WESTERN INDIAN OCEAN

MARINE PROTECTED AREAS OUTLOOK

Towards achievement of the Sustainable Development Goals

COUNTRY CHAPTER: COMOROS

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WIOMSA Coasts Ocean and People

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FOREWORD

It is indeed an honour to launch the *Western Indian Ocean (WIO) Marine Protected Areas (MPA) Outlook* in my capacity as the Minister for Agriculture, Climate Change & Environment in the government of Seychelles. I commend the Contracting Parties to the Convention for this excellent example of regional collaboration in documenting the progress made towards the attainment of the SDG 14.5 Target of 10 percent protected area of each country's EEZ.

The WIO region has a coastline stretching for more than 15 000km, a continental shelf area of some 450 000km^2 from Somalia in the north to South Africa in the south and covers ten countries (Comoros, France, Kenya, Madagascar, Republic of Mauritius, Mozambique, Seychelles, Somalia, South Africa and the United Republic of Tanzania) five of which are island States. The combined population for the WIO region is 244 million, and the ten countries in the region are Contracting Parties to the Nairobi Convention for the protection, management and development of the coastal and marine environment of the WIO region.

The combined economic value of the WIO ecosystems goods and services is estimated at over USD 20 billion Gross Marine Product per annum and a total asset base of over USD 333.8 billion. With over 30 percent of the WIO population (about 60 million people) living within 100km of the coastline, the coastal and marine ecosystems provide essential sources of livelihoods and income to coastal communities and significantly contribute to national economies.

However, the WIO is threatened by ecosystem degradation from rapid urbanization, increased population growth, coastal development, land reclamation and conversion. Impacts of climate change and variability have led to coral bleaching, sea-level rise, flooding and other effects. In response to the emerging natural and anthropogenic challenges, Contracting Parties to the Nairobi Convention are adopting an integrated approach in the management of ocean resources to maintain a balance between conservation and development. The approach aligns with the 2030 Global Agenda for Sustainable Development with Sustainable Development Goal (SDG) 14 focusing on the need to mobilize global effort to conserve and sustainably use the oceans, seas and marine resources for sustainable development.

The *MPA Outlook* outlines the significant strides made in the region in promoting the protection of critical coastal and marine resources. The *MPA Outlook* prepared by the Contracting Parties to the Convention documents the progress made in the WIO region towards achieving MPA targets based on the Convention of Biological Diversity (CBD)'s Aichi Target 11/SDG 14.5 and provides a baseline for the post 2020 Global Biodiversity Framework.

The region has established 143 MPAs (or equivalent), covering a total of 555 436.68km^2, representing 7 percent of the total combined exclusive economic zone (EEZ) of the nine countries covered in the *MPA Outlook*. Most of the MPAs predominantly protect coastal habitats. Notably, a few MPAs have been proclaimed over very large areas of deep-sea habitats contributing to a larger proportion of the 7 percent.

By March 2020, Seychelles had designated 30 percent of its EEZ as protected marine areas, tripling the UN CBD Target 11 for 10 percent marine protection by 2020, and the UN SDG-14.5 for 10 percent coastal and marine protection. Seychelles with an EEZ of 1 374 000km^2 and a land mass area of 455km^2 achieved this milestone through the debt for nature swap spearheaded by The Nature Conservancy (TNC). Promising initiatives on transboundary MPAs are being developed between Kenya and Tanzania and between Mozambique and South Africa.

The establishment of MPAs has a long history in the region. South Africa declared the first MPA in 1964, the Tsitsikamma MPA, which was the first MPA in the region and since then South Africa has steadily increased the number and coverage of its marine conservation estate. By 2019, South Africa had 42 MPAs raising the total MPAs cover from <0.5 percent to 5.4 percent of the EEZ.

The *MPA Outlook* comes at a time when the region has embarked on large-scale socio-economic developments that are equally exerting pressure on MPAs. The *MPA Outlook* thus provides some answers and innovative approaches to minimize the scale of negative impacts on MPAs.

The *MPA Outlook* is the best form of experience sharing, and documenting best practices in MPA management across the WIO.

On behalf of the Contracting Parties, I wish to acknowledge and thank the Nairobi Convention Secretariat for the overall coordination of the process; the Western Indian Ocean Marine Sciences Association (WIOMSA) for technical and financial support through the Marine Science for Management (MASMA) Programme and the Global Environment Facility for funding the preparation and production of the *MPA Outlook* under the GEF funded

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EXECUTIVE SUMMARY

The Western Indian Ocean (WIO) is renowned for the richness of its marine biodiversity, especially that associated with the region's widespread coral reef systems. The mangroves, seagrasses, rocky and sandy shorelines with associated dune systems and coastal forests, and the deep-sea features such as seamounts, ridges and abyssal plains also contribute substantially to the biodiversity of the region. The innumerable islets and atolls scattered across the WIO also support extraordinary biodiversity, including vast numbers of often rare, endemic and endangered marine species.

This rich marine biodiversity supports burgeoning coastal populations both directly, through the provision of a variety of marine resources and vital ecosystem services such as coastal protection, and indirectly, through the opportunities it provides for economic growth through sectors such as fisheries, tourism, infrastructure development and others. However, the marine resources are coming under increasing pressure in the coastal areas through the escalating needs of the local populations, exacerbated by the use of illegal fishing techniques, such as "blast" or dynamite fishing and the use of poisons, and in deeper waters from the legal and illegal harvesting of vast quantities of resources by international commercial fishing fleets. The tourism sector that brings benefits to coastal communities is in many places damaging the very resources the tourists wish to enjoy. In addition, interest in mineral resources including oil and gas reserves, found under the seabed, is exacerbating pressure on coastal ecosystems. Developing coastal nations in the WIO region, particularly those faced with financial constraints, are keen to exploit mineral resources for the benefit of their populations, leading to an exponential increase in the issuing of prospecting and extraction rights.

To these pressures are added increased levels of land and sea-based pollution, sedimentation from silt-laden rivers, and extensive coastal development; together with the increasingly evident impacts of climate change including sea-level rise, ocean warming and acidification, and increased frequency and intensity of storm events. If the twin threat from coastal development and climate-related pressure, is left unmitigated, with no protection afforded to the marine and coastal systems, there is every likelihood that the marine biodiversity of the WIO region would be irreversibly compromised. The consequential impacts on the livelihoods of coastal communities, and the well-being of the populations across the region, are likely to have long-term and negative ramifications on the national economies of the coastal states.

Aware of the global threat from both human-caused and climate change-related stressors, the global community in 2015 committed to achieving the United Nations Sustainable Development Goals (SDG). With particular relevance for the marine environment is SDG 14, "Life below Water".

The SDG 14 has several targets including Targets 14.2 on sustainable management and protection of marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration, to achieve healthy and productive oceans by 2020; and 14.5 that aimed at all countries conserving at least 10 percent of coastal and marine areas, essentially their exclusive economic zones (EEZs), consistent with national and international law and based on the best available scientific information by 2020. Target 14.5 was aligned to the Convention on Biological Diversity (CBD) Strategic Plan for Biodiversity 2011–2020 Aichi Target 11, which encouraged all signatory nations to ensure that:

> "By 2020, at least 17 percent of terrestrial and inland waters, and 10 percent 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 and other effective area-based conservation measures, and integrated into the wider landscape and seascapes." (Secretariat of the Convention on Biological Diversity, 2010).

This *MPA Outlook* reviews the commitment by governments to achieve 10 percent protection of important marine and coastal areas through effectively and equitably managed MPAs and other effective area-based management measures (Aichi Target 11 and SDG 14). The review takes into account the formulation of the CBD's post 2020 biodiversity framework, that proposes, among other goals a zero net biodiversity loss by 2030, as well as providing a baseline for the post 2020 framework.

The declaration of marine protected areas (MPAs), has long been considered a key tool in the fight to conserve the world's marine biodiversity, and the WIO countries have played their part, by identifying and declaring MPAs; from Tsitsikamma, the first MPA in Africa, proclaimed by the Government of the Republic of South Africa in 1964, to the MPAs proclaimed in 2019 by the Governments of Seychelles and the Republic of South Africa, and those proposed for imminent declaration by the government of Comoros. It is also evidently clear that the mere proclamation of an MPA is no guarantee of effective protection. An assessment on MPA management effectiveness showed

that many MPAs in the region lack human resources, skills, equipment, and institutional commitment to fulfil their functions adequately. The assessment also revealed serious declines in conservation funding. The COVID-19 pandemic led many countries to adopt lockdown measures, affecting tourism revenues on which many MPAs in the WIO depend to finance MPA operations. Marine conservation in the WIO region needs a post-COVID recovery plan and marine conservation efforts must now be funded not only at the level that they were at before the pandemic but at an even higher amount that reflects the severity of the unprecedented threats to biodiversity and associated economic sectors.

Madagascar has pioneered an interesting approach to protecting marine areas through a rapid increase in the number of Locally Managed Marine Areas (LMMAs), where coastal communities work in collaboration with government and other stakeholders to protect their coastal resources. A similar approach has been recorded under a variety of names in different countries, across the region. Over three hundred LMMAs have been established across the region in the last ten years. While most of these do not, as yet, provide the levels of protection afforded by the more established formal and effectively managed MPAs, they have great potential to increase the coastal areas under conservation management in the region quite substantially.

Prime targets (prawns and fish) from inshore beach seining off Malindi, Kenya. © Peter Chadwick

At a transnational scale, the moves to initiate transboundary MPAs, such as between Kenya and mainland Tanzania, and Mozambique and South Africa, must be lauded and supported. Coastal states are also taking a large-scale approach to marine conservation, often within "Blue Economy" initiatives such as the Blue Economy Roadmap developed by the Government of Seychelles and Operation Phakisa in South Africa. In both cases, these initiatives have involved thorough and complex marine spatial planning processes, identifying areas suitable for different uses and activities, including for conservation.

In Seychelles, two new MPAs covering an area of 208 365km^2 were declared as a result of this process. In South Africa, 20, mostly offshore MPAs covering an area of 54 214km^2, have been proclaimed under Operation Phakisa following an intense consultation process with all stakeholders. The Seychelles and South African experiences provide excellent models for other WIO countries for the planning, identification and declaration of offshore MPAs. These two experiences were underpinned by strong policy support, evidence-based decision making and requisite financing. These are key lessons in any successful MPA establishment and eventual operationalization and management programmes.

The Republic of Mauritius, Kenya, Tanzania, and other countries have embarked on Blue Economy initiatives and adopted the application of area-based planning tools such as marine spatial planning processes, underpinned by scientific information and understanding of the marine environment. The WIO region is fortunate to be home to some highly productive and effective marine science institutions and scientists, all linked to the Western Indian Ocean Marine Science Association (WIOMSA), which has partnered with the Nairobi Convention Secretariat in the production of this *MPA Outlook*. It is the science emanating from these institutions which provides the evidence required firstly to identify and assess the threats to marine ecosystems and species, and then secondly to identify the areas and habitats most in need of protection and the forms of protection most appropriate to them. However, while the scientific understanding of the coastal and inshore environments is solid, this is not necessarily the case with the offshore deep-sea environments, which have only recently been the focus of concerted scientific attention and research. The value of such research is shown in the proclamation of the South African offshore MPAs.

To achieve its prime purpose of assessing progress towards meeting the SDG and Aichi targets, this *MPA Outlook* set out to document and celebrate the

achievements up to 2020 in the establishment of MPAs, or equivalent levels of protection, across the WIO region. It also documents the exciting move towards more community-based coastal conservation initiatives as represented by the LMMAs and other sites managed collaboratively with coastal communities. In addition to this documentation, there are elements of assessment and analysis to guide the expansion and strengthening of marine conservation in the region, particularly towards the achievement of the post-2020 Global Biodiversity Framework (GBF).

More specifically, the body of the *MPA Outlook* is structured as follows:

Part I

Outlines the purposes for the development of the publication, the key methodologies employed in gathering and documenting the information, and some of the challenges faced in compiling the *MPA Outlook*. The specific purpose of the *MPA Outlook* was to provide a baseline assessment of existing coastal and marine conservation efforts in the region. This involved not only a quantitative assessment of the areas and habitats under protection, but also a qualitative assessment. In addition to the primary technical purposes of this *MPA Outlook*, it was intended to document and celebrate the achievements of governments in furthering the conservation of their marine and coastal environments. It also provides the opportunity to encourage and motivate governments, supported by the scientific community, in increasing efforts towards long-term conservation of vital marine resources, species and ecosystems, including those in the deep-sea.

Part II

Describes the international and regional marine conservation contexts in which the *MPA Outlook* is located. This *MPA Outlook* was not developed in isolation; rather it is embedded in, and is intended to contribute significantly to, the increasing momentum of initiatives aimed at securing the biodiversity and productivity of coastal and marine areas. These initiatives operate from the global to the local levels, with increasing emphasis on the synergies between them as exemplified by the "think globally act locally" environmental mantra.

Part III

Provides detailed descriptions of the MPAs (and equivalents) in each WIO country, together with information on proposed MPAs and areas such as LMMAs under less formal forms of protection. The data revealed that there are 143 MPAs (or equivalents) in the WIO region, covering a total of 555 436.68km^2, representing 7 percent of the total combined EEZ of the nine countries included in this analysis. The numerical majority of MPAs in the region protect predominantly coastal habitats. However, the few MPAs proclaimed over large areas of deep-sea habitats (by France, Seychelles and South Africa) contribute by far the largest proportion of the total area under protection, and make the greatest quantitative contribution (6.2 percent of the 7 percent) to the percentage of total EEZ protected. To strengthen the emerging LMMAs as an approach to community level protection, an enabling policy environment and capacity building of both communities and their supporting agencies will be key for the effective establishment and management of these community managed areas.

Part IV

Provides an assessment of the management effectiveness of MPAs across the region, and makes initial recommendations for improving levels of management effectiveness. The key finding was that legislative and institutional frameworks that support the establishment and management of MPAs exist in every country, suggesting that there is the political will to meet the global and regional marine conservation objectives and targets. However, widespread failure to implement legislation, and in many countries, the ineffective functioning of mandated institutions was observed. Among the challenges identified, those that are cross-cutting throughout the region include shortfalls in financial and personnel capacity, insufficient clarity on MPA boundaries, leading to compliance challenges, and management decision sup¬port systems that are only weakly guided by science.

Part V

Draws on the information provided to analyse the current situation regarding marine conservation in the WIO region, in particular in relation to the achievement of the SDG and Aichi targets. Part V also makes initial recommendations on where future marine conservation efforts, particularly the siting of MPAs, might be concentrated as countries work towards the Targets in the post-2020 GBF.

The key findings of this *MPA Outlook* indicate that there are 143 sites across the WIO region that are considered as MPAs or as having equivalent legal status and levels of protection. The vast majority of these are coastal and/or inshore, however the largest, covering by far the greatest extents of the ocean are the few MPAs with considerable offshore deep-sea elements. These include the MPAs

declared in Seychelles and South Africa's 20 MPAs, of which 14 are offshore sites, proclaimed in 2019. Since it is not practically feasible for the SDG or GBF target to be achieved through the declaration of only coastal and inshore MPAs, as this would require the protection of entire national coastlines extending 37km offshore, or equivalent (i.e. half the coastline extending 74km offshore), identification, declaration and management of offshore MPAs by regional countries remains the most viable option of achieving this target.

A further finding is that the majority of existing MPAs across the region are not managed as effectively as they could and should be, due primarily to lack of funding for essential staff, equipment and capacity development, and weak institutional support and commitment. The question is raised whether the immediate priority should be for governments to firstly ensure effective management of their existing MPA estate, before embarking on expansion of this estate. A balance between establishment of new MPAs and effective management of existing sites is a critical decision, which each country will need to continuously consider.

A very positive finding is that there is every indication of the willingness and commitment of the Nairobi Convention contracting parties to strengthen marine conservation in areas within their jurisdiction. This is evidenced by improvements in legislation, including the development of new MPA-specific legislation, such as in Comoros, and the declaration of new MPAs in Mozambique, Seychelles, Comoros and South Africa.

There is also a good reason to be optimistic about the potential for coastal communities, with the support of governments and other stakeholders in LMMAs (or equivalents) to take on the mantle of coastal and inshore conservation, while the governments themselves focus on the offshore areas. Ongoing efforts on the development of the post-2020 GBF provide a basis for the WIO region to work towards a no-net loss of biodiversity by 2030. This may include exploring the immense opportunities for better recognizing and supporting conservation by local communities and private actors and adopting new models for Ocean Stewardship that reward sustainable actions by stakeholders.

The expansion of the MPA estate by 2030 and by 2050 is also among the goals of the post-2020 Framework. From a regional perspective, configuring an effective post-2020 regional network of effectively managed MPAs would require concerted efforts towards implementing the proposed theory of change that assumes transformative actions are taken to (a) put in place tools and solutions for implementation and mainstreaming, (b) reduce the threats to biodiversity and (c) ensure that biodiversity is used sustainably to meet people's needs and that these actions are supported by (i) enabling conditions, and (ii) adequate means of implementation, including financial resources, capacity and technology.

Lawrence Sisitka
Co-editor

MARINE & COASTAL AREAS
UNDER PROTECTION

COMOROS

Housseni Houssoyni

Sustainable exploitation of resources in Nioumachoua islets, Mwali Island, Comoros. © Hendrik Sauvignet

COUNTRY OVERVIEW

The Comoros Archipelago is located at the northern entrance of the Mozambique Channel, extending from latitude 11°20'S to 13°14'S and longitude 43°11'E to 45°19'E, approximately mid-way between East Africa and Madagascar (Figure 1). It consists of four islands: Ngazidja (Grande Comore), Ndzouani (Anjouan), Mwali (Mohéli) and Maoré (Mayotte).[1] The first three belong to the Union of the Comoros, while the last is under French administration. The exclusive economic zone (EEZ) of the Comoros is not defined, as the boundaries between Madagascar and the Comoros have not yet been clarified.

The total population of the three Comoros islands under the administration of the Union of Comoros, is approximately 790 000 inhabitants (World Bank, 2016), with a growth of 2.49 percent (UNDP, 2003) and a density of 300 inhabitants per square kilometre (*ibid.*). In many of the national reports it had been estimated that by 2015 this population would reach a density of 402 inhabitants per square kilometre.

The Islands of Comoros

All four islands of the Comoros Archipelago come from the same volcanic hot spot, currently occupied by Ngazidja, where Karthala is still a very active volcano. Maoré is the oldest island, followed by Mwali and Ndzouani. The older the islands, the more their landscape is fragmented by erosion and the more coral ecosystem is present. Thus Maoré contains the largest lagoon in the Indian Ocean while the reef formations of the Ngazidja are still embryonic. The four islands of the archipelago are described as follows:

Ngazidja (Grande Comore)
The largest island of the Archipelago by surface area at 1025km^2, being 65km in length and between 15km and 30km in width. It has a population density of 240 inhabitants per square kilometre, and is the main island of the Archipelago. In the new strategy for the expansion of protected areas in the Comoros, three sites on Ngazidja are identified as potential protected areas, including two marine areas (the Coelacanth National Park and the Mitsamihouli Ndroude National Park) and one terrestrial area (the Karthala National Park).

[1] The Comorian Government wishes to reiterate that Mayotte is part and parcel of its territory as per resolutions by the United Nations and the African Union.

Ndzouani (Anjouan)
The second largest island of the Archipelago, with an area of 424km^2. It is also the densest island with 517 inhabitants per square kilometre. In the new protected area expansion strategy, two sites to be protected are identified for Ndzouani: a marine protected area (Shisiwani National Park-Bimbini) and a terrestrial area (Mount Ntringui National Park-Ntringui).

Maoré (Mayotte)
With an area of 374km^2, it is the third in size and oldest island of the Archipelago with a topography softened through erosion over the centuries. It has remained under French administration since the proclamation of the independence of the Comoros Islands on 6 July 1975. The entire lagoon of Mayotte and its EEZ were classified by decree of the French government on 18 January 2010 as a Marine Natural Park. Covering 68 800km^2, it is one of the largest marine protected areas (MPAs) in the Indian Ocean (see chapter French Territories for more details).

Mwali (Mohéli)
The smallest island in the Archipelago, with a land surface area of 211km^2 and a density of 99 inhabitants per square kilometre. It is on Mwali that the first MPA of the Archipelago was created (in 2001) with an area of 404km^2. The former Mohéli Marine Park has seen the integration of its terrestrial component as a protected area to become the current Mohéli National Park with a total area coverage of 449km^2 (Decree No. 15-188/PR, dated 27/11/2015).

Key legislation relating to marine conservation and protection or equivalent proclamation

The Government of the Union of the Comoros has a new law No. 18-005/AU of 05 December 2018, on the Comoros National System of Protected Areas, adopted by the National Assembly and promulgated by presidential decree No. 19-129/PR of 26 November 2019. The protected areas of the Comoros are currently governed by this law. Replacing the framework law on the environment (LCE Law No. 007/AF 1994, rev. 1995, consolidated 1999), this new law defines the types of protected areas (national park and nature reserve), the justification (exceptional interest from the aesthetic, scientific, ecological or cultural points of view), and the formalization process. It also defines the requirements for the creation of decrees (specifying the content of the decree: objectives, delimitation, establishment of a managed peripheral zone, the management plan of the protected area which must be designed primarily for the "maintenance of traditional

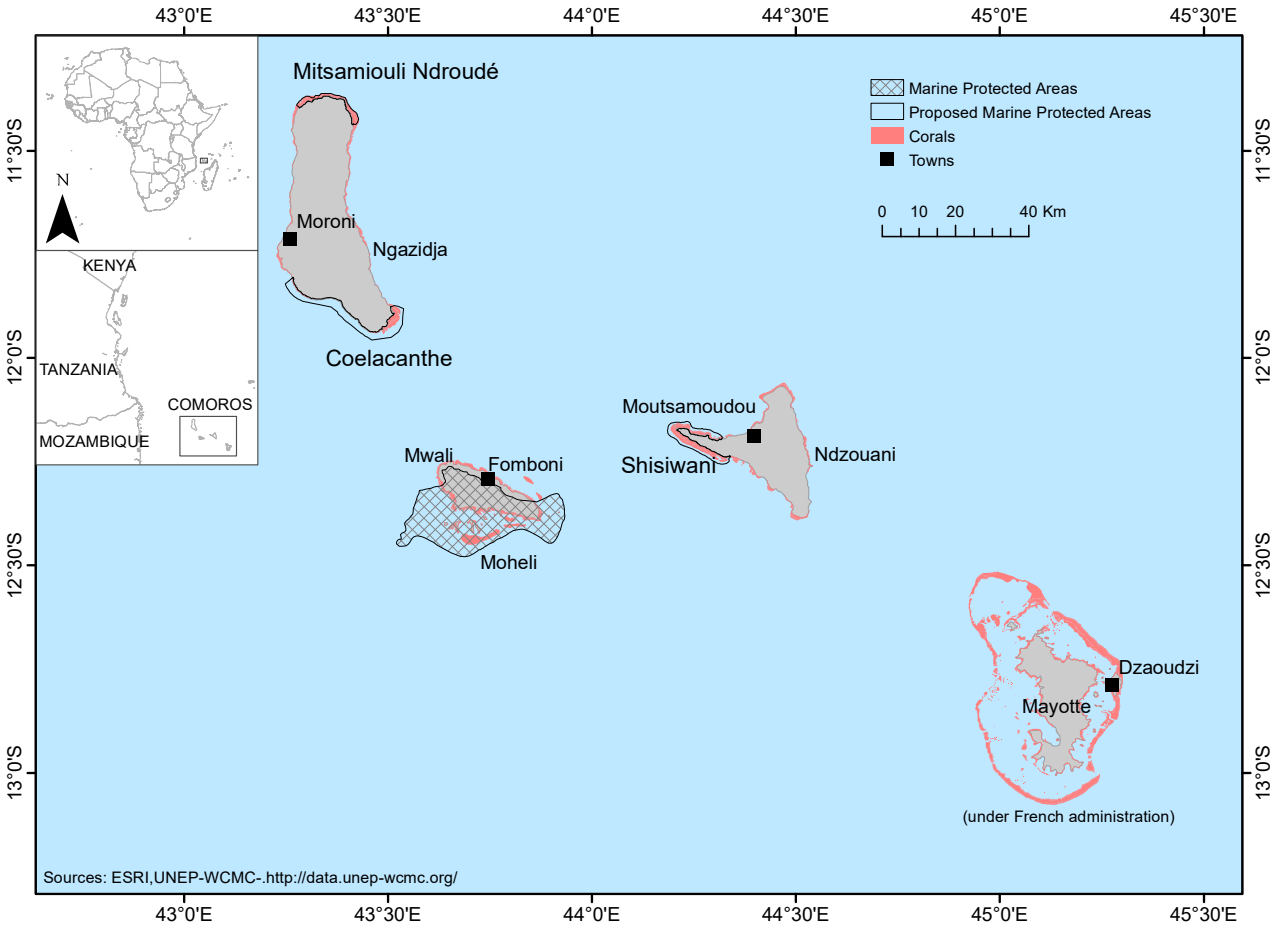

Figure 1: The Comoros Archipelago, showing the three main islands that comprise the Union of the Comoros, with the existing MPA and the proposed MPAs.

land use" which is compatible with the objectives of the establishment of the protected area and the responsibilities and obligations of populations related to protection) and the procedures and conditions for decommissioning.

Key marine habitats

According to Marex (2016) the main key habitats of the Comoros National Parks are:

- corals and other reefs;
- mangrove;
- beaches;
- the Vailleu Bank;
- pelagic marine area with volcanic shoals and underwater volcanic caves (the habitat of the coelacanth and of other little known species);
- coastal zone with volcanic cliffs extending to considerable depth (a coelacanth habitat when fresh water resurges at depths between 100–500m);
- seagrass beds;
- coastal forests or dry forest zone;
- islets.

Key marine (or marine dependent) species

According to Marex (2016) the main species of the Comoros National Parks are:

- green turtle (*Chelonia mydas*);
- hawksbill turtle (*Eretmochelys imbricata*);
- the entire biocoenosis of coral reefs including fish and corals, especially groupers and reef sharks;
- sharks;
- cetaceans (dolphins, whales, including Comoros protected species);
- octopus;
- *Turbo marmoratus* (Green turban, a Comoros protected species);
- *Charonia tritonis* (Giant triton, a Comoros protected species).

And, more specifically *Stylophora pistillata* (uncommon in the Comoros region); *Acropora roseni* (almost endemic to the region); Long-nosed lime fish (*Oxymonacanthus longirostris*, status: threatened); Napoleon wrasse (*Cheilinus undulatus*, status: threatened); Black-saddled coral grouper

Coastal scene at Mwali Island, Comoros. © Jean Harris

or Mérou sellé (*Plectropomus laevis*, status: threatened); and the coelacanth (*Latimeria chalumnae*). Important seabirds include the Masked Booby (*Sula dactylatra*); a colony of Brown Noddy (*Anous stolidus*); a colony of Frigate birds (both *Fregata ariel* and *Fregata minor*); White-tailed tropicbird (*Phaeton lepturus*); and several species of terns.

MPA OVERVIEW

The Union of the Comoros declared its first marine protected area in 2001, and this subsequently became Mohéli National Park at the end of 2015, which remains the only official MPA in the Comoros to date. Through sustained efforts, this national park now conserves Mwali's marine and terrestrial biodiversity and serves as an example for the other islands. For the last several years, successive governments have worked to set up new protected areas, and establish an autonomous management agency, with an environmental fund to run the protected areas, and training to strengthen the capacities of the institution's staff. Since 2016, the Government of the Comoros has made it a priority to establish five new national parks and an autonomous agency in charge of the management of these protected areas.

The benefits expected from the classification of the five new sites as protected areas, the five as National Parks, namely: Karthala, Coelacanth, Mitsamiouli-Ndroudé, Mount Ntringui and Shisiwani, are cited as being not only in terms of the protection of biological species, but also on the basis of a community-based approach for sustainable ecological and economic development. The support of local communities remains one of the main pillars for the sustainable management of protected areas in the Comoros (PA Expansion Strategy, 2017).

Number of formally proclaimed and recognised MPAs

At present the only recognized and formal marine protected area of the Union of the Comoros is the Marine Park of Mohéli (or Parc Marin de Mohéli, PMM), the first protected area of the Comoros (Figure 1). It was created in April 2001 (decree No. 01-053/CE) within the framework of the UNDP-GEF "Conservation of Biodiversity and Sustainable Development in the Comoros" project. The Decree 15/178/PR of 21 November 2015 repealed the Decree No. 01053/CE and added a terrestrial area for the protection of the island's ridge forests to the marine park. The Mohéli Marine Park (or Parc National de Mohéli, PMM) officially became the Mohéli National Park (PNM) at the end of November 2015 (Table 1). This will be integrated into the National Network of Protected Areas by another decree that will repeal the 2015 decree.

Table 1: Mohéli National Park.

Parc National de Mohéli (Moheli National Park)	
TYPE	Coastal and pelagic
PROCLAMATION LEGISLATION DATE	Created by Decree No. 01-053/CE of the Head of State, on 19 April 2001, under the name of Marine Park of Mohéli (Parc Marin de Mohéli, PMM), and amended by Decree No. 15-188/PR of 27/11/2015, under the name of Mohéli National Park (Parc National de Mohéli, PNM)
LOCATION	The Mohéli National Park is located in the southeastern part of the island (12°23'S, 43°47'E) in the Comoros Archipelago
LEGISLATIVE AUTHORITY	Union of the Comoros
EXTENT	Zones: – marine: 366.75km^2 – coast/Islets: 37.25km^2 – land: 45.22km^2 – total: 449.22km^2
HABITATS	– seagrass beds – several coral facies – mangroves – islets – beaches – deep sea – natural forest
SPECIES	– large shells – sea cucumbers (holothurians) – sharks – green turtle (*Chelonia mydas*), threatened – hawksbill turtle (*Eretmochelys imbricata*), threatened – dugong (*Dugong dugon*) – cetaceans, especially whales, including Humpback whale (*Megaptera novaeangliae*) – Brown noddy (*Anous stolidus*) – frigate birds (*Fregata ariel* and *Fregata minor*) – White-tailed tropicbird (*Phaeton lepturus*) – several tern species – Livingstone's fruit bat (*Pteropus livingstonii*)
CONNECTIONS WITH OTHER PROTECTED AREAS	The PNM has the character of being both a marine and a land park. The terrestrial boundaries of the originally marine park of Mohéli, extend from the coastline to the ridgeline of the watersheds on the southern coast, and include the high forest and dry forest on the eastern part of the island.
INSTITUTIONAL FRAMEWORK	Under the administrative supervision of the Ministry in charge of the Environment in the Union of the Comoros. The Ministry in charge of the environment through the Directorate General of Environment and Forestry has delegated the management of the national park to the park management, mandated to implement the Management Committee's decisions. The governance of the PNM remains a mode of governance based on a participatory co-management approach.

COMMUNITY INVOLVEMENT	The PNM is coordinated by a co-management committee that represents the village communities. Routine activities are supervised by an Executive Director (Curator) and carried out by a technical team composed of mission officers, rangers and eco-guards recruited from the local communities. The Directorate General of Environment and Forestry (DGEF) and other government departments as well as local communities contribute to the smooth running of the park's activities. The Management Committee may also seek advice from scientists. The members are appointed for three years and they carry out their duties on a voluntary basis. The Management Committee meets at least once a year. Decisions are taken by majority vote. The Management Committee also reviews reports prepared by the Executive Director (Curator) in collaboration with the local communities. These include: – activity report for the previous year – programme of activities for the following year – financial report and provisional budget The Management Committee may also address other issues related to the management and operation of the park. Among other things, it considers proposals submitted by the village representatives, and it also approves and revises the park's development programme, prepared by the Executive Director and his team in consultation with the local communities, as required.
PLANNING FRAMEWORK	There exists a 2012–2017 Management and Development Plan (or *Plan d'Aménagement et de Gestion*, PAG) specifically for the marine park, but now that the park has become a National Park, there is currently no updated PAG. Each year the park management draws up the annual programme of activities (or *Programme de Travail Annuel*, or PTA) adjusted on a quarterly basis through an implementation and intervention calendar for the various stakeholders concerned.
RISKS/THREATS	Damage to beaches – the exploitation of coastal materials (beach sand, pebbles, beach rock, gravel and river sediments) creates a risk to the conservation of the coastal zone and species dependent thereon. These are very destructive activities and studies show that between 1950 and 1998, the loss of beaches amounted to 4.69km^2, or 54% of Mwali's beaches. The studies carried out showed doubling of the removal rate from 6000m^3/year to 12 000m^3/year in 1998 and 2003, respectively Sea turtle egg collection – one of the major problems in the park is the collection of sea turtle eggs, despite regulations and monitoring. These practices are said to have developed to compensate for the decline in reef fish resources; some fishers resort to turtle poaching or egg harvesting as complements to income-generating activities Sea turtle poaching – the PNM has 45 sea turtle nesting beaches Removal of shells – either for the supply of mother-of-pearl, or as souvenirs for tourists, such removal is reported but poorly documented. Those shells are: Triton (*Charonia tritonis*), Turbos (*Turbo marmoratus*), Casques (*Cypraecassis rufa, Cassis cornuta*), Seven fingers or Spider conch (*Lambis* sp.), Black coral (*Anthipathes* sp.) Removal of mangrove wood – the need for firewood for domestic use or for production activities (ylang-ylang distillation) in the PNM was estimated at 9000m^3 per year in 2003 (PAG of PMM 2012–2017) Dugong poaching Trampling of corals – foot fishing on low tide plains (octopuses, fish, shells) leads to the destruction of corals through trampling or turning over the colonies Household waste pollution Clay sedimentation – loss of vegetation cover in the park's forest zone causes muddy waters to silt up the park's coastal environment

SITE SPECIFIC MANAGEMENT OBJECTIVES	The overall objective for the management of the PNM is to "ensure the biodiversity conservation and to contribute to the development and the improvement of the living conditions of the population while being in harmony with the environmental context which surrounds it, extending its vision to the whole island in order to be labelled as a Biosphere Reserve". This overall objective implies several more specific elements: – to conserve the entire PNM biodiversity (ecosystems, species, genetic variability) – to maintain connectivity between the different habitats to allow for the genetic exchanges necessary for the stability of species populations – to maintain ecological services – to ensure biodiversity conservation by involving the surrounding population in the natural resources rational management while contributing to the improvement of their standard of living and conserving their cultural heritage, and ensure the sustainable development of the areas surrounding the MPA in the context of classification as a Biosphere Reserve
ZONATION	The marine component of the PNM comprises three distinct zones: <u>Marine Park</u> – outside the reserve areas, the Marine Park corresponds to a general multiple-use protection zone, in which certain restrictions on activities apply. The ten villages involved must work in a coordinated manner. <u>Marine Reserves</u> – there are ten Marine Reserves which occupy 5.5% of the Marine Park surface area (former delimitation), with one reserve per village, in which protection is strict: only ecotourism and research activities are authorised. These reserves comprise 45 sea turtle nesting beaches (*Chelonia mydas*), two islets on which nest thousands of birds: Brown noddy (*Anous stolidus*), Sooty terns (*Sterna fuscata*) and Red-footed and Masked boobies (*Sula sula* and *S. dactylatra*), beneath which lies one of the largest shark dens in the Indian Ocean. Eight tourist islands of great aesthetic and floral value also make the richness of the reserves (Ben Mohadji and Paris, 1999) <u>Peripheral area</u> – this zone includes the terrestrial component of the park. It encompasses the watersheds up to the ridge. In this area is Lake Boundouni (Ramsar site), the largest freshwater body in the Comoros, where several hundred migratory birds nest
MANAGEMENT CHALLENGES	Since the end of the project that set up the original marine protected area in 2003, the current park management has faced a number of challenges, summarised by the PMM 2017 PAG, as follows: – lack of funding to effectively manage its biological diversity – lack of qualified personnel to ensure its proper operation – lack of materials and equipment for the implementation of its activities – a heavy reliance on the capacity of the village associations – the need to strengthen its legal framework (creation decree and implementing legal texts) – the requirement for government support to resume its operations Within the framework of the National Network of Protected Areas project, the Comoros Government wishes to set up an Environment Trust Fund (or *Fond Environnemental pour les Aires Protégées des Comores*, FEC) which will have to finance all six protected areas in the Comoros.
MANAGEMENT OPPORTUNITIES	To ensure the sustainability of the PNM the following are required: – prioritising implementation of National Park Management – mobilization of financial resources for the management and proper running of the Park – promotion of ecotourism, to help local communities diversify their activities – co-operation with research and other institutions

Aboard the RV *Angra Pequena* preparing equipment for surveys around Nzouani, Comoros. © Jean Harris

Proposed MPAs

The PNM, with the marine component originally established in 2001 and the terrestrial component extended in 2015, remains the only recognized and official national park in the Comoros. When the PNM was established, the Comoros had planned the creation of at least one terrestrial protected area and one marine protected area on each of the islands. In order to conserve its globally important terrestrial and marine biodiversity, the Union of the Comoros is currently in the process of developing an extensive and functional National Protected Areas System (*Système National des Aires Protégées*, SNAP), which is representative of the country's rich biodiversity and offers prospects for a sustainable future.

One challenge, but also an opportunity, is the fact that biodiversity in the Comoros is strongly affected by human activity. In response to this, the Union of the Comoros has a strategic vision that by 2021, the protected area system will rationally manage 25 percent of the national territory on the basis of a community-based approach for sustainable ecological and economic development. Five protected areas, in addition to the PNM, will be created by 2021 with the support of the communities and managed by a functional agency with an improvement in the standard of living of the populations adjoining the protected areas.

Three of these areas currently being created will be marine protected areas, namely the Coelacanth National Park (Table 2), the Mitsamiouli-Ndroudé National Park (Table 3) and the Shisiwani National Park (Table 4). These proposed MPAs are shown in Figure 1.

The other two proposed protected areas will be exclusively terrestrial and together these five new areas in the Comoros, in addition to the Mohéli National Park (PNM), will belong to the future Comoros National Parks (*Parcs Nationaux des Comores*), which will be the managing authority and whose purpose is to administer and manage the SNAP, ensuring the achievement of the objectives for which they were created.

The parks will have the same management objectives, types of governance, and legal and institutional framework. They will be established and managed according to the legislation of the Union of the Comoros and, for the first five years, will be subject to a universally applied monitoring and evaluation programme.

Table 2. Parc National Coelacanthe (Coelacanth National Park), Ngazidja.

Parc National Coelacanthe	
TYPE	Combination of coastal and pelagic
DATE	The process to establish all the Comoros National Parks is underway, and expected to be completed by the end of 2021. The park will be proclaimed under the new law No. 18-005/AU of 05 December 2018, on the Comoros National System of Protected Areas adopted by the National Assembly and promulgated by presidential decree No. 19-129/PR of 26 November 2019.
LOCATION	The PNC is located to the south of the island, with the following geographical coordinates: latitude 11°48'00"S and 11°57'00"S and longitude 43°14'30"E and 43°32'00"E.
EXTENT	Zones – marine: 84.15km^2 – coast/Islets: 8.61 km^2 – land: none – total 92.76km^2
HABITATS	– reefs and corals including the Vailleu Bank – pelagic marine area – coastal zone – particular volcanic cliffs – beaches
SPECIES	– corals – *Turbo marmoratus* (protected species of the Comoros) – *Charonia tritonis* (protected species of the Comoros) – sea Cucumbers (holothurians - protected species of the Comoros) – octopus – lobster – coelacanth – fish species (particularly those associated with the coral habitats) – sharks – green turtle – cetaceans: dolphins, whales
INSTITUTIONAL FRAMEWORK	Article 3 of the new law No. 18-005/AU of 05 December 2018 stipulates that Protected Areas in the public land or maritime domain, are under the jurisdiction of the State, represented by the ministry in charge of protected areas. Currently, the five protected areas being created in the Comoros come under the authority of the Ministry in Charge of the Environment. But once it will be gazetted by its implementing decree, the Comoros National Parks Agency will be mandated by the Ministry in Charge of the Environment to manage the national parks on the basis of a participatory co-management approach for the sustainable ecological and economic development of the site. Protected areas are part of the National Protected Areas System (or the SNAP) and are managed by a single agency.
COMMUNITY INVOLVEMENT	The National Parks are co-managed with the local village communities who have the responsibility to be representative, taking into account social and gender equity.
RISKS/THREATS	Despite a significant biological richness in terms of the number of species that have been identified, the reef ecosystem as a whole is highly disturbed, both by human pressures and climate change (recurrent coral bleaching phenomenon). According to the study by Marex (2016), the coelacanth area is faced with a number of different threats: – habitat modification – climate change – invasive species – resource over-exploitation – water pollution In the PNC, the greatest threat to Vailleu Bank is overfishing and illegal fishing, particularly with dynamite. It was once a unique diving site. Dynamite fishing has seriously damaged the ecosystem.

SITE SPECIFIC MANAGEMENT OBJECTIVES	The strategic objectives of the National Park: – the National Park is created by 2018 with the support of the communities and is managed by the Comoros National Parks Agency – the park contributes to an improvement in the standard of living of the surrounding populations
ZONATION	The PNC is made up of the following priority conservation zones and several differentiated-use zones: – marine zones (sanctuaries) of ecological importance afforded complete protection. All activities, entries and movements are restricted and strictly regulated. Marine no-take areas are the priority conservation areas identified by scientists – the sandy beaches and mangroves are coastal no-take areas. Marine no-take zones do not yet exist. Priority conservation areas identified by scientists could gradually become no-take areas in some cases. Another proposal would be to have alternating marine no-take zones. For example, for five years no fishing is carried out north of the village concerned and for the next five years no fishing is carried out south of that village, and so on, which allows for the rebuilding of the fish stock and prevents the disappearance of target species – priority Marine Conservation Areas are scientifically identified areas and should gradually become no-take zones. However, in order to remain realistic, the first step will be to inform fishers and the wider population about these areas (marine, beaches and mangroves) and to gradually establish protection to avoid any social shock – buffer zones are spaces in which activities are regulated to ensure better protection of the no-take zones and guarantee the purpose of each component The other zones are: Controlled Occupation Zones (or *zones d'occupation contrôlées*, ZOC) designating land areas located within the PNC and inhabited by populations prior to its creation. These are the villages and their immediate surroundings. The Sustainable Use Zone (or zone d'utilisation durable, ZUD) is an area of land-based economic development where the sustainable use of resources and production activities are regulated and controlled. The marine ZUD covers the entire marine area and excludes ZNPs (*Zones de Non Prélèvement*) where they are defined.
MANAGEMENT CHALLENGES	The PNC faces several management challenges, namely: – requiring adequate dedicated funds – requiring a sound legal and regulatory framework – securing the buy-in of the local communities and stakeholders – ensuring the adaptive and sustainable management of the national park
MANAGEMENT OPPORTUNITIES	The Comoros National Parks are managed through the following legal and institutional instruments: – 2018 Law on Protected Areas and its implementing decrees (in progress) – the decree establishing the park and any amendments thereto (in progress) – an approved development and management plan – the Environmental Management and Social Safeguard Plan (PGESS) – the Board of Directors of Comoros National Parks – the Comoros National Parks Advisory Committee – the Scientific Committee of Comoros National Parks – the annual external audit of Comoros National Parks – support from the Environmental Fund for the Protected Areas of the Comoros – training support from the University of the Comoros and other institutions – an approved multi-year work plan (with its business plan) – a validated annual work plan, with detailed training plan and monitoring plan – a quarterly validated annual monitoring plan – systematic weekly meetings of the entire staff at all levels – an annual retreat for the entire staff (one to three days) – staff rotation whenever possible – regular staff visits to other parks – annual review of the organizational chart – annual confidential written evaluation of the entire staff

Table 3. Parc National Mitsamiouli-Ndroudé (Mitsamiouli-Ndroudé National Park), Ngazidja.

Parc National Mitsamiouli-Ndroudé	
TYPE	Combination of coastal and pelagic
DATE	By 2021
LOCATION	The Parc National Mitsamiouli-Ndroudé (PNM-N) is located at latitude 11°21'30"S and 11°26'30"S and longitude 43°16'00"E and 43°26'00"E
EXTENT	Zones – marine: 18.57 km^2 – coast/Islets: 4.57 km^2 – land: none – total: 23.14km^2
HABITATS	According to Marex (2016) there are five main marine habitats in the National Park: – outer reef slopes – reef plains – seagrass meadows – basins in the reef plains – basalt slopes
SPECIES	The key species in the NPM-N are: – green turtle (Chelonia mydas) – hawksbill turtle (Eretmochelys imbricata) – the entire biocenosis of coral reefs including fish and corals; sharks – cetaceans (dolphins, whales, protected species of the Comoros) – *Turbo marmoratus* (protected species of the Comoros) – *Charonia tritonis* (protected species of the Comoros) – sea cucumbers (holothurians, protected species of the Comoros) And more specifically the five following species: – napoleon wrasse *Cheilinus undulatus* (IUCN status, threatened) – *Mérou sellé* (Saddle Grouper) Plectropomus laevis (IUCN status, threatened) – *Mérou patate* (Potato Grouper) Epinephelus tukula (rare at the regional level) – Black teatfish *Holothuria nobilis* (IUCN status, threatened) – the staghorn coral *Acropora roseni* (IUCN status, threatened)
INSTITUTIONAL FRAMEWORK	See PNC, same authority
RISKS/THREATS	The main risks and threats to the PNM-N are: <u>Habitat modification</u> – the negative effects of climate change and human pressures, and overexploitation of resources are the main causes of habitat modification <u>Climate change</u> – rising sea level and coral bleaching <u>Invasive species</u> – invasion by introduced plants is currently the main threat to the sustainability of indigenous island ecosystems. Invasive alien species have serious effects on the floristic composition, and the structure and the functioning of island ecosystems. Pioneer, pantropical, anthropogenic species introduced for industrial exploitation exist on the study sites. Fruit, medicinal, ornamental species and food or vegetable crops are also found in the environments studied <u>Over-exploitation of resources</u> – the growing demand for fisheries resources is leading to the over-exploitation of these resources. Owing to a lack of effective control, coral fish such as the parrotfish, for example, are highly coveted by residents and restaurants owners <u>Water pollution</u> – water is polluted by run-off that carry particles of eroded clay and waste from the towns and villages <u>Turtle poaching</u> – beaches in the park area that were once marine turtle nesting beaches are no longer so. Turtles are systematically poached (killed and their meat sold) on beaches and even in the open water with the use of gill nets and spear guns.

	Beach destruction – the mining of coastal materials (beach sand, pebbles, stones, gravel, and river sediments) poses a threat to the conservation of the coastal zone and species dependent thereon. The direct impacts are: • disappearance of some turtle nesting beaches • pressure on coastal infrastructure (houses fall into the sea) • increased coastal erosion; destruction of the natural and landscape heritage • loss of tourist potential – beaches are theoretically state property and extraction is prohibited, but national legislation is neither respected nor controlled, giving free rein to the exploitation of a free and easily accessible resource, notably by truck owners; on the island of Ngazidja there is good quality sand being crushed by companies selling building materials; Destructive fishing – many forms of fishing currently practised in the national park represent a serious threat. These are mainly net fishing, explosives (dynamite) fishing, and fishing using the poison from Tephrosia spp. These forms of fishing have almost completely destroyed the coral cover of the area, destroying all the biological potential of the zone. The complete cessation of these forms of fishing will be a significant indicator of good management of the PNM-N Pressure on marine resources (excluding fish) – removal of certain shellfish either for the supply of mother-of-pearl or as souvenirs for tourists is reported but poorly documented Trampling – foot fishing on the low tide plains (for octopus, fish, shellfish) remain very common in the area and leads to the destruction of corals through trampling or turning over the fish colonies Water pollution – several biological indicators of poor water quality have been noted, mainly in the village of Mitsamiouli: localized proliferation of cyanobacteria, seagrass meadows heavily parasitized by epiphytes, fish with skin infections, etc. Improving wastewater treatment is a priority in this area
SITE SPECIFIC MANAGEMENT OBJECTIVES	See PNC; the same objectives for the period 2017–2021
ZONATION	There are currently five priority conservation areas identified by scientists in the PNM-N, which could eventually become no-take zones.
MANAGEMENT CHALLENGES	See PNC.
MANAGEMENT OPPORTUNITIES	See PNC.

Table 4. Parc National Shisiwani (Shisiwani National Park), Anjouan.

Parc National Shisiwani	
TYPE	Combination of coastal and pelagic
DATE	The process to establish the Parc National Shisiwani (PNS) is underway, and expected to be completed by the end of 2021. The National Park will be proclaimed under the above-mentioned new law No. 18-005/AU of 05 December 2018, on the Comoros National System of Protected Areas adopted by the National Assembly and promulgated by presidential decree No. 19-129/PR of 26 November 2019.
LOCATION	The PNS is located at the extreme west of Ndzuwani Island (Anjouan) with the following geographical coordinates: latitude 12°09'30"S and 12°15'30"S and longitude 44°12'00"E and 44°20'00"E.
EXTENT	Zones – marine: 65.0km^2 – coast/Islets: none – land: very small 200m-wide strip of coastal land – total: 65.0km^2
HABITATS	Several classes of coastal habitats have been identified on this site. Among the main marine habitats are: – outer reef slopes – reef plains – seagrass meadows – enclosed lagoons – mangroves

SPECIES	The key species of the PNS are: – green turtle (*Chelonia mydas*) – hawksbill turtle (*Eretmochelys imbricata*) – the entire biocoenosis of coral reefs including fish and corals, especially groupers and reef sharks – sharks – cetaceans (dolphins, whales) protected species of the Comoros – octopus And more specifically: – *Stylophora pistillata* (an uncommon coral in the Comoros region) – *Acropora roseni* (almost endemic to the Comoros region) – orange-spotted filefish, *Oxymonacanthus longirostris* (IUCN status, threatened) – *Mérou sellé* (Black-saddle grouper) *Plectropomus laevis* (IUCN status, threatened)
CONNECTIONS WITH OTHER PROTECTED AREAS	The PNS is the first MPA in Ndzouani. It has no direct link with a terrestrial protected area, the Mount Ntringui National Park being located in another part of the island.
INSTITUTIONAL FRAMEWORK	See PNC, same authority for the five parks in the Comoros.
RISKS/THREATS	The main threats identified in relation to the PNS are: <u>Habitat modification</u> – the negative effects of climate change and human pressures, and over-exploitation of resources are the main causes of habitat modification <u>Climate change</u> – rising sea level and coral bleaching <u>Invasive species</u> – invasion by introduced plants is currently the main threat to the sustainability of indigenous island ecosystems. Invasive alien species have serious effects on the floristic composition, and the structure and the functioning of island ecosystems. Ruderal, pantropical, anthropogenic species introduced for industrial exploitation exist on the study sites. Fruit, medicinal, ornamental species and food or vegetable crops are also found in the environments studied <u>Over-exploitation of resources</u> – the growing demand for fisheries resources is leading to the over-exploitation of these resources. Owing to a lack of effective control, coral fish such as the parrotfish, for example, are highly coveted by residents and restaurateurs <u>Water pollution</u> – water is polluted by run-off that carry particles of eroded clay and waste from the towns and villages <u>Sea turtle poaching</u> – the National Park area has eight beaches that were once sea turtle nesting beaches. Today, it is very rare for anybody to observe egg-laying even on beaches farthest from human habitations such as those on the Saddle Islet. Turtles are systematically poached (killed and their meat sold) on beaches and even in the open water with the use of gillnets and spearguns. Moreover, the Shisiwani fishers are also known to be poachers of marine turtles in the PNM. The sale of turtle meat is regular and abundant in Bimbini <u>Sea turtle egg collection</u> – one of the major problems in the park is the collection of sea turtle eggs. These practices are said to have developed to compensate for the decline in reef fish resources, some fishers resorting to turtle poaching or egg harvesting as an activity and income supplement. Such egg collection is a serious threat that has led to turtles not using the beaches for laying eggs. A beach with a high turtle birth rate is also a guarantee of the presence of carnivorous fish in coastal waters and of regular tourism <u>Beach destruction</u> – the mining of coastal materials (beach sand, pebbles, stones, gravel, and river sediments) poses a threat to the conservation of the coastal zone and species dependent thereon. The direct impacts are: · disappearance of some turtle nesting beaches · pressure on coastal infrastructure (houses fall into the sea) · increased coastal erosion; destruction of the natural and landscape heritage · loss of tourist potential – beaches are theoretically state property and extraction is prohibited, but national legislation is neither respected nor controlled, giving free rein to the exploitation of a free and easily accessible resource, notably by truck owners. The lack of alternative building materials is a brake on compliance with legislation <u>Removal of mangrove wood</u> – there is almost no need for firewood for domestic use or for production activities (ylang-ylang distillation) in the National Park. Overall, mangroves are little exploited. Trees are used for firewood, construction timber for traditional huts and canoe outriggers

	Destructive fishing practices – the forms of fishing practised in the national park represent a serious threat. These are mainly net fishing (200 nets in the area in 2011, more than 500 in Bimbini nowadays), explosives fishing and fishing using the poison from Tephrosia spp. These forms of fishing have almost completely destroyed the coral cover of the area, severely compromising the biological potential of the zone. The complete cessation of these forms of fishing will be a significant indicator of good management of the PNS Pressure on marine resources (excluding fish) – removal of certain shellfish either for the supply of mother-of-pearl or as souvenirs for tourists is reported but poorly documented Trampling – foot fishing on low tide plains (octopus, fish, shellfish) remains very common in the area and leads to the destruction of corals through trampling or turning over the fish colonies. It is practised by fishers but also by women, children, and young people for whom it is a stage in their learning of fishing practices. Particular attention must be paid to this practice, which endangers the integrity of the reef, in order to achieve acceptable management conditions Household waste pollution – at present, although levels of such pollution is relatively low there is an issue with the absence of household and other macro-waste management systems, and of wastewater treatment and of septic tanks or latrines. The risks of accidental oil pollution are also not negligible because of the significant number of oil tankers passing through the Mozambique Channel off the Comorian coast. Waste is dumped directly onto the beaches, and lands in the mangroves, considerably slowing down their growth Damage to seagrass beds and reefs – this is primarily the result of increases in water turbidity and over-sedimentation linked to soil runoff resulting from deforestation and land clearance.
SITE SPECIFIC MANAGEMENT OBJECTIVES	See PNC Park, same objectives for the period 2017–2021.
ZONATION	The PNS is made up of four no-take zones and several differentiated-use zones. The national park no-take zones are marine zones of ecological interest in which all activities, entries and movements are restricted and strictly regulated. Sanctuaries are included within the marine component. The sandy beaches and mangroves are coastal no-take zones. Marine no-take zones do not yet exist. Priority marine conservation areas are scientifically identified with the intention of them eventually becoming no-take zones. Buffer zones are spaces in which activities are regulated to ensure better protection of the no-take zones and guarantee the purpose of each component. These include: – controlled Occupation Zones (ZOC) designating coastal areas located within the national park and inhabited by populations prior to its creation. These are the villages, the village fields and their immediate surroundings – controlled-use zone (ZUC) marks the regulated fishing area on the marine part – the marine ZUD covers the entire marine area and excludes ZNPs where they are defined, either on an alternating basis or the priority conservation areas identified by scientists
MANAGEMENT CHALLENGES	Management action to promote the maintenance of biotopes and ecosystems: The themes on which the management of the PNS will focus include: – abolition of the most destructive poaching and fishing techniques, including · night capture of turtles in the open sea and on beaches · fishing with nets hung on the reefs; · fishing with mosquito nets – the halting of sand removal from beaches – improvement of water quality – improvement of the resilience of the reefs by reducing sedimentation from coastal erosion – monitoring and control of potentially invasive species – development of the exploitation of new resources – implementation of ecosystem restoration actions Four specific objectives are proposed in the Marex (2016) study as part of the recommendations for development related to the restoration of reef ecosystems: – restore degraded natural habitats – support and strengthen biological exchanges between habitats – facilitate access to certain natural resources with still high exploitation potential – increase the production of certain currently over-exploited resources
MANAGEMENT OPPORTUNITIES	See PNC, the same management opportunities.

Total area currently under protection and proposed for protection

The current situation indicates that only a small proportion of Comoro's potential EEZ is under protection, and even with the addition of the three proposed MPAs the area under protection will still be a very proportion of the potential EEZ (Table 5).

Table 5: Comoros EEZ under protection and proposed for protection.

Comoros' EEZ	Not defined*
EXISTING MPAs	
No. of MPAs	1
MPA area	449.22km^2
% EEZ	Unknown
PROPOSED MPAs	
No. of proposed MPAs	3
Proposed MPA area	180.9km^2
Potential % EEZ	Unknown

* The Comorian EEZ is not defined because there are discussions between Comoros and Madagascar, the delimitation includes the Comorian island of Mayotte which remains under French administration.

REFERENCES

Ben Mohadji, F. & Paris, B. 1999. *Marine Turtles in the Federal Islamic Republic of the Comoros: Assessment of the Current Situation*. PNUD/FEM,19 pp.

Marex. 2016. Développement d'un réseau national d'aires protégées de l'Union des Comores: Analyse des écosystèmes marins et inventaire de la biodiversité récifale sur Grande Comore et Anjouan. Rapport MAREX pour le compte de l'Union des Comores/programme des Nations unies pour le développement. 65 pp. + annexes.

PA Expansion Strategy. 2017. Vice-Présidence en charge du Ministère de l'Agriculture, de la Pêche, de l'Environnement, de l'Aménagement du Territoire et de l'Urbanisme, Direction Générale de l'Environnement et des Forêts, « Stratégie d'Expansion du Système National des Aires Protégées Aux Comores 2017–2021.

UNDP. 2011. PNUD, Rapport national sur les OMD 2003.

World Bank. 2016. Profil de risque de catastrophe, Comores, 2016.

This *MPA Outlook for the Western Indian Ocean (WIO)* is the first comprehensive regional analysis that provides a detailed update on the efforts by the Nairobi Convention countries to meet globally agreed marine conservation targets especially SDG14.5, which states that by 2020, to conserve at least 10 percent of coastal and marine areas, consistent with national and international law and based on the best available scientific information. This is also aligned to the Convention on Biological Diversity Strategic Plan for Biodiversity 2011–2020, Aichi Target 11. In 2019, the region had 143 proclaimed MPAs with several proposed across different countries.

A key purpose of this *MPA Outlook* was to establish baselines using appropriate indicators to assess the progress of the Contracting Parties to the Nairobi Convention in meeting these targets. Thirty authors contributed to the nine country chapters, the various case studies and other parts of this volume. Included are detailed descriptions of the MPAs in the countries of the region, the legal mandates under which they exist, the challenges they face and estimates of their management effectiveness. The main findings indicate that the vast majority of the sites across the WIO region, that are considered as MPAs or as having equivalent legal status and levels of protection, are coastal and/or inshore, however the largest, covering by far the greatest extents of the ocean, are those with considerable offshore elements. The assessment also established that the majority of existing MPAs across the region are not managed as effectively as they could and should be, due primarily to lack of funding for essential staff, equipment and capacity development, and commitment from relevant authorities. Recommendations are provided to support improved management of current MPAs and strengthen proposals from different countries for the establishment of further areas under protection, so as to reach conservation goals, including those being developed under the post-2020 Global Biodiversity Framework, while safeguarding coastal livelihoods and economies over the coming decades.