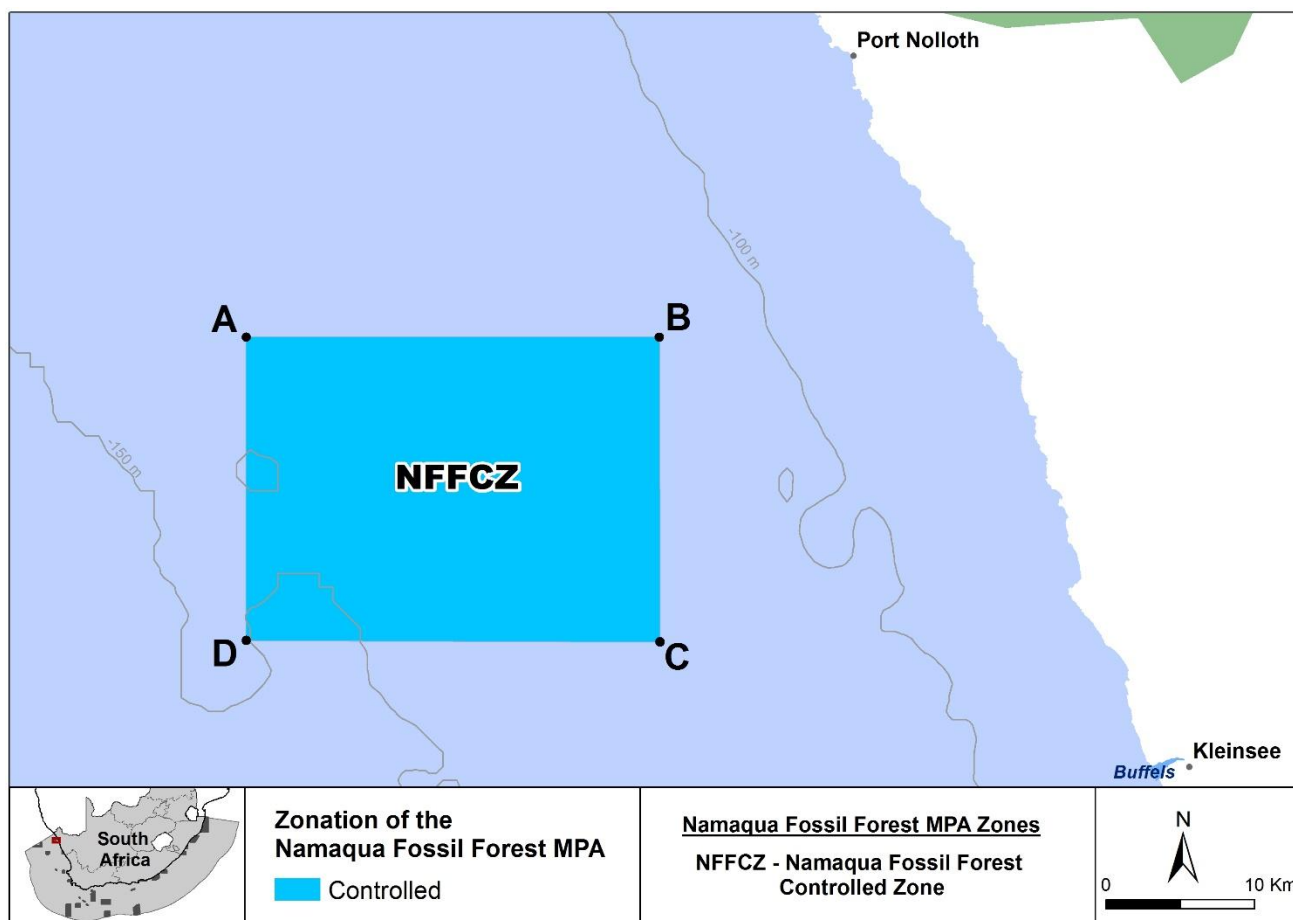


Figure 3. Zoning of the Namaqua Fossil Forest MPA.

8. Access and Facilities

The Namaqua Fossil Forest MPA is an open ocean, open access MPA. There are no facilities associated with the MPA.

Fisheries and Resource use

The waters on the west coast of South Africa are generally heavily fished by several sectors with the majority of effort directed over the mid and outer shelf. The large pelagic long line sector fishes to the west of the MPA. There appears to be no current fishing effort in the vicinity of the MPA, but the regulations allow line fishing for fishers from the Port Nolloth, Kleinsee and Hondeklip Bay communities (Norman et al. 2018; Sink et al. 2019c). The MPA protects vulnerable soft ground sponge habitat (*Suberites dandelini*) and therefore supports new MSC conditions that require the identification and protection of Vulnerable Marine Ecosystems.

Heritage resources

The Namaqua Fossil Forest is a unique heritage resource since it is the only known site of submarine fossilised yellowwood trees in South Africa.

Tourism

The MPA is too far offshore for recreation and tourism activities.

Mining and oil and gas exploration

Tosaco has a Technical Cooperation Permit (12 months permit, exclusive desk-top study, exclusive right to apply for Exploration Right) with PetroSA to explore for oil and gas in a lease area that includes the MPA. The greatest threat to biodiversity from the oil and gas industry is the possibility of an oil spill. Other biodiversity concerns are the physical impacts to ecosystems and species from infrastructure installation, pollution from chemicals in water-based and oil-based drilling muds, the introduction and proliferation of alien and potentially invasive species, the disruption of feeding and communication in a range of species, and potential physical damage caused by noise pollution (Majiedt et al. 2013; Hawkins and Popper 2017; Sink et al. 2019b).

The site of the MPA is considered to be unmined. It used to fall within a mining licence area (South African Sea Area MPT 25/2011 (in Concessions 5C and 4C)) where De Beers Consolidated Mines held a marine diamond mining right, but they have subsequently abandoned it. Since then, Belton Park Trading 127 (Pty) Ltd have been granted Prospecting Rights for marine diamonds in Concessions 2C, 3C, 4C and 5C, which overlaps with the Namaqua Fossil Forest EBSA (in 4C and 5C). However, the Basic Assessment Report for the approval of prospecting activities requires a 250 m “no-go” buffer around all known locations of fossilized yellowwood trees (CCA Environmental (Pty) Ltd, 2015). Currently, sampling operations have been undertaken in Concession 2C and 3C, but not near the MPA and EBSA (MARISMA Project 2020). Deep water diamond mining is potentially very destructive of the benthic environment although the impacts of offshore mining are not well understood. Common mining technologies include an airlift-drill technology, which uses a 6.8m-diameter drill bit working in overlapping circles on the sea floor, and a crawler, which uses a 280-tonne track-mounted crawler to dredge the sea floor. Up to 60 tonnes an hour of sediment can be dredged and lifted aboard a specialised vessel. Sediment is washed, sifted and flushed back into the sea once any diamonds have been removed. Impacts on the marine environment include dredging effects and smothering from tailings disposal.

Mining for phosphates and other mineral resources from the seabed is currently not a feature of the area.

9. Consolidation and Expansion Strategy

In the short term there is unlikely to be an expansion of South Africa’s protected area estate. However, expansion of the marine protected area estate remains a priority for DEFF (National Protected Areas Expansion Strategy 2016). DEFF and SANBI are currently improving spatial biodiversity plans to refine critical biodiversity areas for inclusion in a future expansion programme. Current efforts have been enabled through the MARISMA Project which is refining the extents and locations of existing Ecologically or Biologically Significant Areas (EBSA), identifying relevant new ones, and incorporating these into a marine spatial plan to achieve sustainable use of the ocean.

10. Conservation Development Plan

A Conservation Development Plan setting out the long term development goals including access and facilities and expansion of tourism products for the MPA would be developed under this section. The entire MPA is zoned

as a Controlled fishing zone which allows limited fishing activities in the MPA. There are no development plans for this MPA.

11. Strategic Plan

11.1 Implementation Framework

The implementation framework translates the strategic objectives framework described above into **management actions** and **management targets**, which will be used to inform annual plans of operation and the resources required to implement them.

Management actions are the key activities that should be implemented to achieve the MPA objectives. Management actions are defined and **prioritized** for the ten-year time horizon of this Management Plan. Each management action has been prioritised as follows:

Category	Priorities
HIGH	Critical to the effective management ¹ of the MPA.
MEDIUM	Important to the effective management of the MPA, but its implementation may be delayed because of limited funds or resources.
LOW	Constitutes good management practice, but not critical or important to MPA management effectiveness.

Time Frames, Targets, Key Performance Indicators and **Responsibilities** are allocated for each management action, or a group of linked management actions. Management targets reflect the desired outcome of the management action and KPIs provide an index of progress towards the target.

Each of the Key Management Themes is introduced by:

- A demonstration of link between the Key Management Theme and the Purposes for which the MPA was declared
- A brief discussion of the issues relevant to the Management Theme
- An outline of the MPA's approach to addressing the Key Management Theme

Theme 1: Governance and Stakeholder involvement

Goal: To ensure effective governance and management of the MPA, in adherence with management principles

This Key Management Theme and its Goal are a principal requirement for the protection of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes. It is also a

¹ As reflected in the Management Effectiveness Tracking Tool (METT).

principal requirement if the gazetted purposes of the Namaqua Fossil Forest MPA “to contribute to a national, regional and global representative system of marine protected areas providing protection to the benthic ecosystems of the shelf ...” and “to conserve and protect fragile ecosystems” and “to conserve and protect ecologically sensitive biodiversity and the ecological processes associated with these features.....” (Purposes (a) (b) and (c) Section 5.) are to be achieved. Without effective governance these purposes cannot be achieved. In terms of South African environmental and conservation legislation this must be undertaken in a consultative manner and it is thus critical that a formal Stakeholder Forum be established. The Forum should be constituted from the Stakeholder bodies outlined in Section 4 (Consultation). The roles of the Stakeholder forum should include:

- Providing input and recommendations to DEFF on Namaqua Fossil Forest management issues.
- Helping to identify and resolve any issues and conflicts.
- Serving as a liaison between and disseminate information about the MPA to the various stakeholders and bring the concerns of stakeholders to DEFF.
- Providing technical and background information on issues affecting the MPA.

The Stakeholder Forum should meet at least once a year but more frequently when important issues arise

The exact nature of the institutional arrangements that will be put in place to manage the Namaqua Fossil Forest MPA are not clear at this stage. The Deputy Director General for Oceans and Coasts is responsible for the promotion, management and strategic leadership on oceans and coastal conservation in South Africa. The Chief Directorate of Specialist Monitoring Services will be responsible for implementation of the Management Plan. It is not known if a Departmental Coordinating Officer will be appointed. Whatever the nature of the final arrangement, the governance framework will have to be consultative and cooperative in nature because the immediate area around the Namaqua Fossil Forest MPA is a focus for fishing as well as oil and gas exploration and potential diamond mining.

The provision of an effective staffing capacity to undertake the necessary management actions outlined in the MPA Management Plan is a critical requirement for effective governance. In the case of offshore MPAs, sufficient well trained staff are particularly important in the areas of VMS monitoring and data analysis, the collection and storage of evidence, and the implementation of the correct protocols for inspections, boarding and arrests. All of these activities are essential if prosecutions are to be successful (see Compliance). There are a number of organisations that can assist with various aspects of training relevant to the management of offshore protected areas. FishForce provides training in inspections, boarding and arrests protocols and evidence collection. Fish-I Africa and Global Fishing Watch provide training and mentoring in VMS and AIS data analysis, and the goal of the Southwest Indian Ocean Fisheries Commission (SWIOFC) EcoFish programme is to promote sustainable fisheries in the East Africa, Southern Africa and the Indian Ocean region.

Because the institutional arrangements for management of the MPA are not yet clear, it is difficult to provide focus for other staff capacity building for management of the MPA. Within DEFF there is already expertise in research and monitoring, management of resource use, the development of education and awareness materials and the management of disasters. How the skills of these various separate departments will provide input for

the management of the MPA must still be resolved. Additional support in stakeholder consultation and further input from social scientists is recommended.

A Protected Area Management Effectiveness audit like the METT-SA should be implemented annually for the first three years and thereafter every five years to monitor the implementation of the management plan. After each audit, a report on the status of implementation of the Management Plan should be compiled and submitted to the DDG Oceans and Coast. The report should be used to guide adaptive management strategies (Section 11)

The focus of Governance of the Namaqua Fossil Forest MPA is i) To establish and ensure the on-going involvement of a representative and functional MPA Stakeholder Forum to participate in and help implement management of the MPA, ii) To develop and maintain effective mechanisms for on-going communication with stakeholder groups to facilitate management, iii) To reduce conflict among stakeholders of the Namaqua Fossil Forest MPA and iv) To develop a staffing capacity that is continually improving the effectiveness of an ecosystem based approach to management.

Management actions and targets

Table 11.1.

Key Management Theme 1: Governance

Goal: To ensure effective governance and management of the MPA, in adherence with management principles.

Objective 1.1: To establish and ensure the on-going involvement of a representative and functional MPA Stakeholder Forum to participate in and help in the management of the Namaqua Fossil Forest MPA

Management action	Priority	Management targets	Key performance indicators	Responsibility	Time frame (years)				
					2	4	6	8	10
(i) Establish a MPA Stakeholder Forum with representative members of stakeholder groups and government agencies		Functional Stakeholder Forum that meets at least once a year	Minutes and reports of meetings	DEFF					
(ii) Establish formal terms of reference (TOR), and clarify institutional functioning for the Stakeholder Forum									
(iii) Coordinate and attend regular Stakeholder Forum meetings									
(iv) Provide logistical and resource support to the functioning of the Stakeholder Forum									
(v) Develop and maintain effective mechanisms for on-going communication with stakeholder groups									
(vi) Regularly update stakeholders on all research developments in the MPA									

Objective 1.2: To reduce conflict among stakeholders of the Namaqua Fossil Forest MPA

Management action	Priority	Management targets	Key performance indicators	Responsibility	Time frame (years)				
					2	4	6	8	10
(i) Provide all stakeholders with clear information on the conservation management measures in the area including compliance requirements as laid out in the regulations		Codes of conduct developed for Oil and Gas industry and offshore diamond mining industry	Codes of conduct developed for Oil and Gas industry and offshore diamond mining industry	DEFF/Oil and Gas Industry/ Offshore diamond mining industry					
(ii) Build industry support through promoting development of codes of conduct and other non-regulatory approaches									

Objective 1.3: To ensure sufficient and effective staff capacity to achieve management objectives

Management action	Priority	Management targets	Key performance indicators	Responsibility	Time frame (years)				
					2	4	6	8	10
(i) Review DEFF administrative, enforcement and technical staff capacity for the management of offshore MPAs and identify needs and gaps		Appointment of a manager and appropriately trained	Manager appointed						

(ii) Appoint staff required to implement management plan		personnel sufficient to oversee implementation of MPA management plan.	Personnel appointed	DEFF					
(iii) Identify effective and appropriate training interventions that align with international best practice in order to address needs and gaps									
(iii) Implement ongoing capacity development in all aspects of the management of MPAs and fisheries through practical and theoretical training courses, workshops, technical skills development programs and cross-deployments									
(iv) Approach regional programs like EcoFish, Fish-I Africa and FishForce for assistance in compliance and enforcement capacity development									
			MoA with suitable training institution to build capacity						
			Two (2) capacity development initiatives per year to support staff skills development. At least one initiative should be compliance and enforcement training						
			Two staff seconded to Fish-I Africa each year for 3 months mentoring						

Objective 1.4: To improve management effectiveness through appropriate monitoring and evaluation of management

Management action	Priority	Management targets	Key performance indicators	Responsibility	Time frame (years)				
					2	4	6	8	10
(i) Implement and maintain the METT-SA		Annual METT-SA survey for 3 years thereafter every 5 years	Appropriate action plans put in place 3 months after the publication of METT reports	DEFF and Partners					
(ii) Improve management effectiveness through adaptive management and the development of action plans									
(iii) Compile annual progress report on the status and implementation of the Management Plan									

Objective 1.5: To develop an ecosystem approach to management of the MPA

Management action	Priority	Management targets	Key performance indicators	Responsibility	Time frame (years)				
					2	4	6	8	10
(i) In the long term, develop an understanding of, and management protocols for, all the key links, ecological processes and energy pathways in the Namaqua Fossil Forest system as well as all the human activities and their impacts in order to implement an ecosystem approach to management		Regional institutions and stakeholders whose activities affect the ocean identified to develop a legitimate process. Threats identified	List of Stakeholders for EBM. Diagnostic Threats analysis undertaken	DAFF and Partners					

Theme 2: Biodiversity and Conservation

Goal: To conserve and protect the ecosystems, ecological processes and biodiversity of the Namaqua Fossil Forest MPA

This Key Management Theme and its Goal are a principal requirement for the protection of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes. It is also a principal requirement if the gazetted purposes of the Namaqua Fossil Forest MPA “to contribute to a national, regional and global representative system of marine protected areas by providing protection to the benthic ecosystems of the shelf ...” and “to conserve and protect fragile ecosystems.....” and “to conserve and protect ecologically sensitive biodiversity and the ecological processes associated with these features....” (Purposes (a) (b) and (c) Section 5.) are to be achieved.

South Africa’s offshore ecosystems support important economic activities including fishing, petroleum and gas extraction, diamond mining and shipping. All these activities have to a greater or lesser degree, negative impacts on biodiversity, ecosystem processes and the marine environment generally. The conservation of biodiversity is critical to the maintenance of stable ecosystems. With the presence of the fossilised yellowwood forest, the cold water corals colonising the tree trunks, the Namaqua Fossil Forest MPA protects a unique feature with substantial structural complexity that has not been found anywhere else in the South African marine environment. In addition, the habitat created by the large *Suberites* sponges which have been recorded in this MPA contributes to the protection of another potential Vulnerable Marine Ecosystem (Sink et al. 2019c). Such cold water coral and sponge habitats are comprised of slow growing species that are sensitive to benthic impact and may take a very long time to recover. The MPA also protects a previously unprotected inner shelf mud ecosystem type (Sink et al. 2019a). The benthic infauna and epifauna are currently not well researched and should be a focus of future research. An area of approximately 832 km² that includes the entire area of the fossilized forest is under consideration as the revised Namaqua Fossil Forest EBSA.

The conservation of the biodiversity and features of the Namaqua Fossil Forest MPA directly addresses Purposes (a) (b) and (c); see Section 5.) for which the MPA was declared. There are crosscutting issues relating to the Biodiversity and Conservation Theme that are addressed in the Theme for Research, Monitoring and Information management.

The long term focus of this Key Management is to i) Conserve and manage the ecosystems and ecological processes in the MPA to ensure their long term persistence and ii) To protect and restore populations of, vulnerable, threatened, rare, and endemic species.

Management actions and targets

Table 11.2.

Key Management Theme 2: Biodiversity and Conservation									
Goal: To conserve and protect the ecosystems, ecological processes and biodiversity of the Namaqua Fossil Forest MPA									
Objective 2.1: To conserve and manage biodiversity patterns and ecological processes in the Namaqua Fossil Forest MPA to ensure their long term persistence									
Management action	Priority	Management targets	Key performance indicators	Responsibility	Time frame (years)				
					2	4	6	8	10
(i) Develop a prioritised list of the MPA’s baseline information and biodiversity research and monitoring requirements (See Monitoring and Research)	High	Development of a state of knowledge report for the MPA including all bio-physical information	State of knowledge report for Namaqua Fossil Forest MPA stored on central data archive	DEFF and partner research institutions	Black	Black	White	White	White
(ii) Undertake a targeted collection of baseline data of the Namaqua Fossil Forest MPA biodiversity with a focus on corals, sponges and other invertebrates	Medium				White	Black	Black	Black	Black
(iii) Identify and map ecosystem processes and areas of importance with a focus on understanding land-sea connectivity, benthic-pelagic connectivity, marine circulation patterns, hake and invertebrate spawning, recruitment and feeding processes	Medium				White	White	Black	Black	Black
(iv) Develop formal research partnerships with important research institutions, NGOs, and industries operating in the area	Medium	Ongoing research in the MPA	Number of Registered research programmes		Black	Black	Black	Black	Black
Objective 2.2: To protect and restore populations of vulnerable, threatened, rare and endemic species									
Management action	Priority	Management targets	Key performance indicators	Responsibility	Time frame (years)				
					2	4	6	8	10
(i) Identify species of special concern (vulnerable, rare, threatened, endemic) and the threats facing them	High	Improved understanding of the extent and life cycles of cold water corals and sponges	Dedicated monitoring programme for cold water corals, sponges and other species of concern	DEFF and partner research institutions	Black	Black	White	White	White
(ii) Promote research to improve understanding of the extent of cold water corals and sponge colonies and the role the MPA plays in the protection and restoration of these species of special concern	Medium				White	Black	Black	Black	Black
(iii) Incorporate improved understanding in the management of the MPA	Medium	Species of concern identified			White	White	Black	Black	Black

(iv) Develop a dedicated prioritised monitoring programme for species of concern										
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Theme 3: Socio-economic benefits - Natural Resource use, Recreation, Tourism, Heritage and Culture

Goal: To ensure sustainable social and economic benefits from the Namaqua Fossil Forest MPA

This Key Management Theme and its Goal provide for the sustainable use of natural and biological resources and the development of sustainable benefits associated with the existence of the MPA as well as the conservation of the heritage and cultural features of the MPA. In the case of the Namaqua Fossil Forest MPA, the MPA regulations allow only line fishing without anchoring, since a key purpose of the MPA is the protection of the benthic environment of the MPA (Purposes (a) and (b) Section 5.). The MPA is probably too far offshore for tourism or recreational activities. However, it hosts the unique heritage resource of the fossilised yellowwood forest which could provide details of historical regional climate patterns. The management of heritage resources is subject to the National Heritage Resources Act (NHRA) which states that all state supported bodies should maintain and conserve the heritage resources under their control in accordance with standards and procedures set out by the South African Heritage Resource Agency (SAHRA). As an initial step SAHRA should be approached to evaluate the fossilised yellowwood forest as a Grade 1 national heritage site.

Although not listed a purpose of the MPA, the MPA also helps to support eco-certification of the hake trawl industry because it provides protection for Vulnerable Marine Ecosystems which is a MSC condition for re-certification of the hake trawl industry. Eco-certification provides significant direct economic benefits to a commercial fishery in terms of pricing and market accessibility. The MPA may ultimately help to preserve the structure, productivity, function and biodiversity of hake habitat.

The focus of this Key Management Theme is i) To protect the unique fossilised yellowwood heritage feature ii) To allow for controlled resource use in a manner and in areas permitted by the regulations and in a way that does not compromise the biological integrity of the MPA and iii) to ensure that the MPA continues to support the eco-certification of the hake trawl industry.

Management actions and targets

Table 11.3.

Key Management Theme 3: Socio-economic benefits - Natural Resource use, Recreation, Tourism, Heritage and Culture									
Goal: To ensure sustainable social and economic benefits from the Namaqua Fossil Forest MPA									
Objective 3.1: To protect the unique fossilised yellowwood forest heritage feature									
Management action	Priority	Management targets	Key performance indicators	Responsibility	Time frame (years)				
					2	4	6	8	10
(i) Approach SAHRA to evaluate and register the fossilised yellowwood forest as a Grade 1 national heritage site	Q99988	Registration of the Namaqua Fossil Forest as a Grade 1 heritage site	Registration of the Namaqua Fossil Forest as a Grade 1 heritage site	DEFF and partner research institutions					
(ii) Improve the understanding of the heritage resource by mapping and recording the extent of the fossil forest									
iii) Solicit research projects to better understand the significance and vulnerability of the fossil forest and its associated biodiversity									
iv) Build industry support for the MPA through development of best practice guidelines, industry codes of conduct, promotion and development of stewardship initiatives and other non-regulatory approaches (see Compliance and Enforcement)			Registered research projects for study of the Namaqua Fossil Forest		Registered research projects for study of the Namaqua Fossil Forest				
Objective 3.2: To allow for controlled resource use in a manner and in areas permitted by the regulations and in a way that does not compromise the biological integrity of the MPA									
Management action	Priority	Management targets	Key performance indicators	Responsibility	Time frame (years)				
					2	4	6	8	10
i) Establish a database of the extent, permitted users and main location of resource use activities. Share with VMS operators (Fisheries Management - MCS)		No illegal fishing related activities in the MPA	Record of number of illegal fishing related activities detected in the MPA	DEFF					
(ii) Ensure resource users are provided with clear information on the conservation management measures in the area including compliance requirements as laid out in the regulations									
(iii) Enforce regulations and monitor implementation of regulations (see Compliance)									
iv) Obtain records of and evaluate annually line fishing activities (catch and areas) from DEFF Branch Fisheries Management data (an ongoing assessment of appropriateness of regulatory controls)									

(iv) Develop relationships that encourage fishing vessel crew members to respect regulations		Reports of illegal activities from the fishing industry	Record of number of illegal activities reported by fishing industry	DEFF					
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Objective 3.3: To support the eco-certification of the economically important hake trawl fishery

Management action	Priority	Management targets	Key performance indicators	Responsibility	Time frame (years)				
					2	4	6	8	10
(i) . Promote research to understand biodiversity of the MPA ecosystem types with a focus on corals, sponges and other invertebrates (See Conservation of Biodiversity)		Implementation of a research programme to improve understanding and protection of Vulnerable Marine Ecosystems	Protection of benthic habitat recognised in MSC audits and reports for SA's hake trawl fishery	DEFF and partner research institutions					
(ii) Build industry support for the MPA through development of best practice guidelines, industry codes of conduct, promotion and development of stewardship initiatives and other non-regulatory approaches (see Compliance and Enforcement)									
iii) Identify and communicate benefits of eco-certification to stakeholders and civil society generally									

Theme 4: Compliance and Enforcement

Goal: To ensure adherence to the regulations of the MPA

This Key Management Theme and its Goal relate directly to the effective management of the MPA. Without effective compliance and enforcement that control illegal activities and ensure general adherence to the regulations relating to the MPA, the MPA will not meet any of the purposes for which it was declared (Purposes (a), (b), (c) and (d); Section 5.).

Non-compliance threats for the Namaqua Fossil Forest MPA are likely to come from the fishing industry (line fishing and long liners) but mining activities in this area also warrant monitoring. The implementation of compliance and enforcement in an offshore MPA will differ considerably from that of a coastal MPA where the focus is on high visibility of compliance staff and regular and frequent inspections and patrolling of the area. In a coastal MPA many of the activities can be completed on land or within close proximity to the coast. To achieve high-profile, visible enforcement in an offshore MPA like the Namaqua Fossil Forest will be difficult and expensive in terms of staffing and equipment. Because of the rough conditions that generally prevail in the South African marine environment, offshore patrols require sophisticated patrol platforms which are expensive to purchase, maintain and operate, require highly skilled staff to operate and are to some extent limited by port availability. Thus, traditional enforcement operations like patrols will probably only occur on an ad hoc basis when DEFF offshore patrol vessels are in the vicinity of a particular MPA.

Since in-situ enforcement and compliance efforts will be limited, it is important to develop cooperative arrangements with other services like SAPS and the South African Navy that have an offshore marine capacity that could assist with patrolling exercises. It is even more important to develop a reliable indirect enforcement capability in the form of an effective vessel tracking capacity that includes the necessary hardware, staffing, data analysis and reporting functions. To be effective, VMS systems need to be permanently monitored, to have relatively short reporting schedules, and should be able to provide alerts when vessels approach MPAs or other sensitive areas. An effective vessel monitoring capacity facilitates the detection of illegal activities that can be addressed either by targeted operations or by arrest and prosecution on return to harbours. The detection of illegal activities from VMS and AIS data combined with vessel licence registers, fishing access permits, and IUU fishing blacklisted vessels or crew requires skilled analysis. There are several training and mentoring options that can develop these skills. VMS transponders are only compulsory on fishing vessels >6 m because of the power requirements. There are a number of recently developed low power transponders for use on smaller line fishing vessels that provide vessel identification services. Promoting voluntary compliance by maintaining effective communication channels with stakeholders and developing best practice guidelines, protocols and codes of conduct that are endorsed by stakeholders also helps to reduce the need for out-in-the-ocean compliance activities.

The focus of this Key Management Theme and Goal is to develop, implement and maintain an effective enforcement capacity that minimizes illegal activities and negative impacts in the MPA, by developing an effective vessel tracking capability, and by encouraging the development of best practice guidelines, protocols and policies that reduce the necessity for enforcement activities.

Management actions and targets

Table 11.4.

Key Management Theme 4: Compliance and Enforcement									
Goal: To ensure adherence to the regulations of the MPA									
Objective 4.1: To develop, implement and maintain an effective enforcement capacity that minimizes illegal activities and negative impacts in the MPA and deters transgressors									
Management action	Priority	Management targets	Key performance indicators	Responsibility	Time frame (years)				
					2	4	6	8	10
(i) Evaluate the monitoring, control, and surveillance (MCS) needs, challenges and opportunities associated with the MPA		No illegal activities in the MPA	Monthly record of the number of illegal activities occurring in the MPA	DEFF					
(ii) Conduct an audit of availability and functionality of the physical resources required to carry out MCS duties effectively									
(iii) Develop a compliance and enforcement strategy for the MPA ensuring funding and staffing requirements are outlined in the strategy, and cooperative arrangements prioritised (Navy, South African Police Services)									
(iv) Ensure compliance and enforcement staff have sufficient resources to implement compliance strategy									
(v) Approach Fish-I Africa/FishForce for training to capacitate staff to undertake effective MCS and improve inter-agency cooperation in MCS.									
(vi) Implement a programme of inspections and patrols, with trained and formally designated compliance staff, optimising patrol platform and other resource use									
(vii) Develop and utilise Standard Operation Procedures for patrols, boarding and inspection procedures, evidence collection protocols and arrest (sea and land) that are aligned with the criminal procedure laws									
(viii) To improve the efficiency of compliance and enforcement operations develop quick reference field manuals for Field Officers that include fisheries and MPA regulations, commercial fish identification guides, fishing gear identification, guides to vessel identification and measurement conversion tables									
(ix) Establish and maintain collaborative working relationships with the SA Navy to boost patrol capacity									

(x) Share information necessary for effective MCS at both national and regional levels (Namibia and Angola). This includes at a minimum, vessel registers, fishing license registers, VMS/AIS data, IUU vessel lists, PSM and Observer reports										
(xi) Establish and maintain a good communication network aimed at identifying activity and vessel movements into and out of MPA areas										
(xii) Ensure that the MPA boundaries are incorporated in South African Naval charts by Naval Hydrographic Office and geo-reference data are incorporated into base maps for VMS operations		MPA boundaries are incorporated in South African Naval charts	Updated SANHO charts	DEFF/SA Navy						
(xiii) In the long term provide support for the development and implementation of a NPOA-IUU plan for South Africa		NPOA-IUU	NPOA-IUU	DEFF						

Objective 4.2: To develop an effective vessel tracking capacity and reporting protocols

Management action	Priority	Management targets	Key performance indicators	Responsibility	Time frame (years)				
					2	4	6	8	10
(i) Promote the upgrade of the DEFF VMS system to ensure effective vessel monitoring capability with a minimum four-hour reporting schedule and 24-hour monitoring		24 hour VMS and AIS monitoring capability with <4h reporting schedules managed by personnel capable of detailed VMS data analysis	Monthly record of illegal vessel activity Database of vessel and persons of interest (engaged in illegal activities) Two staff seconded to Fish-I Africa each year for 3 months mentoring	DEFF					
(ii) Promote the establishment of collaborative working relationships with systems used by global surveillance providers (Global Fishing Watch)									
(iii) Develop reporting procedures for all maritime traffic in the area of the MPA with emphasis on identifying IUU vessels									
(iv) Approach Fish-I Africa for training to capacitate staff to undertake effective VMS/AIS data analysis									
(v) In the long term, promote the exploration and installation of alternative technologies for monitoring (satellite technology, radar, low powered vessel tracking systems based on simplified technology (solar powered cell phones VMS) for small vessels and other alternatives for improved compliance									
(vi) In the long term, build an integrated MCS system that incorporates data from land, sea and aerial patrols as well as fisheries intelligence from observer reports, fishing logbooks and vessel position reports from the automated VMS.									

Objective 4.3: To promote compliance among stakeholders and users of resources in and adjacent to the MPA and deter transgressions MPA

Management action	Priority	Management targets		Responsibility	Time frame (years)
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			Key performance indicators		1	2	3	4	5
(i) Build industry support for the MPA through development of best practice guidelines, industry codes of conduct, promotion and development of stewardship initiatives and other non-regulatory approaches		Codes of conduct established for all user groups	Number of Codes of conduct established for user groups	DEFF and Partners					
(ii) Foster co-operative relationships with other national authorities, international agencies and stakeholders to improve compliance (see Governance)									
(iii) Make it a requirement for the Petroleum Board and offshore diamond mining companies to develop protocols and policies to help guide the environmental assessment and operation of diamond mining and oil and gas activities that may have an impact on the area									
(iv) Develop relationships that encourage fishing vessel observers and crew members to assist with both environmental monitoring and reporting of IUU fishing activities		Reports of illegal activities from the fishing industry	Record of number of illegal activities reported by fishing industry	DEFF					
(v) Enforce regulations and monitor implementation of regulations		No illegal activities in the MPA	Record of number of illegal activities detected in the MPA						

Theme 5: Disaster management

Goal: To provide for the safety of the biodiversity and human elements, and the continued functioning of the ecological processes of the MPA in the face of any environmental crisis

This Key Management Theme and its Goal relate directly to all the purposes for which the MPA was declared. If management does not address the threat of potential disaster or pollution events none of the purposes for which the MPA was declared will be achieved if the area is severely impacted by a pollution or disaster event (Purposes (a), (b) (c) and (d); Section 5.).

The Western margin of South Africa is subject to high levels of marine traffic and rough sea conditions which together pose a significant oil pollution risk. In addition, there is ongoing exploration for oil and gas reserves in the vicinity of the MPA, and diamond prospecting licences have been granted for areas that overlap with the MPA. All these activities pose potential environmental threats to the MPA both in the prospecting/surveying phase and the operational phase. Oil spills have extreme negative impacts on marine biodiversity in both the pelagic and benthic environments and there is the potential for major pollution events from the cargos of vessels traversing the inshore and offshore waters of the Western Cape. It is critical to be prepared for such contingencies. The National Oil Spill Contingency strategy has been developed for oil spill situations but the vessels available to implement the strategy are not always functional or may be operating in another capacity. Surveillance capacity is limited and there may be administrative complications that hamper the effective implementation of the Contingency strategy. It is important that a MPA specific contingency plan is developed to ensure a rapid and effective response is possible in the event of any environmental disaster.

The focus of this Management Theme is to establish and maintain effective disaster/pollution management planning that provides for the safety of the biodiversity, human elements and the continued functioning of the ecological processes of the Namaqua Fossil Forest MPA in the event of any environmental crisis.

Management actions and targets

Table 11.5.

Key Management Theme 5: Disaster management									
Goal: To provide for the safety of the biodiversity and human elements, and the continued functioning of the ecological processes of the MPA in the face of any environmental crisis									
Objective 5.1: To establish and maintain effective disaster management planning to minimise risk of pollution and other disaster events in the MPA and its vicinity and ensure that the biodiversity and ecological processes of the MPA are sustained in the event of an environmental crisis									
Management action	Priority	Management targets	Key performance indicators	Responsibility	Time frame (years)				
					2	4	6	8	10
(i) Ensure that the MPA and surrounds are accommodated adequately within the National Oil Spill Contingency strategy (October 2019)		Pollution or Disaster impacts are mitigated by proactive planning	A MPA Contingency Plan developed with minimum details as specified in the management action Oil spill trajectory model exists for the MPA Annual record of Pollution/Disaster events with report that details lessons learned from any incidents	DEFF					
(ii) Identify most likely disaster/pollution risks associated with the MPA									
(iii) Develop a MPA Contingency Plan that must include at a minimum communication lines, emergency contact details, maps and charts of the MPA, identification of responsibilities, equipment availability and an assessment of training needs to effectively implement the Contingency plan									
(iv) Implement immediate reporting requirements of any pollution/ disaster events using formalised accident reporting protocols that ensure an early response and report on any incidents with key lessons learnt to inform future efforts									
(v) Where practical monitor areas/activities assessed as being high pollution or disaster risk and develop an oil spill trajectory model for pro-active management in the event of a spill s									
(vi) Ensure all vessels operating inside the MPA comply with MARPOL									

Theme 6: Planning

Goal: To integrate the management of the MPA with external developments, processes and impacts to ensure that the MPA objectives are not compromised by these issues.

This Key Management Theme and its Goal relate directly to the protection and conservation of the biodiversity and ecological processes of the Namaqua Fossil Forest MPA (Purposes (b) and (c); Section 5.). MPAs do not operate and cannot be managed in isolation. They have physical, ecological and social links to everything around them. Because of the interconnectedness and open access nature of coastal and marine systems, activities on land and in the sea can have a negative impact on ecosystems even if such ecosystems are a considerable distance from the source of a disturbance. Industrial practices, mariculture, waste disposal and even catchment erosion and river flow modification can change the chemical, physical and biological characteristics of coastal and offshore marine systems, often to their detriment. As a result, the MPA management authority must be aware of, and where necessary be proactively involved in, any planning process involving the MPA and areas adjacent or close to the MPA where there is potential for negative or positive impacts on the MPA ecosystems. Part of the management process may be the determination of a zone of influence for the MPA and the development of a zone of influence policy which stipulates compliance with legal requirements and due process for the authorisation and operation of developments in the Zone of Influence.

The focus of this Key Management Theme is to identify activities, issues and developments in the marine environment that have the potential to impact in any way on the Namaqua Fossil Forest MPA and to make arrangements to be involved in the planning and management of these elements in order to mitigate any potential negative impacts and benefit from any positive impacts. As this MPA hosts the unique heritage resource of the fossilised yellowwood forest which could provide details of historical regional climate patterns., one of the first actions under this theme could be to approach the South African Heritage Resource Agency (SAHRA) to evaluate the fossilised yellowwood forest as a Grade 1 national heritage site.

Management actions and targets

Table 11.6.

Key Management Theme 6: Planning									
Goal: To integrate the management of the MPA with external developments, processes and impacts to ensure that the MPA objectives are not compromised by these issues									
Objective 6.1: To co-operate with the relevant international and national government structures, industries, NGOs and communities insofar as their activities affect the MPA and to keep track of issues affecting the MPA and vicinity to ensure functional ecosystems are protected									
Management action	Priority	Management targets	Key performance indicators	Responsibility	Time frame (years)				
					2	4	6	8	10
(i) Identify factors and activities outside the MPA that could negatively or positively impact on the ecological integrity of the MPA		No negative impacts on the MPA from developments, processes and impacts external to the MPA Heritage listing investigated and implemented if feasible	Registration as IAP in local and regional development/industrial planning	DEFF					
(ii) Cooperate with relevant structures to ensure planning related to such factors/activities protects functional ecosystems in the MPA			Attendance records at local and regional development and industrial planning stakeholder meetings	DEFF and Partners					
(iii) Initiate discussions with stakeholders to evaluate any beneficial extensions to the area of the MPA and evaluate other approaches to strengthen management such as SAHRA Heritage listing			Development of a Zone of Influence Policy	DEFF					
iv) Institute a programme to identify the Zone of Influence for the MPA			Feedback received from SAHRA						
(v) Develop and implement a Zone of Influence Policy to protect the integrity of the MPA									

Theme 7: Engagement, Education and Public awareness

Goal: To engage resource users, stakeholder and the general public on the attributes, function and benefits of the MPA including its contribution(s) to marine conservation and sustainable use

This Key Management Theme and its Goal relate directly to Purpose (d) which requires that the MPA promotes and contributes to environmental education (Purpose (d); Section 5.).

A key issue in the management of any protected area is the general lack of understanding by key stakeholders of the ecological and economic benefits generated by a protected area, its legal context, and the obligations generated by such legal context. Such lack of understanding complicates management and increases the need for expensive enforcement and compliance activities. Ongoing engagement that takes place at different levels of society (schools, general public, MPA user groups) can serve to build relationships and the development of a sense of care, ownership and responsibility across the different levels of society. Stakeholders contribute multiple forms of knowledge, can share ideas and potential solutions to emerging challenges and have a key role in disseminating information more broadly. It is thus important to direct resources to engaging with stakeholders.

Apart from improving legal contextual understanding and obligations, an education and awareness programme promotes an understanding of the importance of healthy ocean ecosystems, outlines the ecological benefits associated with the MPA, and where relevant, can highlight the economic, recreational and cultural benefits that accrue to stakeholders from the existence of the MPA. This increased awareness promotes public support for a MPA and often plays a key role in facilitating the management process and reducing the need for expensive enforcement and compliance activities.

The focus of this Key Management Theme is to build support for the Namaqua Fossil Forest MPA by undertaking a range of engagement, awareness raising and educational activities with a focus on improving voluntary compliance with regulations and in the long term, facilitating the interpretation of marine ecosystems and conservation for the promotion of the MPA and the marine environment generally amongst both stakeholders and the general public.

Management actions and targets

Table 11.7.

Key Management Theme 7: Engagement, Education and Public Awareness									
Goal: To engage resource users, stakeholder and the general public on the attributes, function and benefits of the MPA including its contribution(s) to marine conservation and sustainable use									
Objective 7.1: To raise the profile of MPA and increase appreciation of its attributes, functions and benefits including its contribution(s) to marine conservation and sustainable use, with a focus on improving voluntary compliance with regulations									
Management action	Priority	Management targets	Key performance indicators	Responsibility	Time frame (years)				
					2	4	6	8	10
(i) Develop an Awareness and Outreach Plan and Programme									
(ii) Source or develop awareness raising materials that improve understanding of the attributes, functions potential benefits of the MPA for stakeholders and the general public as well as clarifying the legal context of the MPA, the obligations of all stakeholders affected by the management of the MPA, and the implications of poor compliance with regulations for ecosystems, biodiversity and fisheries		Outreach materials outlining benefits, opportunities, and legal and regulatory context of the MPA sourced or developed and effectively distributed	Educational materials exist and are shared with stakeholders including Ocean Literacy partners e.g. WWF or Two Oceans Aquarium	DEFF and Literacy Partners					
(iii) Evaluate the most effective distribution and communication formats for different groups and implement									
(iv) Interpret and disseminate relevant research outputs for use by the non-research community		Presentations of research results creatively interpreted and documented for non-scientists	Number of education/ awareness raising/ Outreach meetings or workshops completed per year						
(v) Ensure the MPA is included in awareness raising initiatives									
(vi) Update information regularly									
(vii) Include details and description of the MPA on official government communications and relevant project websites									

Theme 8: Monitoring, Research and Information management

Goal: To realise the potential of the Namaqua Fossil Forest MPA for enhancing scientific knowledge and increasing the evidence base to inform ecosystem-based management

This Key Management Theme and its Goal directly addresses Purpose (d) of the declaration of the Namaqua Fossil Forest MPA. Purpose (d) requires the protection and provision of an appropriate reference environment for research and monitoring including climate change research. The Management Theme and its Goal are also implicit in the conservation and protection of the biodiversity and ecological processes associated with the fossilised yellowwood forest and the protection of benthic ecosystems on the shelf (Purposes (a) (b) and (c); Section 5.). There are crosscutting issues relating to this Theme that are addressed in the Theme 2 (Biodiversity and Conservation).

Monitoring and research in the offshore environment is challenging because almost all monitoring requires specialized and expensive platforms since the operation of small vessels far from shore poses significant safety concerns. Research generally requires expensive equipment and platforms and is almost always weather dependent which is problematical because weather conditions on the Western Cape coast are often not conducive to sea-going activities. The lack of harbour facilities north of Saldanah Bay also limits seagoing activities. To implement a successful monitoring programme, it will be necessary to establish cooperative arrangements with a range of parties like NGOs, other research programmes, oil and gas surveys, diamond prospecting programmes and particularly with the fishing industry who spend more time in the area than any other stakeholder. The current lack of understanding of the structure and functioning of the Namaqua Fossil Forest MPA probably prevents the identification of key pathways or components that could be selected as efficient monitoring indicators. The focus of monitoring should probably be on baseline monitoring to develop the foundations of understanding on which more effective, and more efficient monitoring can be built in the future. Research should focus on those aspects that would help to better characterize the system, an analysis of existing data (where available) and the establishment of quantitative baselines.

The focus of this Key Management Theme is i) To Increase the understanding of the ecosystem types and the biodiversity associated with the fossilised forest within the Namaqua Fossil Forest MPA and how they might be impacted by human activity and climate change ii) To develop and maintain a monitoring programme that provides managers with accurate and timely information on the state of the Namaqua Fossil Forest MPA ecosystems, the potential threats to meeting the MPA purposes, and which provides scientific reference points for monitoring and management of ecosystem types iii) To collate and adequately manage data and information on the MPA, ensuring ease of access to support research and management decisions.

Management actions and targets

Table 11.8.

Key Management Theme 8: Monitoring, Research, and Information management										
Goal: To realise the potential of the Namaqua Fossil Forest MPA for enhancing scientific knowledge and increasing the evidence base to inform ecosystem-based management										
Objective 8.1: To support research and monitoring that increases understanding of the ecosystems, biodiversity and benefits of the MPA including research on climate change and the impacts of human activities on habitats and biodiversity										
Management action	Priority	Management targets	Key performance indicators	Responsibility	Time frame (years)					
					2	4	6	8	10	
(i) Collate relevant research and identify and communicate key knowledge gaps for the MPA.		Research database and plan developed and approved	Research database and plan developed and approved	DEFF and Research Partners						
(ii) Develop research and monitoring partnerships underwritten by MoAs with important research institutions, NGOs and industries operating in the area										
(iii) Archive data onto the MIMS database to ensure that it is adequately curated and accessible to stakeholders. Liaise with the MIMS/OCIMS teams at DEFF to incorporate information into OCIMS that includes spatial biodiversity information, threats and trends in the status of biodiversity. Describe and map the physical environment (bathymetry) and identify the spatial distribution of the fossil forest and other habitats. Include socio-economic research of relevance.										
(iv) Implement timely research permit application approval process		Active management orientated research programme	Annual research report that informs management	DEFF						
(v) Maintain a research register for all research programmes										
(vi) Assist with access, data collection and supervision for approved research projects										
(vii) Ensure all research results are fed back to management				DEFF and Research Partners						
(viii) Ensure research results inform adaptive management				DEFF						
Objective 8.2: To develop and maintain a monitoring programme that provides managers with accurate and timely information on the state of the MPA, the potential threats to meeting the MPA purposes, and which provides scientific reference points for management of ecosystem types										
Management action	Priority	Management targets	Key performance indicators	Responsibility	Time frame (years)					
					2	4	6	8	10	
(i) Review and prioritise monitoring needs for the MPA		Monitoring plan that informs management	Monitoring plan and baseline data	DEFF and Research Partners						
(ii) Identify and establish benchmark areas for monitoring										

(iii) Establish other relevant and logistically pragmatic ecosystem health indicators for monitoring		developed and implemented							
(iv) Facilitate the collection of prioritised monitoring data									
(v) Analyse monitoring data and apply appropriate management actions				DEFF					
Objective 8.3: To collate and adequately manage data and information on the MPA, ensuring ease of access to support research and management decisions									
Management action	Priority	Management targets	Key performance indicators	Responsibility	Time frame (years)				
					2	4	6	8	10
(i) Set up Namaqua Fossil Forest data archive in MIMS.		Development of a central data archive of all biodiversity and resource use data	Development of a central data archive of all biodiversity and resource use data	DEFF and Research Partners					
(ii) Archive all biodiversity and resource use data for the MPA that can inform and refine its management									
(iii) Ensure appropriate access to information and its interpretation									

11.2 Management Effectiveness

The date for the implementation of the Management Plan has not been determined. Meetings and discussions with stakeholders must take place before the draft Management Plan is finalised and implemented. An overview of the process followed in the development of the draft Management Plan will be developed/completed in February 2021.

The purpose of implementing a management effectiveness audit is to ascertain the relevance and effectiveness of the activities recommended within the framework of this Management Plan. The management authority (DEFF) and the Namaqua Fossil Forest MPA (or Offshore MPA) Stakeholder forum must agree on a programme or tool for undertaking the audit. There are a number of current audit tools designed to evaluate the effectiveness of protected area management programmes, including the Management Effectiveness Tracking Tool (METT). The METT-SA has been modified for South African protected areas and has been used to assess management effectiveness in South Africa's MPAs (Tunley 2009; Chadwick et al. 2014). Before deciding on the METT-SA tool it should be assessed for its suitability for offshore MPAs. A key challenge to effectively undertaking a management assessment is to ensure that the correct indicators for assessment are chosen. These indicators must be directly linked to the objectives of the MPA, and the assessment must be undertaken at the strategic and operational levels. The METT-SA can be used as a baseline framework with adaptations being made so that MPA specific issues may be addressed.

The recommended interval for an audit is annually for the first three years and thereafter every five years. After each audit, a report on the status of implementation of the Management Plan should be compiled and submitted to the DDG Oceans and Coast. The report should be used to guide adaptive management strategies.

11.3 Research and Monitoring Programme

It has been noted above that monitoring and research in the offshore environment is challenging because almost all monitoring requires specialized and expensive platforms, research generally requires expensive equipment and platforms and rough sea conditions often limit sea time. It should be a priority to establish cooperative arrangements with other research programmes in the area (e.g. University Projects, SAEON monitoring nodes, Namibia research programmes). Data can also be acquired and collated from the oil and gas and fishing industries who could be approached to collect/share bathymetric and oceanographic data as well as key information on biodiversity and the health of fish populations (catch data). The focus of initial research should be on baseline studies to acquire a better understanding of the biodiversity and ecology of the Namaqua Fossil Forest MPA and surrounding areas by describing the environmental parameters and ecosystems present in the MPA. A key issue is the determination of the extent of the fossil forest. Once initial baseline/foundational information has been obtained and analysed, select key components of the MPA ecosystem should continue to be monitored at appropriate intervals to enable detection of changes to the system.

A research and monitoring plan could include:

- Collation of all relevant information on the area of the MPA and surrounds
- Further baseline sampling of benthic and fish communities with a focus on potential Vulnerable Marine Ecosystem indicator taxa and the potential hake nursery function of this MPA

- Development of species lists for the MPA
- Further study of the characteristics and distribution of the fossil forest, sediment and water quality in the MPA
- Establishment of monitoring sites inside and outside the MPA that would provide insight both pelagic and benthic impacts from activities such as such trawling, diamond mining, oil and gas surveys and infrastructure development, and the process of recovery from such activities.
- Systematic monitoring of physical parameters that are identified to be important/feasible to measure in this MPA
- Surveys to assist with identifying potential areas for expansion of Namaqua Fossil Forest MPA.

12. Costing and funding

Funding for the management of MPAs is by way of National Government through the Department of Environment, Forestry and Fisheries. Without a clear understanding of the detailed nature of the institutional arrangements, staff requirements and the operational planning for the management of the Namaqua Fossil Forest MPA it is difficult to determine costs for the management of the MPA. An outline of likely budgetary requirements is provided in Table 12.1. The estimated costs for various components of a management programme are presented in Table 12.2. A budget to fund the implementation of the Namaqua Fossil Forest MPA Management Plan must be compiled and approved by DEFF before the start of each financial year.

Table 12.1. Budget categories for the management of a typical MPA.

Capital Expenditure - new infrastructure	Assets including computers, office equipment, vehicles, trailers, MCS platforms, firearms	Governance – meetings, stakeholder engagement
Staffing costs	Human capital development costs	VMS functionality
Financial management and administration	Compliance and Enforcement costs – fuel, gear, equipment, patrol platforms	Education and Public Awareness activities
Software licence fees	Information management	Disaster management
Research and monitoring	Communication – radios, phones	Recurring operational costs

Table 12.2. Estimated costs for some elements of a MPA management programme (Costs estimated from current SANParks and CapeNature Protected Area Management Plans and Fielding et al. 2020).

Item	Purpose/Description	Cost (ZAR)
Simple Database model and/or metadata	Vessel registry, fishing permit applications, Black-listed IUU vessels, Records of illegal fishing activities	110 352
Complex Database model and/or metadata	Capture, storage and analysis of complex data in a relational database	441 376
Development costs of Analytical Model Algorithms or User Interfaces	Data mining and analyses	1 655 168
Permanent Personnel (pa)	Junior manager	450 000
Permanent Personnel (pa)	Senior manager	600 000
Management Effectiveness Evaluation	Cost of annual survey	110 336
Software licences	Use of basic software to allow standard IT operation	220 688
Software licences	Use of sophisticated technology for vessel tracking, data mining etc	882 752
Inspection equipment for undertaking basic MCS activities	Start up Ongoing	16 000 1 600
SATphone for MCS activities	Start up Ongoing	11 200 1 600
Aerial surveillance	Per hour	60 000
Operation of offshore patrol platform annual cost	100 h per month	5 000 000
Monitoring costs	Estimated	200 000
Training of personnel (per person per 40 contact hour training course)	MCS, EMI, Peace Officers, VMS	20 000
Development of educational materials and dissemination	Costs per annum	100 000
Cooperative governance	Stakeholder meeting once per year	80 000
METT Survey	Survey cost per annum	60 000
Disaster preparedness	Audits, equipment inspection/update	80 000
Information management	Ad hoc Services from IT technicians	150 000

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