

SITE INFORMATION SHEET TEMPLATE

in support of a formal proposal to nominate a site for inclusion in the IOSEA Marine Turtle Site Network

The completed Information Sheet is intended to be submitted to the IOSEA Secretariat, through the national IOSEA Focal Point. As the contents will serve as the primary basis for evaluation of site nominations, responses should be as comprehensive as possible.

1. Date of submission (DD/MM/YYYY):

The date on which the Site Information Sheet was completed.

15 / 04 / 2019

2. Name and address of compiler(s), if not the

IOSEA Focal Point

Name and contact information (including affiliation) for the individual(s) who prepared this information sheet, for formal submission through the national IOSEA Focal Point.

Name:	Mr Anfani MSOILI	
Functional Title:	IOSEA NATIONAL FOCAL POINT	
Organization:	Ministère de la Production, de l'Environnement Union des Comores	
Address:	CEFADER MDE MORONI COMORES	
Email:	amsoili@yahoo.fr	Tel. / Fax: (00269) 332 01 11
Name:	Mr Stephane CICCIONE	
Functional Title:	Directeur	
Organization:	Kelsonia, l'observatoire des tortues marines de La Réunion	
Address:	46 rue du Général De Gaulle, 97436 Saint Leu, La Réunion, France	
Email:	Stephane.ciccione.kelsonia@museesreunion.re	Tel.: 0262 34 81 10

3. Country: The name of the country in which the site is located.

Comoros

4. Name of site: The name of the site (alternative names should be given in brackets).

Itsamia Moheli

5. Geographical coordinates

The geographical coordinates (latitude and longitude) of the **approximate centre** of the site, expressed in 'decimal degrees'. For example, the location of the IOSEA Secretariat in Bangkok is 13.763483°, 100.508157°. If the site consists of two or more discrete units, the coordinates of the centres of each of these units should be given. (Add any additional coordinates in a separate annex.)

Decimal Degrees

12.370230

, 43.869343

6. General location

Describe the general location of the site. This should include the site's distance (in a straight line) and compass bearing from the nearest significant administrative centre, town or city. The human population of the listed centre and its administrative region should also be stated. (See also the information requested under point 24: Site Map)

Location of the site

The Comoros archipelago is located in the Indian Ocean at the northern entrance of the

Mozambique Channel between 11°20' and 13°04' south latitude and 43°11' and 45°19' east longitude, midway (approximately 300 km) between Madagascar and the east coast of Africa. It comprises four main islands, separated from each other by distances of about 80 km and separated by depths from 2000 to 3000 meters: Grande Comore (also called “Ngazidja” - 1,150 km²), Moheli (or “Mwali” - 290 km²), Anjouan (or “Ndzouani” - 425 km²) and Mayotte (or “Maoré” - 375 km²) (Abdou 2010). The first three islands constitute the Union of Comoros, while Mayotte is part of the French overseas Department since 2011 (Fig. 1). Moheli is the smallest of the four islands of the archipelago (Abdou 2010), and its population, as of 2017, was 51 230 (RGPH 2017). Moheli hosts a Marine Protected Area within the Moheli National Park (PNM), located along the southern coast of Moheli island between 12°23'S and 43°47'E (Abdou 2010) and covering a surface of 404 km² (Granek and Brown 2005). Itsamia village is one of more than twenty-five villages of Moheli Island, located at the eastern end of Mwali (Moheli), facing the island of Ndzuani (Anjouan) (Boulet 2009). Itsamia is the eastern-most village of both Moheli and the PNM. The site to be included in the network is immediately seaward and south of Itsamia village.

Nearest administrative centre and population

The nearest administrative centre from the village of Itsamia is Fomboni, located approximately 16 km (30 min car drive) from Itsamia. The population of Itsamia oscillates at an estimation of about 800 inhabitants, with less than 250 residents (RGPH 2017).

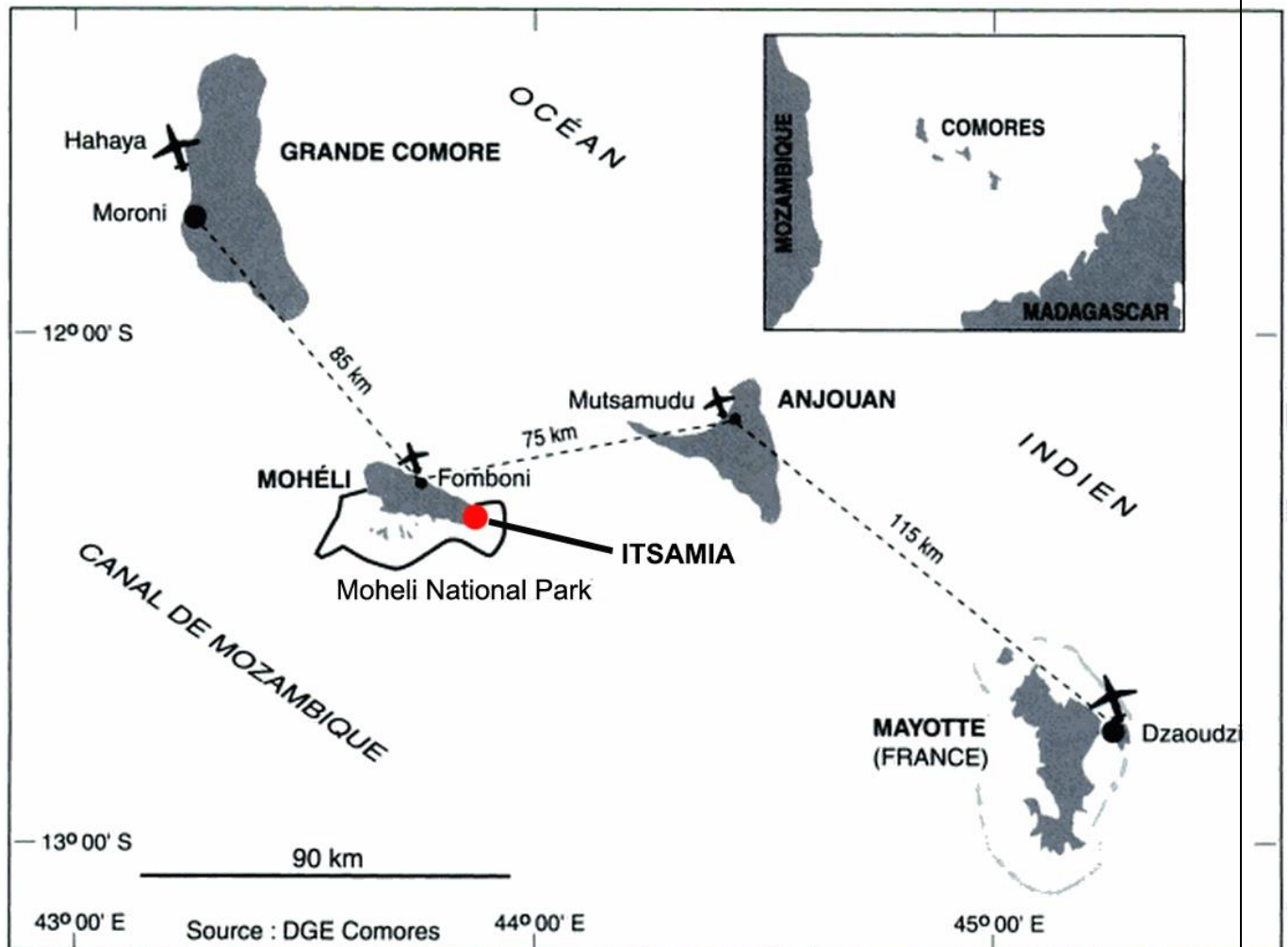


Figure 1. Map showing the Comoros Archipelago, with indications of distances and main administrative centres for each island. Moroni is the capital of the Union of the Comoros (Grande Comore, Moheli and Anjouan), and the Island of Mayotte is one of the French overseas departments. The general area of PNM is shown along the southern coast of Moheli island. The general location of the Comoros Archipelago, in the northern Mozambique Channel, is shown in the inset in the top right (source: DGE Comores).

In the remainder of this document, the codes that appear in square brackets alongside each of the titles below refer to sections of a separate document describing the evaluation criteria, which will be informed by the proponents'

submission. Proponents are encouraged to consult the Evaluation Criteria document¹ for further explanation of the rationale behind each criterion and of the detailed information to be used for evaluation purposes.

7. Area [N3]

The approximate surface area of the site to be included in the network (in hectares or square kilometres). If the site is an island, indicate also the total surface area of the coastline directly relevant to turtle conservation. Area should correspond to the map provided under point 24.)

The area of the site to be included in the network is composed of five contiguous beaches which vary from less than 200 m to more than 500 m long: Itsamia beach (440 m), M'tsanga nyamba (510 m), Bwelamanga (160 m), Miangoni No. 1 (310 m) and Miangoni No. 2 (210 m). Itsamia's five beaches combined are 1.6 km long (Bourjea et al. 2015). The total surface area of the beaches of Itsamia is 6 hectares.

The area of seagrass beds and coral reef adjacent to these beaches is estimated to be 2.3 km² (Beudard 2003).

8. Physical features of the site [EB1- 4, S5, S6, N1]

Describe the principal physical characteristics of the site, including the marine turtle habitat types occurring at the site. List the ecosystem types included in the site (nesting beach, foraging habitat, reproductive habitat, migratory habitat) and the approximate area in hectares (or km²) of each habitat type included. Indicate whether the site's physical attributes are shared by other sites in the country or are exceptional/unique.

Moheli's climate is tropical with an average temperature of 25.6 °C and irregular rainfall (ranging between 1,500 to 5,000 mm). There are two seasons: the cooler dry season corresponds with the southern hemisphere winter (between May and October), whilst the hot and humid season is between November and April. It is the oldest island of the Comoros, is of volcanic origin and developed about 10 million years ago (Michon 2016). As a result, small hills, cliffs and shores are made of basaltic rocks. There is a fringing reef all around the island, 250 to 1,300 m wide.

Itsamia's site is characterized by "sub-humid" megathermic vegetation, which tends to be semi-xerophilic (>1300 mm rainfall), including a particularly dry coastal fringe. Itsamia's coastline consists of five nesting beaches facing east, separated by small basaltic rocky shores. There is a small slope (2 to 4°) behind the beaches and Itsamia village to the shore (Mahabot and Pennober 2015, POCTOI). The fringing reef in front of Itsamia is 200 to 800 m wide, with a slow slope characterized by extended sea grass beds (Fig. 2). There are small patches of coral reefs, which are the most developed at the edge and outer slope of the fringing reef.

Nesting beaches

The five beaches of Itsamia are considered one of the most important green sea turtles (*Chelonia mydas*) nesting sites in the south-western Indian Ocean, and also the only major green turtle rookery inhabited by humans (Frazier 1985, Bourjea et al. 2015). Hawksbill sea turtles (*Eretmochelys imbricata*) have also been reported as nesting at this site. While Itsamia's nesting site was proven to be as an exceptional one for green turtles in the South-western Indian Ocean (and ranked among the largest green turtle nesting sites of the world), the wider PNM area has 45 beaches suitable for nesting sea turtles, mostly for green sea turtles and with occasional encounters of hawksbill nesting turtles (Abdou 2010). There are several physical factors at the site Itsamia likely to contribute to the attraction of an especially large nesting population in comparison with other sites on the island of Moheli or the Comoros Islands:

- Itsamia's beaches are isolated and do not have any artificial lighting. Itsamia village is quiet located at the back of one of the five nesting beaches, in between trees and cliffs. Its inhabitants are sensitised to sea turtle conservation and do not bother the turtles in any way when they come up to lay their eggs on this beach.
- There are strong currents associated with east-westerly trade winds on Itsamia's coastline. It was shown in an annual report on sea turtle conservation in the PNM that the peak of the green turtle nesting season in the PNM's correlates with the strong trade winds season (Mouchitadi Madi Bamdou 2017). Itsamia's nesting site being located at the eastern-most

¹ Criteria for the Evaluation of Nominations to the Network of Sites of Importance for Marine Turtles in the Indian Ocean – South-East Asia Region, IOSEA Marine Turtle MoU Secretariat. <http://ioseaturtles.org/sitenetwork-evaluation.php>

point of the PNM, with all five nesting beaches facing east, it is characterized by stronger winds and currents than for other nesting beaches of the PNM.

Two of the five Itsamia beaches have coralline sand. They are separated by a small hill with a terminal rocky point projecting directly into the sea. Both beaches have gentle slopes with well-developed low dunes on which many tracks of turtle nesting can be seen (from 10 to 130 tracks per night according to the season). The other three beaches are narrow because of the presence of rocky and clay cliffs up on the beach. The clay component of the sand is important as it may affect the egg incubation period and successful development. All five beaches of Itsamia have turtle nesting at night and throughout the entire year.

Stability of the coastline: There is a seasonal erosion on Itsamia's beaches. The sand is transported from the south side of the beach to the north, mostly driven by the wind (Mahabot and Pennober 2015). Small cliffs are visible especially near hard structures or houses in the village. Trees of *Hibiscus tiliaceus* maintain a certain stability of the beach. The lagoon, the reef flat and reef slope also play a major role in maintaining the sand on the beaches. Dunes on inland of Itsamia's beaches dampen well waves and swells. The mobility of the sand on Itsamia's beaches is relevant to sea turtles' conservation as physical characteristics of the beach play a major role in a sea turtle female's nest site selection, as it is critical to the hatching and emergence success of its nests (Mortimer 1990).

The coastline of Itsamia corresponds to the eastern extremity of the basaltic Djandro plateau, which has a low relief (altitude about 200-300 meters above sea level). Ancient basaltic rocks of the Djandro plateau are degraded into deep lateritic red soils. These fragile soils are highly erodible when they become exposed following degradation of vegetation and higher humic horizons. A more recent volcanic phase, thought to be of middle to upper quaternary age, has left, between Itsamia and Hamavouna village west of Itsamia), the Dziani Boundouni Crater, whose inner slopes are known for its remnant semi-dry forest of high ecological interest (Boulet 2009).

Foraging habitat

Coral reefs

Coral reefs in front and around of Itsamia's beaches consist of a large fringing reef. They have been reported as important feeding areas for hawksbill sea turtles, as the turtles are frequently observed there (Abdou 2010).

Sea grass beds

Sea grass beds extend on the reef flat all along the fringing reef, on coral debris or sand areas, in front of Itsamia's coastline (Fig. 2, Ballorain 2002, Beudard 2003). The entire surface covered by seagrass beds is 21,4 hectares (Ballorain 2002, Beudard 2003), and the mean width is 199 ± 16 m (Ballorain 2014).

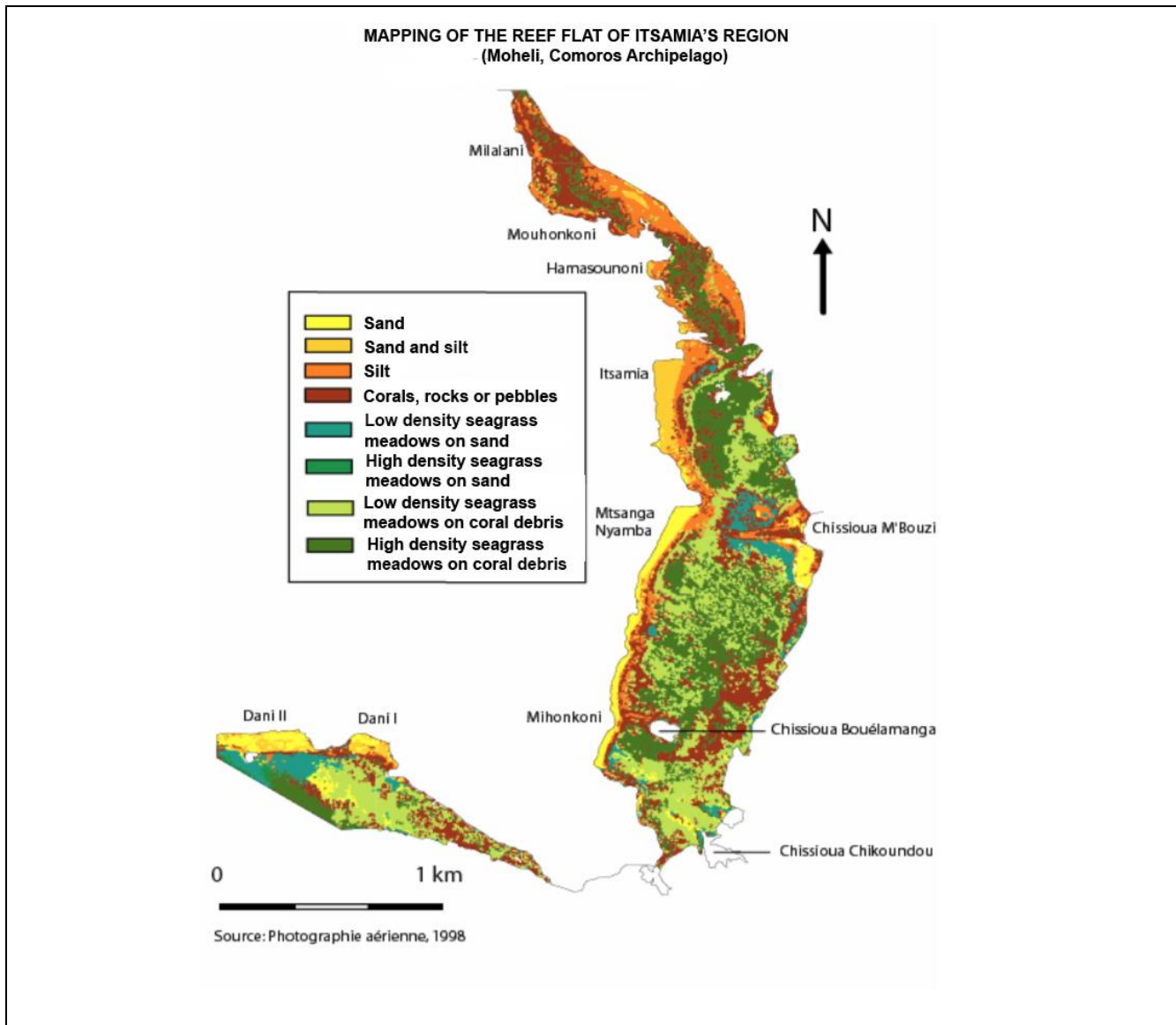


Figure 2. Map showing the distribution of sea grass beds and reefs/rocks on the reef flat of the site of Itsamia (made using aerial photographs on Geoimage and ArcInfo, source: Beudard 2003).

General characteristics of the PNM (surroundings of Itsamia beaches)

The PNM ranges from coastal villages of Miringoni and Itsamia to islands and islets, and a large area of open sea, to the 100 m isobath. The coastline of the marine park is approximately 55 km and the reef flat surface of about 4,000 ha (Abdou 2001).

The marine park includes a diversity of habitats, including beaches and rocky shores, sand flats and channels, seagrass beds, offshore and uninhabited islands, well-developed coral reefs, fringing reefs and scattered mangrove forests (Granek and Brown 2005). This habitat diversity makes Moheli's south region suitable site for many species' reproduction and larvae recruitment and growth.

9. Ecological resources [EB1- 4, S5, S6, N1]

Describe the ecological resources at the site, including marine turtles and other noteworthy biodiversity. Describe the marine turtle species / management units occurring at the site, if they are known. Where possible, provide an abundance estimate for each marine turtle species/management unit (e.g. in terms of average number of turtles nesting annually or foraging). Evaluation Criteria EB1a and EB1b offer guidance on how to describe the relative importance of a site frequented by one or more marine turtle species. Indicate whether the site's ecological resources are shared by other sites in the country or are exceptional/unique.

Marine biodiversity

Sea turtles

Itsamia was reported to be a major nesting area for green turtles for the first time in 1972 (*Chelonia mydas*; Frazier 1985); since then detailed studies have confirmed that the nesting population is still important (Innocenzi et al. 2010) and increasing (Bourjea et al. 2015). In 2010 it was reported that about 3,000 green turtles nest on the five beaches of Itsamia annually. A few nesting hawksbill turtles were also observed (Innocenzi et al. 2010).

Inventory data on seagrass in PNM (Beudard 2003; Beudard 2005; Ballorain 2014), and investigations on dugongs (Fatouma 2004, Beudard and Ciccione 2008) and PPG overflights (UNDP 2012) show that the seagrass areas located at the southeast of Mohéli, including Itsamia, host the highest foraging sea turtle density on Mohéli Island from January to March (Fig. 3, UNDP 2012, Abdou 2010). The green turtle population foraging on the seagrass beds of Itsamia was estimated at 211 juvenile turtles through 70 snorkelling transects (ranging from 200 to 1,300m) for the entire seagrass beds area of 21.4 hectares (Beudard et al. 2003), counted following Roos and colleagues' (2003) method.

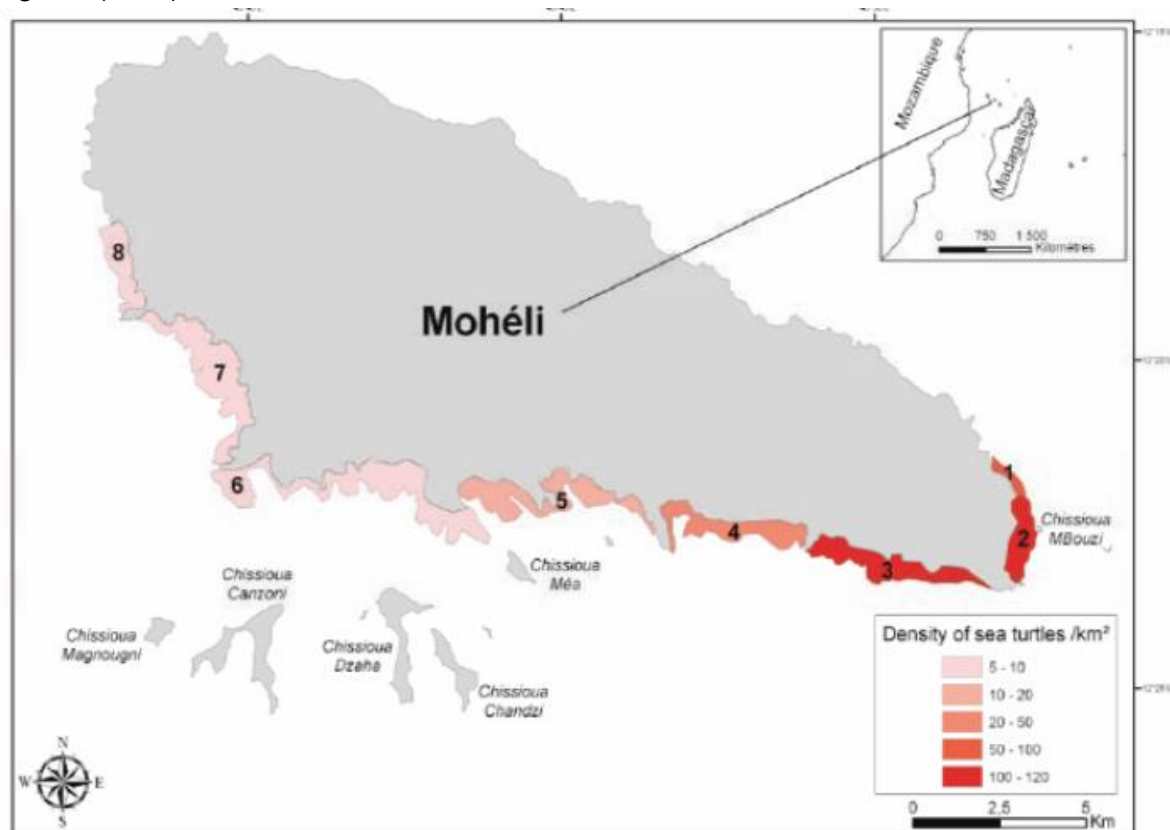


Figure 3. Map of sea turtle density as observed during the PPG flights over the Mohéli Marine Park (extracted from UNDP 2012).

Leatherback sea turtles, *Dermochelys coriacea*, olive ridley sea turtles, *Lepidochelys olivacea*, and loggerhead sea turtles, *Caretta caretta*, probably pass through the waters of the Comoros archipelago (Abdou 2010).

Between 2010 and 2015, satellite tracking of nesting green turtles tagged in Itsamia (a study undertaken by CNRS/Ifremer/Kelonia as part of POCTOI project) revealed that nesting females migrate from Comoros to the north of Mozambique, the United Republic of Tanzania and Madagascar, likely to reach their foraging grounds (Fig. 4, POCTOI project). It confirms a high connectivity between islands from the South-western Indian Ocean.

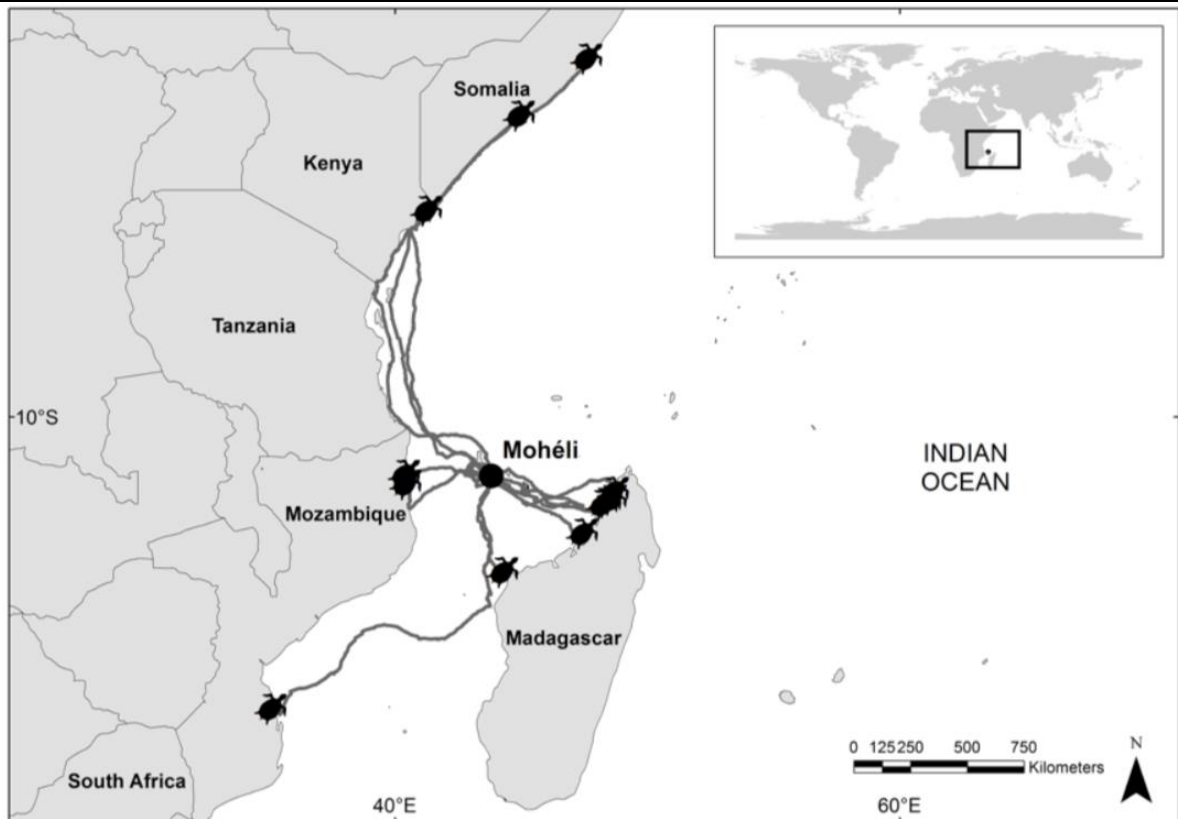


Figure 4. Map showing the post-nesting migration paths of 12 green sea turtles equipped with satellite trackers on Itsamia, Mohéli between 2010-2015 (Dalleau and Bossert 2015, POCTOI project)

Other marine megafauna in the PNM and Itsamia

In 2010, it was reported that, at the PNM:

- There is a diverse range of cetacean species in the PNM waters. Humpback whales (*Megaptera novaeangliae*) are present in large numbers from July to November. Dolphins, including spinner dolphins (*Stenella longirostris*), pantropical spotted dolphins (*Stenella attenuata*) and Indo-pacific bottlenose dolphins (*Tursiops aduncus*), are frequently or rarely observed depending on species. There are most commonly seen in the open sea but sometimes come inside the PNM's waters.
- Dugong (*Dugong dugon*), and Mohéli Shearwater (*Puffinus temptator*) also occur (Fatouma 2004, Beudard and Ciccione 2008, Kiska et al. 2006).

Coral reefs

In 2000, a survey of the status of coral reef communities was undertaken in the South-western Indian Ocean in order to evaluate the impact of the largest coral bleaching event ever recorded, which occurred in 1998. Itsamia was one of the ten sites monitored in the Comoros Islands. The study revealed that Itsamia's reef was composed of 36% live coral cover and 47% dead substrates. The community composition of live corals was mostly *Porites* (50%), followed by *Acropora* (22%), *Diploria* (20%), *Pavona* (5%) and *Favia* (2%). The fish community was dominated by Scaridae, Serranidae and Pomacentridae (Quod and Bigot 2000). In a recent study, the coral cover of Itsamia was estimated to be 5%, the lowest from all sites surveyed in the Comoros (Cowburn et al. 2018). However, it was noted that the coral and fish species diversity on Itsamia's reef was as high as in other sites (Cowburn et al. 2018). Recent surveys of marine biodiversity all around Mohéli have confirmed that there was a high diversity and abundance of marine species and that coral reefs were healthy (CORDIO 2016).

Seagrass

Studies conducted in 2003 and 2005, revealed that most of the PNM, including Itsamia, shelters multi-specific seagrass pastures, with *Halodule uninervis* being dominant. *Halophila ovalis* patches

and *Cymodocea* sp., *Thalassia hemprichii* and *Syringodium isoetifolium* meadows can also be seen, depending on depth, substrate and local conditions (Beudard 2003, 2005). In 2014, a new assessment of sea grass diversity and abundance was undertaken through the use of 50 transects randomly set on main sea grass beds all along the south coast of Moheli island including inside the PNM. A total of six species was reported inside the PNM, five that had already been reported in Beudard 2003 and 2005 and a newly identified species *Cymodocea rotundata* (Ballorain et al. 2014). An additional species (*Thalassodendron ciliatum*) was only reported washing up on beaches but never seen during the transects (Ballorain et al. 2014). The study also confirmed the dominance of *Halodule uninervis* meadows, which have been reported as key foraging areas for dugongs and green turtles in many reviews.

Terrestrial Biodiversity of Moheli

Fauna

Moheli Forest habitats are of high importance for the conservation of species and subspecies endemic to Comoros, such as birds and insects. The most important habitats for avifauna are not degraded or only slightly degraded forest above 600 m altitude in which two species are strictly associated: Comoros Pigeon (*Columba polleni*, IUCN NT) endemic to the four islands, and the Moheli Shearwater (*Puffinus temptator*) recently described with a world population of only 300 individuals nesting in burrows on the natural forest of the ridge of Moheli (Shirihai and Bretagnolle 2015).

Moheli and Anjouan are the only places where the world's largest flying fox, *Pteropus livingstonii*, occurs naturally (critically endangered according to the IUCN). This flying fox depends on the intact forest on both islands, and three rookeries are known on Moheli. The world population is estimated at around 800 individuals with a minimum of 80 on Moheli (Mickleburgh et al. 2008).

A significant population of free-ranging lemurs (*Eulemur mongoz*) endemic to north-western Madagascar, thought to have been introduced onto Moheli before the European discovery of the archipelago, was also reported to occur in Moheli (Nadhrou et al. 2017).

Vegetation and Flora

The typical native vegetation of Itsamia is open deciduous forest with associated dry thickets. The architecture and floristic origins of these dry forests are also closely related to the deciduous forests found in western Madagascar.

Among the most significant native species found in this sub-humid zone, also found on Moheli and Mayotte, are: *Mimusops comorensis*, *Adansonia digitata*, *Commiphora arafy*, *Poupartia gummifera* *Diospyros comorensis*, *Ochna ciliata*, and *Strychnos spinosa* (Boulet 2009).

There is an incredible variety of flora on Moheli: 500 species of plants and an exceptional endemism. Agriculture has resulted in the emergence of introduced species particularly scented plants used for perfumes and spices that contribute to the island's total flora: ylang-ylang, orchids, cloves, black pepper, coffee and vanilla.

The transformed forest is typically characterized by a dominance of exotic tree species such as *Eucalyptus robusta*, *Pterocarpus indica*, *Syzygium jambos*, *S. aromaticum* and *Tectona grandis*. The coconut is also abundant and widespread particularly at low altitude (CBDD 2003).

10. Cultural/traditional importance [S1]

Describe the cultural / religious / spiritual importance of the site (e.g. in terms of historical associations, spiritual traditions, religious significance etc.), as well as non-consumptive traditional beliefs/practices, in relation to marine turtles. If possible, provide references to published/unpublished historical or other accounts, which may give an indication of relative importance in a national context.

Symbolic importance of Itsamia as a leading village in turtle conservation in Comoros

Apart from Nioumachoua, on the south coast of Moheli where the PNM headquarters is located with technical staff and two eco-guards, Itsamia is the only other village with more than one eco-guard dedicated to sea turtle conservation onsite. Itsamia is known throughout the Comoros, and elsewhere, as the pioneering village in terms of sea turtle conservation, and its far-sighted, dynamic village non-profit organisation: Association pour le Développement Socio-Économique d'Itsamia (ADSEI-*Organisation for the socio-economic development of Itsamia*), created in 1991, ten years before the Moheli Marine Park was implemented.

ADSEI has chosen sea turtles as flagship species for promoting socio-economic development of Itsamia village. For that purpose, this community decided to lead their conservation programme mainly based on monitoring the nesting beaches and protection against poaching on the five nesting beaches (Lilette 2007).

ADSEI is unique to the Comoros, and also very special to the entire IOSEA area, and indeed the world. To a great extent the National Park of Moheli (Parc National de Mohéli, PNM) has been inspired by efforts of the people of Itsamia Village. Itsamia is commonly called "The village of turtles" (Le village des tortues) by Comorians and visitors.

Traditional beliefs in relation to marine turtles in Itsamia village

An anthropological study about the social and cultural importance, including traditional use, of marine turtles in Itsamia village was undertaken in 2006 (Ciccione and Lilette 2006; Lilette 2007). This study reported that the local community in Itsamia follows the shafeite sect of Islam, which dictates that the consumption of animals that live in two different worlds is forbidden; hence, the green sea turtle, that spends its life in the sea and comes out on land to nest or rest on beaches is haram (unclean and cannot be eaten).

Comorians in general, but particularly those from Itsamia, did not formerly consider turtles to be particularly important. However, due to accrued interest in the protection of the environment and endangered species, many Comorians now adhere to these ideals which are becoming new facets of the local culture (Lilette 2007).

Green turtles are called "Nyamba" in Comoros (as is the case along much of Swahili-speaking coast of East Africa), and hawksbill turtles are called "male Nyamba" (Abdou 2010).

Nonetheless, throughout much of Comoros, including in Moheli and even certain villages within the PNM, consuming turtle meat is believed to bestow strength (Hauzer et al. 2008).

11. Jurisdiction [G1]

The name of the government authority with: (a) territorial jurisdiction over the site, e.g. state/province, region or municipality etc.; and the name/description of the authority with (b) functional jurisdiction for conservation purposes, e.g., Department of Environment, Department of Fisheries, traditional owners, etc.

Territorial jurisdiction

Itsamia village and its beaches are located in the administrative zone covering Djandro on the island of Moheli. The PNM is located entirely within an area of national jurisdiction (Abdou 2010).

Functional jurisdiction

The directorate of Environment of Moheli has functional jurisdiction over the PNM, which includes Itsamia (UNEP 2008).

The PNM is an autonomous institution under the Ministry of the Environment of the Comoros and co-managed by the ten communities that are within the PNM (CBDD 2003).

12. Management authority [G1]

Name, address and contact details of the body responsible for the direct local conservation and management of the site.

PNM

A Park Management Committee oversees the management of the park. This consists of sixteen individuals, including ten elected representatives of the ten member communities, and brings together the government and local communities in a joint management approach (CBDD 2003, see details for management governance in section 17.).

Contact

Parc National de Mohéli, Nioumachoi – Ile de Mohéli, Union des Comores, telephone: (00269) 772 61 78

13. Current protected status and governance framework [G1, S4]

Describe any applicable legislation / regulations (or traditional laws / norms) relevant to the protection / conservation of marine turtles and their habitats at this site, and comment on their effectiveness. Include details of how any incompatible human activities and/or uses of land and sea at the site are prohibited or mitigated.

Mention any nationally relevant protected area status, international conservation designations and, in the case of transboundary sites, bilateral or multilateral conservation measures which pertain to all or part of the site. If a protected area or reserve has been established (at a national/regional level), give the date of its establishment and size. If only a part of the site is included within a protected area, the area of marine turtle habitat that is protected should be noted.

International designations may include sites listed under the UNESCO/World Heritage Convention, Man and Biosphere Reserve Network, Ramsar Convention, other site conservation networks, etc. Where appropriate, list the IUCN (1994) protected areas management category(ies) that apply to the site.

Religious practices

Lillette (2007) reported that the local community in Itsamia follows the shafeite sect of Islam, which dictates that the consumption of animals that live in two different worlds is forbidden; hence, the green sea turtle, that spends its life in the sea and comes out on land to nest or rest on beaches is haram (unclean and cannot be eaten).

National protection framework

Presidential decree No 79-012 of 9 April 1979 and Interdepartmental order No 92-015 of 30 March 1992 stated: "*The capture of turtles as well as their commercialising are prohibited by the Comorian law*" (David et al. 2003). Anyone violating this decree risks up to 500 000 KMF fine (\$1,000) and imprisonment.

In 2001, a Ministerial Order (01/031/MPE/CAB) described additional protection measures and listed all threatened and/or endemic flora and fauna species from the Comoros into two protection categories. Three sea turtle species (green turtles *Chelonia mydas*, hawksbill turtles *Eretmochelys imbricata* and leatherback turtles *Dermochelys coriacea*) were classified among the list 1, meaning they are fully protected species. In addition to the capture and commercialization prohibition already in place for several decades, this ministerial order stated that transport, keeping in captivity, collection of eggs and animal harassment were also forbidden.

Despite regulations instituted from 1979, the numbers of poached sea turtles quadrupled between 1975 and 1991, growing from an estimated 185 individuals in 1975 to an estimated 800 turtles in 1991 (Mortimer 1993). In recent years, it was reported that poaching events have become rare, thanks to increased surveillance through the Moheli National Park (see below for details), and the hiring of a law enforcement agent working full time at the site of Itsamia since 2012. Beach patrols for poaching surveillance undertaken jointly by eco-guards of the PNM, communities and the law enforcement agents are regularly organised and have been proven effective in dissuading poachers (A. Msoili, pers. comm.). As a few poachers were caught and had to pay a fine or go to prison since anti-poaching patrols started in the PNM and Itsamia, it seems to have discouraged more poachers from capturing turtles in this area (more details on poaching history in Itsamia in section 16.).

Regional protection framework

The PNM (Moheli National Park) was created in 2001 by government authorities in partnership with

village communities. It is defined and protected by Presidential decree No 01-053/CE. It was created to address coastal and marine threats in a co-managing approach that empowers local communities with opportunities to participate in natural resource management.

The decree creating the marine park sets general rules for the entire park:

- Fishing is prohibited except traditional and artisanal methods, but nets are prohibited (except for the “hawk” – a small cone-shaped net)
- Fisheries targeting some species of fish can be closed by the Registrar of the Park or the Management Committee (there had been no prohibition before the creation of the PNM);
- Hunting, and the weapons and ammunition used for hunting are prohibited;
- Agriculture, grazing and forestry activities are prohibited;
- Forestry, agricultural, and pastoral activities carried out along the outside edge of the marine park may continue in their present form, provided that they do not change the character of the park, and any fundamental alteration proposed must be approved by the Management Committee ,
- Unless authorized by the Registrar of the Park, it is forbidden to introduce wild or domestic animals; destroy or remove eggs or nests; injure, kill or remove wild mammals, birds or reptiles, or to advertise, sell, buy or transport them; tamper with or disturb wildlife;
- Unless authorized by the Registrar it is prohibited to introduce seeds and plants, and also to uproot, pick, destroy, remove or peddle native plants;
- The traditional use of medicinal and other useful plants is permitted freely to the local population;
- The use of herbicides and insecticides requires special permission from the Registrar;
- The Management Committee and the Registrar may take any action to restore or maintain the natural vegetation including restocking activities / power restoration and / or reintroduction of wildlife;
- Except by permission, it is forbidden to collect, remove, transport or sell minerals and fossils;
- The collection of corals, living or dead, is strictly prohibited;
- Mining activities are prohibited;
- Professional activities involving radio, photography or cinematography require special authorization;
- All public works that could have an impact on the nature of the marine park are banned or subject to authorizations by the Management Committee and / or the Registrar;
- Ecotourism activities are permitted and their management is overseen by village associations and licensed operators; some boats are prohibited or require special authorization to enter the PNM;
- Over flights below 1,000 m are prohibited unless authorized by the Registrar;
- Fire, disposal of wastes and other harmful activities are prohibited;
- A right of access must be purchased to enter the marine park;
- Scientific research and educational activities must be approved by the Management Committee or the Registrar.

Each village has designated a special marine reserve area within the park (Fig. 5), where all forms of exploitation are prohibited. Activities within designated reserves for the conservation of marine biodiversity are generally limited to authorized scientific research and environmental monitoring. However, the Management Committee and the Registrar may allow some ecotourism activities including scuba diving and boat access (Presidential decree No 01-053/CE).

Those regulations have been proven to be effective as recent coral reef surveys have a high diversity and abundance of marine species and were healthy (Marex 2017, CORDIO 2016).

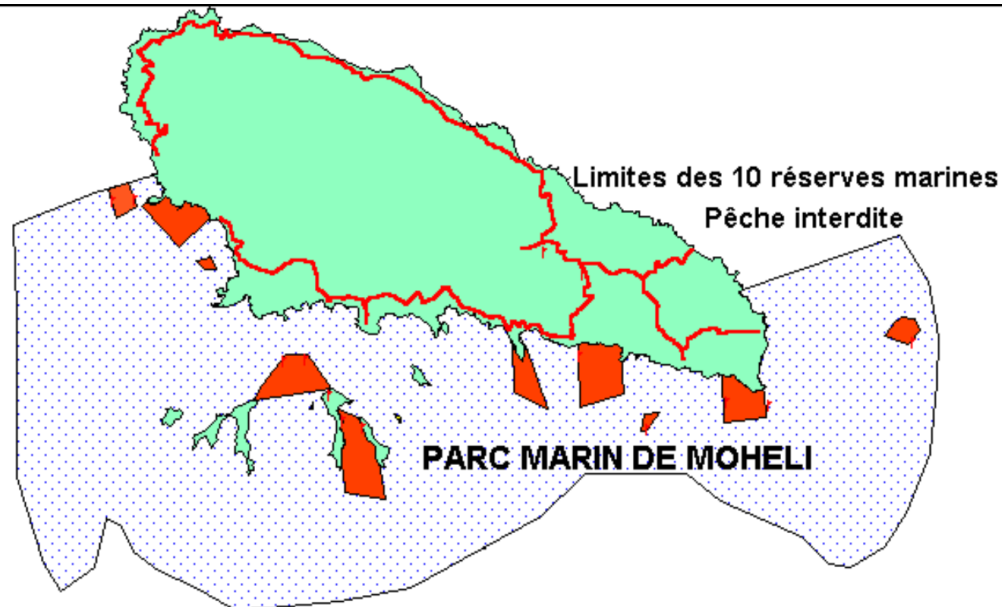


Figure 5. The island of Moheli, Union of Comores, showing the terrestrial area of Moheli (light green) with major roads (orange lines); the PNM, Moheli National Park, is shown by the stippled area, and the 10 marine areas closed to fishing are shown by the orange polygons inside the marine park (Abdou 2010).

International protection framework

The Union of Comoros has signed and ratified most international environmental conventions:

- United Nations Convention on the Law of the Sea (UNCLOS) adopted at Montego Bay, 10 December 1982;
- Ramsar Convention on Wetlands of International Importance especially as Waterfowl Habitat, adopted February 2, 1971. Ratified by Decree No. 94-007/AF of 6 June 1994.
- Convention Concerning the Protection of World Cultural and Natural Heritage, adopted in Paris on 23 November 1972. Ratified by Decree No. 94-008/AF of 6 June 1994;
- Washington Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), adopted at Washington, 29 December 1972. Ratified by Decree No. 94-005/AF of June 6, 1994;
- Vienna Convention for the Protection of the Ozone Layer, adopted in Vienna March 22, 1985 and the Montreal Protocol on Substances that Deplete the Ozone Layer of 16 September 1987. Ratified by Decree 625. Policy and Governance No. 94-011/AF of 6 June 1994;
- United Nations Framework Convention on Climate Change, adopted in New York, 9 May 1992. Ratified by Decree No. 94-010/AF of 6 June 1994;
- Convention on Biological Diversity (CBD), adopted in Rio de Janeiro 5 June 1992. Ratification 30 August 1994;
- Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, adopted in Basel, 22 March 1989. Ratified by Decree No. 94-009/AF of 6 June 1994;
- Convention for the Protection, Management and Development of Marine and Coastal region of Eastern Africa (Nairobi Convention), adopted in Nairobi in 1985. Ratified by Decree No. 94-012/AF of 6 June 1994;
- Convention on the Fight Against Desertification, adopted in Paris on 17 June 1994; and
- Stockholm Convention on Persistent Organic Pollutants (POPs).

Additionally, Comoros is a Signatory to non-binding instruments under the auspices of the Convention on Migratory Species of Wild Animals, which are directly relevant to the protection of marine turtles and their habitats:

- Memorandum of Understanding on the Conservation and Management of Marine Turtles

and their Habitats of the Indian Ocean and South-East Asia (IOSEA Marine Turtles MOU);

- Memorandum of Understanding on the Conservation and Management of Dugongs (Dugong dugon) and their Habitats throughout their Range (Dugong MOU); and
- Memorandum of Understanding on the Conservation of Migratory Sharks (Sharks MOU).

14. Land/sea tenure/ownership [G1]

Provide details of ownership of the site and ownership of immediate surrounding areas (e.g., state, provincial, private, etc.) which may have a bearing on the conservation of the site. Explain any terms that have a special meaning in the country or region concerned.

The PNM, including the Itsamia site, with both terrestrial and marine areas, is owned by the State of Comoros (Abdou 2010).

15. Socio-economic values and land/ocean uses and activities within the vicinity of the site [EB4, G5, S2, S5, S6]

Describe, in general terms, the principal social and economic values of the site, including human activities and land uses (past, current and planned) within the vicinity of the site (e.g., agriculture, fishing, resource extraction, grazing, water supply, urban/industrial development, tourism, outdoor recreation, education and scientific research), irrespective of whether or not they are considered to directly impact the conservation of marine turtles. Some indication of the relative importance of each form of land use should be given, whenever possible.

Eco-tourism

In 2010 it was reported that eco-tourism was an effective source of supplementary revenue for the village of Itsamia, and these financial resources were partly reinvested in communal materials and equipment such as the Turtle House (used for communal meetings), the school and solar panels (IOSEA Report). In 2019, it is estimated that 30% of Itsamia's village development projects are now covered by eco-tourism revenues (A. Msoili, pers. comm.).

Sustainable management regulations of the PNM have produced social and economic gains for local communities, particularly for Itsamia. International support for sustainable livelihood projects facilitated the construction of ecotourism lodges by four community development associations (including ADSEI in Itsamia). This led to the annual number of tourists visiting Moheli to rise from 75 tourists per village in 1998 to 140 in 2001 (Gay 2001). In 2018, 240 tourists visited the site of Itsamia, indicating eco-tourism activity is increasing there (A. Msoili, pers. comm.). Tourists mostly come to Moheli to observe nature and landscapes, making Itsamia a site of touristic relevance. The organisation of annual Sea Turtle Days by the ADSEI since 1999 (details in section 20.) has also played an important role in developing tourism at Itsamia, as more and more people from Moheli or other Comorian islands heard of those events through the media and word-of-mouth. Eco-tourism has had spill-over effects in terms of creating related livelihood opportunities for villagers. Community members have been employed as guides, in building and managing accommodation facilities, and selling handicrafts (C3-Comores 2007).

Three of the local development associations have set up small, rustic bungalows, and are offering a range of activities including turtle watching, scuba diving, visits to archaeological sites, marine mammal watching tours, sea birds watching tours, visits to the forest to see the endemic Livingstone's Fruit Bat, and demonstrations of traditional dances (Tari, Gala lashi Mwali, Baho la nyombé).

Agriculture

Agriculture is the dominant activity in the Comoros' economy, representing 40% to 44% of the GDP and responsible for about 2/3 of all employment on the island (P.E.U.C. 2001). The most important plantations are: banana, coconut, manioc (cassava), fruit à pain (bread fruit), orange, Ylang-Ylang, pepper, cloves and tobacco. There is also some agriculture activity in Itsamia (Comoros National IOSEA Report).

Fishing

The waters east of Itsamia (in and outside the PNM) are known for good fishing that attract boats from the north of Moheli, as well as from the more distant islands of Anjouan and Grande Comore, when the weather permits transit. Although there are no published studies on the amount of fish harvested over time, anecdotal information from fishermen provides evidence that there has been

an overall decline in inshore fisheries over the past 50 years (Gabrié 2003). In recent years, fishermen have noted that there was an increasing number of boats in PNM's waters and that fish harvested are smaller than in the past (A. Msoili, pers. comm.). In 2016, 340 fishing boats were identified as using the PNM's water for fishing, and it appears that this number has doubled in 2018 (PNM, A. Msoili, pers. comm.). The PNM's team has started recording fish quantities harvested in order to compare with some data collected in 2017.

PNM: Mohéli National Park is based on a co-management approach, which relies on decisional institutions as well as local communities, including fishermen, for each decision taken. To optimize the contributions of local communities to co-management, community education was undertaken notably to educate on sustainable fisheries. Sustainable harvesting regulations on fishing allowed local fishermen to increase catches. Between 1998 and 2002, catches nearly doubled from 160 kg per month to over 300 kg in the PNM, benefitting 250 fishermen working in the park. With increased revenues from higher fish catches, villagers were able to buy motorboats for use in fishing, reserve surveillance, and tourism activities (CBDD 2003).

Collection of shellfish

Undated information: Gathering shellfish on the mudflats in the park at low tide (octopus, fish, molluscs), which is still allowed, was reported to be a very important economic activity (Abdou 2010).

In the past, Conques (*Charonia tritonis*), specific predators of the coral-eating starfish (*Acanthaster planci*), Turbo (*Turbo marmoratus*), Helmets (*Cipraecassis rufa* and *Cassis cornuta*), Spider shells ("Seven Fingers") (*Lambis* spp.) were reported to be subject to an important commercial activity in Comoros. A report from the IOC (1997) estimated that two tons / year of seashells were being collected in Comoros at that time. However, today this activity is no longer practised following the implementation of regulations from the national park, and certainly also due to resource depletion.

16. Factors adversely affecting the site's overall ecological character, as well as threats to marine turtles and their habitat at the site [EB4, S2]

Describe the human and natural factors negatively affecting the ecological character of the site, both within and in the vicinity of the site. These may include existing, new or changing activities/uses, major development projects etc., which have had, are having, or may have a detrimental effect on the natural ecological character of the site. For all adverse and change factors reported, supply measurable/quantifiable information (if such data exist), as well as information on the scale, extent and trend of the change factor and its impact. For example, describe in terms of the percentage of coastline (or other area) modified/affected by a particular threat; for egg collection, describe in terms of number of nests, per species, per year. Mention also data-deficient threats, where a threat is known to be present but is not quantified. Collectively, this information should provide a basis for monitoring of ecological character of the site.

Sea turtle threats in Itsamia

Turtle poaching

Poaching is the greatest threat faced by sea turtle populations in the Comoros region, and has been mitigated at the site of Itsamia and the PNM thanks to persistent efforts from Itsamia villagers and PNM eco-guards (A. Msoili, pers. comm.).

In 1972, it was estimated from preliminary observations that about 10% of the total nesting green turtles were killed at Mohéli, including some occasional events on Itsamia's beaches. In the 1980s, the introduction of motorized boats (Japawa) by the Japanese fishing industry contributed to an increase in poaching as it made the trip easier between islands (David et al. 2003). It was estimated that 75% of all poached nesting sea turtles from Mohéli's beaches were then brought to Anjouan to be sold (David et al. 2003). As locals from Itsamia had recognized the ecological value of having the largest concentration of nesting green turtles in Mohéli and all of Comoros, they came together to create a non-profit organisation for socio economic development of Itsamia (ADSEI) in 1991, aiming to protect sea turtles at this site and to develop activities around them. As many as 10 to 30 nesting turtles were caught per day, until the Itsamia villagers decided to deny access to fishermen coming to Itsamia to catch turtles, by patrolling the beaches regularly. As a result, poaching was greatly reduced to infrequent events on Itsamia's beaches (A. Msoili, pers. obs). However, females that nested on other beaches of Mohéli - not patrolled by ADSEI - still suffered from poaching. In 1992, following an increase in the observed number of turtles poached on Mohéli's nesting beaches, residents from the three villages of Comoros were interviewed in order to better understand drivers behind this pattern. Locals reported that fishermen from other Comoros Islands, especially from Anjouan, routinely visited the island in boats at night and took nesting females directly on the beach

before they could lay their eggs (persons interviewed said the meat was “considerably worse” if the female was killed after laying) (Woodworth 1992).

In 1999, the creation of the Moheli National Park and the mobilisation of 12 eco-guards allowed patrols to be undertaken of nesting beaches located inside the park as well. Right after those actions started, it was noted that sea turtle poaching had become five times higher on beaches located outside the Moheli National Park than inside. A year later, with eco-guards still undertaking daily patrols, there had been a 20% decrease in poaching events inside the Moheli National Park and a 16% increase on other Moheli’s beaches (CBDD 2003).

Nowadays, sea turtle poaching usually occurs around villages inhabited by people originating from Anjouan, as Moheli’s local population does not eat sea turtle meat (A. Msoili, pers. comm.). Sea turtle consumption in those villages is a tradition and a food preference due to sea turtle meat’s high nutritional value. Sea turtle meat was evaluated to be one of the cheapest of available meats (two and three times less expensive than fish and beef respectively), which makes it the most accessible meat for Comorians. In 2019, the price for 1kg of beef goes from 2,500 KMF to 5,000 KMF (\$5.75 to \$11.50) depending on its availability and the price for 1kg of sea turtle meat goes from 750 KMF (in Moheli, \$1.70) to 1,000 KMF (Anjouan and Grande Comore, \$2.30), showing sea turtle meat is still considerably cheaper than beef no matter where it is from (A. Msoili, pers. obs.). Despite this fact, it was reported that poaching events have become rare in the past years, thanks to the increased surveillance through the Moheli National Park (see below for details), the presence of the ADSEI onsite, and the hiring of a law enforcement agent working full time at the site of Itsamia since 2012. From June 2017 to February 2019, 76 poached turtles were counted at the site of Itsamia, which is small for a nesting population of several thousand individuals. Since 2017, three poachers have been arrested. Poachers often operate in groups, and sometimes parts of a group find ways to escape. There have been around five encounters between poachers and ADSEI members or PNM eco-guards in this period.

Therefore, although poaching remains an important and increasing threat to nesting sea turtles on islands surrounding Moheli (e.g. Anjouan, Mayotte), and seems to occur frequently on beaches outside of the PNM (A. Msoili, reports that dead sea turtles’ remains are often found and that the smell of decomposing sea turtles is omnipresent on most beaches outside of the PNM), it is rare and decreasing at the site of Itsamia thanks to efforts undertaken at this site by the ADSEI, the PNM and the law enforcement agent (A. Msoili, pers. comm.).

Collection of turtle eggs

Undated: It was reported that one of the major problems in the park was the collection of eggs of sea turtles, despite regulations and supervision. (Abdou 2010).

Nowadays, the collection of sea turtle eggs is rare at Itsamia, with an estimation of one or two cases reported per year nearby Itsamia (A. Msoili, pers. comm.). Collection of turtle eggs does not occur on the five nesting beaches of Itsamia, but on Dani 1 and Dani 2, two beaches located near Itsamia, on the west side of Moheli Island. Sea turtle eggs poachers are not locals from those beaches, but opportunist visitors coming from neighbouring towns (A. Msoili, pers. comm.). There are and have been no published reports on sea turtle egg poaching activity in Moheli to date.

Natural Hazards affecting the PNM

Increasing sea temperatures (global warming)

In 2016, the Comoros’ National Adaptation Programme of Action (NAPA) and UNFCCC National Communications noted an increase in annual temperatures of around 1°C over the last thirty years. The fact that the temperature in some egg chambers exceeded 35°C can explain the relatively low hatching and hatchling emergence rates observed during a study conducted in January 2010 on Itsamia beaches by Innocenzi *et al.* (2010) and may imply that global warming may have a significant impact on marine turtle reproduction, though more data are needed to confirm this hypothesis. Beach erosion and nest flooding occurs on Itsamia beaches, but there is no systematic information.

The reefs were badly hit by the 1997-1998 mass coral-bleaching event that affected much of the Indian Ocean following a major El-Niño Southern-Oscillation (ENSO) event (Wilkinson 2008; Ateweberhan *et al.*, 2011). Surveys undertaken in 2016 on the reef of Itsamia showed that even though coral cover was the lowest of the sites surveyed in the Comoros, the coral species diversity was close to the one from other islands and no bleached coral colonies were observed (Cowburn *et al.* 2018).

Illegal fishing in the area: coral damage and bycatch

From the results of interviews carried out in 2006 in ten villages within the PNM, including Itsamia, it appeared that, although knowledge of the prohibitions on fishing methods was widespread throughout the PNM, stakeholders from the majority of villages (70%) stated that the use of prohibited fishing gears continued to be a problem within PNM. These illegal methods were used both openly and secretly, by fishers from within the PNM and also from neighbouring villages outside the PNM. Many focus groups were particularly concerned with the damaging effects of gillnetting, such as coral damage and bycatch. Unfortunately, it has not been possible to evaluate turtle bycatch by those illegal fishing boats to date (A. Msoili, pers. comm.).

Coral damage was frequently identified as a result of octopus fishing practices; particularly through the use of iron rods (“ntshora”) or rocks to smash coral and extract the octopus. While the use of iron rods was not officially banned under PNM regulations, it has been regarded as an infraction as a form of spearfishing (Loupy 2001; Hauzer et al. 2008). While no bleaching events had been reported in 2016 coral surveys in Itsamia, it was noticed that recently killed colonies were present on the reef, however no information was given on possible explanations.

Although illegal fishing may have been a threat to coral reefs in the past, it is reported that there is no illegal fishing on the reefs of the Itsamia’s site in recent years, thanks to the surveillance efforts and law enforcements undertaken by the community and the ADSEI (A. Msoili, pers comm). However, illegal fishing far from the coast around Itsamia’s reefs commonly occurs and cannot be controlled by ADSEI members or PNM eco-guards due to a lack in appropriate logistical means (A. Msoili, pers comm). The origin and purposes (stocks, targets...) of observed fishing boats in the far sea are unknown to Moheli’s inhabitants (A. Msoili, pers comm).

Urban development and destruction of beaches in areas of Moheli surrounding Itsamia

The extraction of coastal materials (beach sand, pebbles, beachrock, gravel and river sediments) creates a risk to the conservation of the coastal zone and dependent species. They are very destructive activities: studies show that between 1950 and 1998, the loss of beaches on Moheli amounted to 469 ha (1.7 million m³), or 54% of the beaches. Since then, urbanization has tripled in Moheli and demand for these construction materials is still growing. It was previously reported (undated) that the main extraction sites within the park are: Nioumachoi, Miringoni, and Moihani Ouallah, where the beach has virtually disappeared following the construction of the Fomboni school (Nassur Madi, 1996). Fortunately, the extraction of coastal materials from the Itsamia area is low, even if it occurs.

So far, such extraction activities were made without prior impact assessment (Abdou 2010).

In a study from 2002, it was reported that there was a clear damage to the coral reefs in front of the Itsamia River which dumps excess sediment, leaving only massive and opportunistic corals on the reef flat (5% cover). Moreover, there was a marked increase of rock and rubble cover since 2000 (13% to 35% cover), which was suggested to be linked to the reef flat degradation (Ahamada et al. 2002).

Within the PNM, it was reported that by 2010 most of the original rainforest at intermediate altitudes had been transformed, in particular having been degraded by the exploitation of economically valuable species (CBDD 2003). This problem does not directly affect the immediate vicinity of Itsamia, which has no rain forest, but it is a problem around Boundouni Lake, a RAMSAR site located 4km from Itsamia. Farmers from Itsamia could be impacted from the degradation of the lake, as it has been reported that livestock animals are regularly brought around the Lake to drink (A. Msoili, pers comm).

Potential risk of water pollution due to oil shipping around Comoros

Comoros Islands are located on the main shipping route from the Indian Ocean where large oil tankers carry crude oil from the Persian Gulf to Europe and America. While there have not been any oil spilling events recorded to date in Moheli, a boat transporting oil, fuel and gazoil sank in 2018 north of Moheli Island. Luckily, there have been no oil or fuel leaks since the boat sank, but will become a threat as time passes and the boat containers get eroded (A. Msoili, pers comm). The risks of accidental pollution by hydrocarbons are not negligible because of the important passage of oil tankers off the coast of Comoros, in the Mozambique Channel (Abdou 2010).

Socio economical instability

Overpopulation (population growth rate of 2.6 %/year; Fukuda-Parr 2003), institutional and political instability (more than 20 coup attempts since independence in 1975; UNDP 1997), and poverty are also beyond the scope of conservation projects, and contribute to decreasing biodiversity (Cincotta et al. 2000).

17. Conservation and management interventions taken [G2, G3]

Describe conservation and management interventions already taken at the site to address threats. Note that some of this information may have been recorded in abbreviated form in the IOSEA Site Data Sheets, available online (www.ioseaturtles.org/reporting). Any application of coastal and marine spatial planning, or integrated coastal/marine zone management planning, involving or affecting the site should be noted.

Describe the management planning process for the site, including the state of implementation of any management plan that has been developed and approved for the site. Describe any other conservation measures taken at the site, such as restrictions on development, management practices beneficial to wildlife, closures of hunting, etc. (Note that information on any monitoring schemes and survey methods should be given under point 19, below.)

Where applicable, describe the involvement of local communities and indigenous people in the participatory management of the site, including co-management activities, surveillance and enforcement, and performance evaluation.

Management interventions at Itsamia were found to be numerous and involving local stakeholders, but most of them have finished and very little information was found on current protection activities, which is consistent with reports of a reduction in conservation activities at the site. The village of Itsamia has been the focus of much of the turtle conservation work undertaken in Moheli and the Union of Comoros as a whole (Bourjea et al. 2015).

1991- ongoing: Creation of the ADSEI and beginning of activities to prevent poaching

As locals from Itsamia recognized the ecological value of the nesting green population in Itsamia, and in order to fight against poaching that was threatening nesting turtles all around the island of Moheli, they came together to create a non-profit organization for socio economic development of Itsamia (ADSEI) in 1991, aiming to protect sea turtles at this site and to develop activities around them. Activities involved the organisation of awareness events at the village (such as Sea Turtle Days organised yearly at Itsamia, details in section 20), as well as a surveillance on nesting beaches in order to discourage poaching.

With the creation of the PNM in 2001 (details below), two eco-guards have been assigned to patrolling the five beaches of Itsamia in order to prevent poaching and to assist ADSEI members. Despite periods of time with limited effort due to interrupted funding (including for the PNM management), ADSEI members, eco-guards from the PNM and the community (as Itsamia's villagers sometimes raise the alarm) now work jointly and effectively at preventing poaching at Itsamia's site.

1998 – Initiation of beach patrolling by ADSEI to increase knowledge on sea turtles

In 1998, in order to increase knowledge on sea turtles at the site of Itsamia, Kelonia and IFREMER staff trained two ADSEI members in basic field techniques, particularly for monitoring nesting beaches. Track counts were used to estimate the number of green turtle females using the nesting site. In 2008, with the observed increase in poaching activities, surveillance against poaching was added to the monitoring. When poachers' footprints around a sea turtle track, sea turtle drag marks, or materials such as cloths, lamps and ropes were observed or found, night patrols were initiated by the ADSEI. The presence of the ADSEI on beaches discourages poachers and increases the chances to catch poachers in the act, in which case the culprits with their gear are taken to the police.

These preventive and enforcement activities are still currently undertaken at Itsamia.

1998-2003: Creation of the marine protected area Moheli National Park as part of the project 'Conservation of Biodiversity and Sustainable Development in the Federal Islamic Republic of the Comoros' (typically shortened to 'Project Biodiversity'.) initiated by IUCN, UNEP and the Comorian government, with funding from the GEF and UNDP

This project's most notable achievement was the declaration of the Mohéli Marine Park (now called Moheli National Park) in 2001. The establishment of the park represented the culmination of a multi-stakeholder process which began in 1993, when the government introduced a National Environmental Policy designed to halt the spiral of environmental degradation.

The policy introduced the idea of involving a broad spectrum of stakeholders in marine and coastal management, namely local resource users, non-governmental organisations, government departments, the private sector, and international donors. This was the first time the government sought to work with local communities in resource management. Consultations were held with residents of coastal villages, aiming to both identify socio-economic needs and to raise awareness of the need for conservation. This project was then extended in 2003 – 2005 “Project for Rehabilitation Activities for the Conservation of Biodiversity” (extension of the Project Biodiversity). One of the main actions undertaken by the PNM was the implementation of regulations in order to better manage marine resources and biodiversity inside the PNM. Those included many regulations applicable to Itsamia’s marine environment, including (see section 13 for full list of regulations):

- The ban on destructive fishing practices: the creation of the PNM had tangible benefits for the marine environment and its member communities in the early years of its existence. For instance, coral health was seen to improve thanks to bans on destructive fishing practices. Between 1998 and 2001, live coral cover on the park’s reefs increased from 30% to 65% (UNDP 2012).
- The ban on direct harvest of turtles and their eggs: after the PNM banned harvest of marine turtles, the number of locations with turtle nesting sites increased on the island’s southern beaches (UNDP 2012). The effectiveness of this ban is discussed in section 16.

In 2009, a newsletter called “Mwana Wa Nyamba” was first published to report publicly the activities and news of the PNM. This newsletter was distributed in the entire Union of the Comoros. However, the newsletter was no longer issued after 2011 due to lack of funding.

PNM participatory governance

As of 2010, the PNM relied on a mode of governance based on a participatory approach to co-management based on three levels of structure and an additional sub level:

- The Park Management (or Management Committee): The Park management decides on all regulations that may be undertaken inside the Park. It manages the Park, including the development of conservation plans or specific actions, as well as the funding management. The Park management consists of:
 - A President, who is the Secretary-General of Moheli’s government
 - A Vice-President, designated among the villages’ representatives
 - Ten members from the non-profit organisation from each of the ten villages located inside the Moheli Marine Park (called the “General assembly”)
 - The Director of Production and Environment of Moheli and his representative
 - A representative from the Police
 - A representative from the touristic operators
 - A representative from Park agents
- The Executing Committee: The Executive Committee represents the interests of communities in the Marine Park and ensures that human activities in the Marine Park are respected and contribute to the conservation of biological diversity. Twelve eco-guards are in charge of implementing the legislation in the PNM, with at least one eco-guard from each village located inside the Park and selected by non-profit organizations from each village. As for the members of the Park management, each non-profit organisation was responsible for choosing one eco-guard among its members. Because of Itsamia’s exceptional nesting population and as a reward for the long-term conservation actions undertaken by the ADSEI, the PNM has assigned two eco-guards dedicated to the protection of biodiversity at Itsamia, in comparison with one eco-guard on other sites inside the PNM (A. Msoili, pers. comm.).

In addition, each village community has signed a co-management agreement with the Marine Park and the Ministry of Environment that assigns the functions of each organization in the management of the park, as well as their rights and duties. The agreements define the geographic limits of village reserves, park regulations and the rights and responsibilities of each party. The level of sanctions is specified for each village. In the event of an infringement made within the area of the village by a member of the community, the village chief may impose fines in accordance with the agreement. The agreement specifies the allocation of the distributed income (fishermen, village associations, village activities) and/or how the funds obtained can be used.

At the international level, the structure and system of governance of Mohéli National Park are based on the principles of the International Union for Conservation of Nature (IUCN) and the World Commission on Protected Areas. Moheli National Park falls into the 6th category of the IUCN Protected Area Categories System, where all conservation targets are part of a participatory approach to resource conservation to integrate communities in the conservation process and to promote sustainable development (CBDD 2003).

It is worth mentioning that the PNM, despite ups and downs in its management and effectiveness in the past 18 years (details below in the 2012 Park management assessment), has now been proven effective (notably for its anti-poaching actions). It has grown to become a model for Marine Protected Areas in the Comoros Archipelago and internationally and has inspired many similar community-based projects in the region and in the world. The PNM has served as a base for the development of the project GEF/PNUD in the Comoros Islands, which consists in developing Marine Protected Areas in Grande Comore and Anjouan. The PNM is also involved in the Réseau National des Aires Protégées (RNAP, National Marine Areas Network) project.

June 2007- December 2008: Development of activities and construction of the Turtle House as part of the project “Development, protection and integrated management of the coastal zone at Itsamia, Mohéli, Comoros”. The project was officially launched by the Minister of Agriculture, Fisheries and Environment on 6 May 2008, in Itsamia. Executing agency: National Directorate of Environment in cooperation with ADSEI. Funded by UNEP and FEM (UNEP 2010).

Objectives: The project aimed at demonstrating Integrated Coastal Zone Management practices at a selected site on Itsamia beach. The project introduced a community-based management approach aiming at limiting pressures from land-based activities while generating direct benefits to the community through the development of ecotourism activities (UNEP 2010).

In 2010, it was reported that this community-based project had brought a proactive habitat restoration dimension to community ecotourism in Itsamia (UNEP 2010). Itsamia’s “Maison des tortues” (Turtle House) had been well established and was well networked at completion of the project. However, concerns were raised whether activities at the Turtle House could be maintained exclusively through support by visitor fees in the future, as visitors remained rare (UNEP 2010).

2009 - 2015 Support for the organisation of Sea Turtle Days at Itsamia village as part of the ProGeCo (Programme régional de gestion durable des zones côtières des pays de l’Océan Indien). Funded by the Commission de l’Océan Indien (COI), Fonds Français pour l’Environnement Mondial (FFEM)

Of the nine projects accepted by ProGeCo in Comoros in 2009, four concerned the island of Moheli and a fifth, specific to marine turtle conservation in Itsamia was accepted in 2009.

Those included financial support for the organisation of Sea Turtle Day, and financial help with the development of sea turtle awareness material, including T-shirts for the event.

2009 - ongoing: Creation of alternative livelihood opportunities to turtle poaching at Itsamia

Since 2009, ADSEI is in the process of developing eco-tourism based on the presence of sea turtles that come to nest every night on Itsamia beaches. Bungalows were built to accommodate tourists, and village youth eco-guides were trained. It was estimated that this activity had become a symbol of success for this isolated village.

2010-2014 Five-year management plan implemented by the PNM

Conservation targets

Eight conservation targets were directed at the biodiversity in greatest need of interventions in the PNM:

- Coral reefs with specific targets: molluscs, sea cucumbers (holothuria), and coral reef fishes;
- Seagrass pastures;
- Mangroves: taking into account their critical roles as breeding areas, refuges and nursery areas for reef fishes, crabs and marine and coastal birds;
- Islets and marine birds;
- Cetacean species, including/particularly humpback whale (*Megaptera novaeangliae*) and beaked dolphin (*Stenella longirostris*);
- Marine turtles, mainly green turtles;

- Dugongs;
- Natural and transformed forests including two integrated targets: hydrography and associated fauna.

(CBDD 2003)

Implementation

- Monitoring of species and ecosystems through partnership agreements established with ten villages of the PNM
- A statistical system of takes from reef fishing and number of fishing boats coming in the PNM has been launched in August 2009 and it still ongoing. Data on those takes are still collected by the Directorate-General for fisheries resources (Direction Générale des Ressources Halieutiques) and the PNM. However, results on those takes have not been published to date. It was reported that the number of fishing boats have doubled from 2016 to 2018, showing the fishing activity is still developing in the PNM (details in section 15., A. Msoili, pers. comm.).

2013-2015 POCTOI (Operational Program of Territorial Cooperation Indian Ocean): CEDTM/Moheli Cooperation Actions for conservation of marine environment. Funding: European Union, France and Regional Council of Reunion Island.

Partners of this programme: PNM, ADSEI, Association CEDTM (Réunion Island)

Actions:

- Monitoring of indicator species and ecosystems of importance to eco-tourism for conservation status
- Ecological restoration of coastline of Itsamia
- Reinforcement and development of eco-tourism

Implementation

Four missions in Moheli were organized in 2013 and 2014

Action 1:

- A monitoring of nesting female green turtles and nest incubation was implemented from 2013 May to 2014 June. Data collected will be analysed in 2015
- In 2014 October, ten satellite tags were put on nesting female green turtles at Itsamia (<http://wwz.ifremer.fr/lareunion/Les-tortues-en-direct>) to put in evidence foraging habitat of females that nest in Itsamia beaches
- 2013 August through 2014 March aerial monitoring of marine turtle foraging grounds in the Marine Park of Moheli was undertaken
- A baseline study of sea grass bed of Itsamia for training ADSEI members (2014 October)
- A baseline study of beach profile, for training PNM members (2014 March and October)
- An evaluation of sea-bird populations in the PNM, for training ADSEI and PNM members (2015 October)

Action 2:

In 2014 March, endemic and indigenous seed collection and seedbed construction in Itsamia; training for ADSEI members.

Action 3:

Formation of ADSEI guides for eco-tourism. Definition and implementation of eco-tourism products: sea-turtle nesting beaches, littoral and dry forest, sea-bird watching, agriculture, Boundouni lake visit (Ramsar site). Flyers (e.g. Fig. 6) were prepared in 2015 and were provided to the ADSEI to help welcome tourists at Itsamia.



Figure 6. Example of flyers developed to promote eco-tourism activities at Itsamia (POCTOI Project).

Production of 26mm video on the POCTOI programme and exposition of eco-tourism in Mohéli: was shown during de 2015 Sea-Turtles days in Itsamia (28 May) and in La Réunion (5-6 July).

Performance assessment of the Mohéli National Park management (source: United Nations Development Programme. 2012. Mohéli Marine Park, Comoros. Equator Initiative Case Study Series. New York, NY.)

Despite the initial successes of the PNM, in 2012 UNDP's "Equator Initiative" estimated that the PNM had been operating at a vastly reduced capacity since 2005.

From 2005, as all GEF-funded activities concluded, the management of the park at the community level was significantly reduced. Tourist numbers declined dramatically from their initial levels, and lack of funding for monitoring and enforcement of park regulations led to increases in poaching of high-value species such as sea turtles.

A study conducted in 2007 (Hauzer et al. 2008) interviewed a large number of respondents across the park's ten communities to assess its impact. The study did not show if the results were different between communities and combined all opinions, thus not allowing to look at Itsamia specifically. Overall, community respondents were often frustrated by the slow progress in seeing economic rewards from sustainable fishing that had been promised by park officials.

The study identified six main contributing factors to the park's diminished effectiveness. These were: the inequitable distribution of benefits; the lack of sustainable livelihoods options; the failure to involve women in awareness-raising and leadership roles; the challenges to effective monitoring and enforcement; the number of environmental threats to biodiversity that remained; and the lack of sustainability that undermined the management of the project.

Although the survey respondents credited the park with eleven key achievements, such as reducing environmental degradation, raising environmental consciousness, and increased coral cover, they also identified eighteen negative aspects of the park. These included its lack of sustainability, the lack of effective monitoring or enforcement, lack of respect for park personnel or official agreements, and poor management of equipment. Specific criticisms were directed at the lack of communication between the park's management and external actors: commercial harvesting of sea cucumbers had been carried out within the park by foreign companies, for instance, while local community members were banned from harvesting these commercially valuable species.

There was also a widely-held belief that the park's regulations had unfairly discriminated against women, for instance in outlawing the use of uruva poison (*Theoprosia candida*) in fishing, an activity exclusively carried out by female fishers. Benefits of ecotourism were also not distributed equally across the ten communities; those that were marginalized were typically where the worst instances of poaching were seen.

Lack of technical assistance and equipment was also highlighted: the promised introduction of Fish Aggregating Devices (FADs), which would have helped to increase fishing yields, was not carried out, for example. Lack of effective monitoring or enforcement ranked second for negative aspects of PNM. This issue was raised in eight villages where respondents stated that the lack of permanent monitoring and enforcement was leading to a continuation of turtle poaching and destructive fishing practices. As a result, local communities have become demotivated.

Resentment has arisen from the fact that those who do respect regulations gain no benefits, while those who do not respect regulations gain increased benefits. Lack of enforcement has also led to

the perception that PNM no longer exists and thus, people may carry out illegal activities with no fear of incrimination (Hauzer et al. 2008).

Since 2012, new funding allowed to reinforce the management plan for the PNM. An important project named SWIOFish (1 and 2), financed by the World Bank, has been established to help with the fisheries resource management.

2016 – Programme d’Appui à la Formation Technique et Professionnelle (Programme Supporting Professional and Technical Training - PAFTP) led by the ADSEI and financed by the European Union

This programme aimed at reinforcing eco-touristic activities at Itsamia. Training sessions were organized for ADSEI members and Itsamia villagers, on many aspects of eco-tourism including knowledge on biodiversity and species biology as well as management of eco-touristic activities. The CEDTM was a partner for the training sessions on sea turtles’ ecology and to provide additional awareness material for the Turtle House.

18. Conservation interventions proposed, but not yet implemented [G2, G3]

Provide details of any concrete conservation measures that have been proposed, or are in preparation, for the site, including any proposals for legislation, protection and management. Summarize the history of any longstanding proposals that have not yet been implemented, and differentiate between those proposals that have already been officially submitted to the appropriate government authorities and those which have not as yet received formal endorsement, e.g., recommendations in published reports and resolutions from specialist meetings. Also mention any management plan that is in preparation but has not yet been completed, approved or implemented.

Classification for a UNESCO Biosphere Reserve

Since 2010, the PNM management team decided to support the initiative to establish a Biosphere Reserve for the whole island of Moheli and coastal areas in the context of the Global Programme of UNESCO.

There have been considerable advances towards this goal, as a project called GDZCOI funded by the Indian Ocean Commission and led by the Directorate-General for the Environment in Moheli helped local stakeholders in developing a Biosphere Reserve project for consideration as a UNESCO site. As part of this project, an exchange travel was organized between Moheli and Sahamalaza, to show an example of a UNESCO Biosphere Reserve. In December 2018, a workshop about UNESCO Biosphere Reserves was organized in Fomboni, Moheli, with support of the project RNAP/PNUD, the PNM and Moheli’s Governance. The Governor of the Republic of Sao Tome, which hosts the UNESCO Biological Reserve of the Island of Principe, was present at this workshop and provided valuable comments on their experience in UNESCO classification process. As a result of this workshop, a collaborative team including RNAP/PNUD’s and PNM’s staff is now working to organize a national MAB Committee to compile a UNESCO Biosphere Reserve proposal for Moheli Island. This proposal is intended to be submitted in August 2019 at the latest.

Further ecotourism development

Specifically to Itsamia, according to government policies, eco-tourism should be further developed, particularly by improving infrastructure, by developing specific tourist sites, and by protecting certain species (and their habitats) in danger of extinction (UNEP 2010), particularly those with a high ecological, cultural, and tourism potential.

19. Current / proposed scientific research and monitoring [G4]

Describe any current and/or proposed scientific research on marine turtles and their habitats, as well as information on any special facilities for research. In particular, describe past and current marine turtle monitoring activities at the site (e.g., tagging, satellite tracking, genetic sampling, nesting and foraging ground surveys, ongoing beach monitoring, etc.). Describe the survey methodology in sufficient detail to allow for an assessment of its efficacy. Indicate the number of years of continuous monitoring, and whether data have been used to estimate trends in the size of the management unit. Cite relevant published papers in support of the submission.

Green turtle nesting monitoring programme (on going)

Since 1998, ADSEI, Ifremer and Kelonia (CEDTM - Study and Discovery Center for Marine Turtles) have collaborated to develop a green turtle research programme which have demonstrated the importance of Itsamia to green turtle reproduction for Moheli, Comores, and its importance for the green turtle populations of the entire IOSEA region.

Tracks of nesting females are counted daily (effort >90% of nesting events) on the five beaches of

Itsamia (Itsamia, M'Tsanga nyamba, Bwelamanga, Miangoni 1 and Miangoni 2). Tracks are marked with a cross to avoid double-counting the next day. The nesting success (nesting attempt, confirmed nest or undetermined nesting success) is also determined using clues along the track and around the body pit as taught during training.

The number of tracks is used to evaluate breeding seasonality and trends in the number of mature females at nesting sites. An average of 18 306 +/- 8 037 tracks were counted per year on the five beaches (Bourjea et al. 2015).

Based on this statistical approach, it was shown that the population increased, at a mean growth rate of 19.8% per year for the nesting population between 1999 and 2014 (Bourjea et al. 2015). Since 2017, additional funding has allowed reinforcement of the partnership between ADSEI and Kelonia/CEDTM and has provided recent results on the nesting population trends. Although some more sampling is required to see how the patterns evolve year after year, it appears that the nesting activity is still exceptional on Itsamia's beaches, and likely still increasing (Fig. 7).

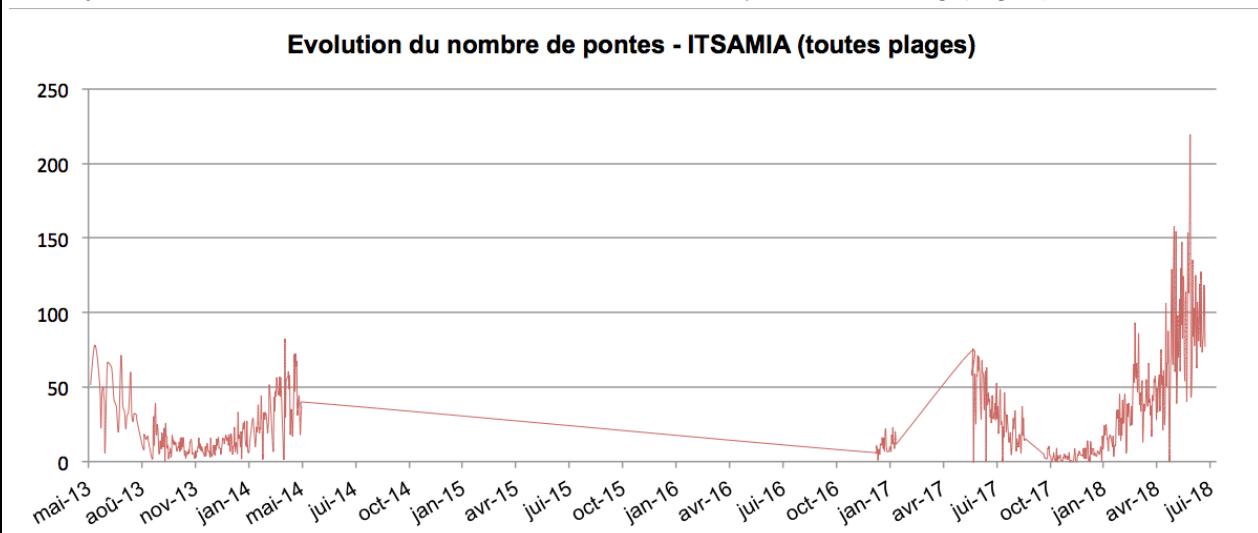


Figure 7. Time-series showing the number of nesting events counted since the regular monitoring by the ADSEI re-started again in July 2017 at the nesting site of Itsamia.

Monitoring of poaching activities

During daily track counts, ADSEI members and PNM eco-guards report on the number of poached individuals encountered: poaching can be confirmed when there are poachers' footprints around a sea turtle track, sea turtle drag marks, or materials such as cloths, lamps and ropes found.

Poached nests are also counted: it can be identified when footprints are visible around a sandy patch showing signs it has been dug and re-filled (large patches of loose sand) or that the dug hole is left open. There are no dogs on Itsamia's beaches, so a poached nest cannot be mistaken for a dog attack on those beaches (A. Msoili, pers comm).

Study on the impact of an elevation of the incubation temperature for sex determination of marine turtles

Data were collected on Itsamia beaches between April and June 2009. Each female that laid eggs was measured (curved carapace length - CCL) and tagged with a Monel tag. Sixty nests were monitored to determine clutch size and emergence success (for protocol see Miller, 1999). Ten eggs from each nest were measured (diameter) and weighed. A Wemco temperature logger was positioned in the centre of the clutch for 30 nests. The nest location was indicated by a piece of nylon net placed on the surface of the beach, over the nest. These nets were examined twice per day to monitor if hatchling emergence had occurred. Fifteen emerged individuals per nest were measured (straight carapace length - SCL) and weighed before being released on the beach. Once 72 hours had passed since the last emergence, nests were excavated to categorize nest contents and determine hatchling and emergence success.

The results of the study confirmed the importance of Itsamia as a key site for green turtle reproduction, with 742 females tagged during four months on two of the five beaches of Itsamia. Temperatures recorded during the study exceeded 30°C starting from the second third of the incubation period with the critical temperature of 35°C reached in 11 nests. Previous studies have shown that incubation temperatures higher than 29°C result in almost exclusively female hatchlings.

Furthermore, death of the embryos was observed at temperatures exceeding 35°C. These results show the vulnerability of turtle reproduction to climate warming (Innocenzi et al. 2010).

Study on female turtle's orientation to the nesting beach

From 17-30 July 2010 an international mission on the beaches of Itsamia was organized by ADSEI in partnership with Kelonia. The objective was to study the mechanisms by which adult female green turtles orient themselves at sea.

Methodology: The preparation undertaken by ADSEI made it possible to select females at the beginning of the laying season. Members of ADSEI systematically tagged all the females having reached the beaches of Itsamia during the eight weeks preceding the arrival of the scientists. Sixteen specimens were then fitted with satellite transmitters and four were equipped with temperature, depth and speed data loggers. The turtles were then taken on board the vessel, Antsiva (www.antsiva.com) and transported 80 miles from their laying site before being released at sea. The path that the turtles took to return to the Itsamia beaches to continue their nesting cycle will be/was studied by the scientists and compared with recovered environmental information in order to establish the turtles' navigational modes at sea and in proximity to the beaches (Benhamou et al. 2011).

Boulet 2009

The coastal vegetation of Itsamia was studied by the Conservatoire Botanique National de Mascarin in 2007 as part of the INTERREG programme (Boulet 2009). See section 9 for results of that study.

Nesting monitoring programme in the PNM

The PNM has developed a specific nesting monitoring program for all green turtle nesting sites located inside the PNM, which includes data from the Itsamia's nesting site. Eco-guards undertake track counts and evaluate potential factors influencing nesting activity patterns. In 2017, it was reported in the final report on sea turtle conservation at the PNM (Mouchitadi Madi Bambou, 2017) that there was more nesting activity at the nesting sites when trade winds were stronger.

20. Current / proposed communication, education, and public awareness activities [S3]

Give details of any existing and/or planned site-based programmes, activities and facilities for communication, education and public awareness, including training. Comment on potential opportunities for future educational and outreach activities at the site.

In Comoros, like in many developing countries, tourism is an important tool for economic development, fostering growth and employment and contributing to conservation activities in protected areas.

Turtle House

There is a small house entirely dedicated to sea turtle conservation in Itsamia, called the Turtle House (details on its history/origin provided in section 17.): since its construction in 2010, the Turtle House serves as a centre for sea turtle conservation awareness activities. A projection room can show documentaries or movies about sea turtles or the environment, and workshops or training sessions are organised regularly, especially when researchers or environmental actors are visiting. Finally, permanent exhibitions about sea turtles or Moheli's environment are provided by partners to be displayed in the Turtle House.

Sea Turtle Days (yearly)

Since 1999, ADSEI has annually organized "Sea Turtle Days" on 28 May. This has become the most important popular event in Moheli and is an opportunity to raise awareness of the population to the necessity of preserving sea turtles and their natural habitats in the Union of the Comoros. (Comoros National Report to IOSEA Marine Turtles MOU).

Sea Turtle Days are some of the most popular public events in the Comoros; about 200 people from Itsamia and another 400 people from other places on Moheli participate. Among the participants are government officials, Chief of Police, judges, deputies, religious leaders, the governor of Moheli, and ministers. The activities include films, popular presentations on scientific work, sporting events for children and adults, the edition of a special T-shirt. The overarching theme of the activities is the conservation of marine turtles, but other species such as Livingstone's fruit bat and dugongs are also given attention. Members of other community organizations learn much from the event, and Sea Turtle Days have given Itsamia and ADSEI considerable notoriety on Moheli and throughout Comoros Islands. Since the start of the organization of Sea Turtle Days, other NGO's from nearby villages have expressed their motivation in preserving sea turtle species. Therefore, it is believed

that those special events are particularly effective to increase awareness on sea turtle conservation status and protection in the Comoros Islands, which is important as threats, especially poaching, is still a significant threat.

The Itsamia village association ADSEI organizes “Sea Turtle Days” in Itsamia every year. During the course of three days, several activities are organized which include the parade of costumed children dancing to the sound of drums, drawing competition of sea turtles on the beach and a race of buénis (local name for "woman") (A. Msoili, pers. comm.).

Distribution of short-films and documentaries about Itsamia in the Region

A 26-min film (POCTOI project, see details on the production of this film in section 17.) has been available for viewing in Kelonia’s projection room every day and all day long since 2015, presenting ADSEI’s and researchers’ actions for the conservation of nature at the Itsamia site. Kelonia is the most visited museum in La Réunion island (170,168 visitors in 2018), and probably inspires local and international tourists to visit the Itsamia site.

Involvement of schools

As part of the 2010-2014 PNM management plan, awareness and environmental education programmes were conducted in primary and secondary schools in the region of the PNM.

On the occasion of the Sea Turtle Days festival of 2006, C3 and Moheli National Park (PNM) initiated a programme to inform students about the life history, ecology and conservation issues of Moheli’s sea turtles and to encourage their involvement in their protection. The programme took place at schools in five villages that are inside PNM from 16 June to 11 July. The villages were identified by the PNM Curator, Kamardine Boinali, as those most heavily affected by turtle poaching. A total of 313 students attended the five presentations: 151 girls and 162 boys between the ages of 7 and 23. C3 was assisted by PNM eco-guards Hamada Issoufi, Cheikh Moussa (‘Bush’) and community volunteers.

In addition to educating students about the turtles that were nesting nightly on Moheli’s beaches at the time, a drawing contest was held in each village. The eco-guards held the attention of classrooms full of up to 81 children with their animated and heartfelt presentations (Comoros IOSEA Report).

Exchange of information at regional meetings

A poster presentation on the results of studies conducted in 2003 (Beudard 2003) and in 2005 (Beudard 2005) on seagrass beds of the Moheli Marine Park, including Itsamia, was given during the 2009 WIOMSA meeting (Ciccione et al. 2009).

The movie “3M: Moheli, Mafate and Marine turtle” which promotes conservation awareness and information about scientific programs carried out at Itsamia was presented in La Réunion (Kelonia and Reunionese TV), Alliance française de Moroni, and also video session of 34th Annual Symposium on Sea Turtle Biology and Conservation, in New Orleans in April 2014.

Proposed communication actions:

- Production of a documentary film at Itsamia’s activity, to be displayed in schools and events
- Hosting important international events about sea turtles, such as the WIOMSA scientific symposium or the International Sea Turtle Symposium.

21. Financial resources available for management of the site and other activities [G5]

Identify human and financial resources (including in-kind contributions) available to support immediate and near-term activities, as well as resources available to sustain site-based activities in the longer-term (e.g. in relation to monitoring, management interventions, surveillance and enforcement, and performance evaluation).

Itsamia

French Embassy

The Social Development Fund provided by the French Embassy in Comoros 2013-2014 supported: Improvement of the quality of ecotourism services in the village of Itsamia;

- Renovation of childcare facilities
- Assistance for the adequate management of trained personnel and equipped circuits
- Communication at the national, regional and international levels, on ecotourism products of Itsamia and on marine turtle conservation

Kelonia provided the materials for the original "Turtle House" in Itsamia (computer, marine turtle exposition, movies).

The European Union and PAFTP have also provided financial support for developing eco-tourism activities in 2016-2017.

Nowadays, Itsamia's developmental projects are sustained by eco-touristic revenues for 30%. The remaining activities are supported by regional or international funding and require ADSEI members to respond to any relevant Call for projects in order to continue their ongoing activities.

PNM

Two French government agencies provide support and technical expertise in administration and finance to the committee of the PNM. These are Agence Française pour la Biodiversité (French Biodiversity Agency, AFB) and Fonds Français pour l'Environnement Mondial (FFEM).

In the past, the PNM has received support from various international partners funding projects for the conservation of biodiversity.

- UNDP (United Nations Development Programme)
- PROGECO (Regional Programme for Sustainable Resource Management of Coastal Zones of countries of the Indian Ocean) funded by the European Union.
- Decentralised Cooperation Programme of the EU in the Comoros
- Network of Marine Protected Areas of the IOC
- French Volunteers Association supported by the Regional Council supports the PNM by the provision of a voluntary Technical Assistance for the protected area.

UNDP, UNEP and IUCN have also provided financial support and technical assistance to train community volunteers as "eco-guards", who are responsible for awareness-raising as well as monitoring.

Despite major efforts to obtain support from technical and financial partners, the National Park Moheli relies on funding from occasional projects. There is no permanent funding for the Park, so its activities are usually funded for a period of the duration of the project only (2-3 years). To achieve its sustainability strategy (Axis 4 of the Development and Management Plan), support and reflections of reliable partners are essential to ensure implementation of the participatory conservation in this protected area in the long term.

22. Additional resource needs at the site [G5]

Where specific needs are identified (e.g. skilled personnel, specialised training, facilities, field equipment etc.) indicate how marine turtle conservation activities are presently impaired on account of their unavailability (e.g. inability to carry out regular surveys, to conduct certain types of research, to monitor certain parts of the range etc.) This information may be useful for compiling a general picture of deficiencies and resource needs that could be presented to potential programme sponsors.

Turtle House

As of 2019, it was reported that awareness materials of the Turtle House were out of date or heavily used. In order to improve the quality of the Turtle House as an awareness centre, the needs would be:

- Improvements, decoration and better fitting of the Turtle House building
- More equipment with awareness material for all ages of the public (children, youth, adults)
- Construction of an extra room to serve as a museum, with sea turtle conservation-related objects displayed for visitors
- Installation of a better internet connection (very limited at the moment)

Improvement of tourist accommodation at this site

In order to continue the development of eco-tourism activities in Itsamia's site, it is important to renovate the bungalows for which issues have been identified.

Improvement of Itsamia's village waste and water management

Although the installation of a controlled landfill and the implementation of systems for collection and management of solid waste was proposed as part of a large project in 2007, it still has not been constructed and would be necessary for Itsamia's villagers and visitors aware of their management of waste and encouraging sustainable use of resources. Itsamia's village also needs installations for a better evacuation of run off waters and engineering projects in order to prevent the erosion of cliffs around Itsamia's village (see section 16. for details).

PNM Newsletter

From 2009 to 2011, a newsletter for the PNM was produced and distributed throughout the Comoros islands. Even though it did not last long because of a lack of funding, it is believed that it had a great impact for the marine environment conservation by inspiring other communities to undertake similar actions. Additional funding to support the development of a newsletter dedicated to nature conservation by the PNM would be useful, especially as new means of communication, such as social media, are now available.

Materials to help anti-poaching activities

The access to a fast boat would be useful for eco-guards of the ADSEI in order to intervene in case of poaching where poachers escape with their boat. Drones could also help to locate poachers without putting eco-guards or villagers at risk, as poachers operate in groups and are often armed.

23. References [e.g. S1, G2, G4]

List key references relevant to marine turtle records and to the site, including management plans, major scientific reports, and bibliographies. When a large body of published material on the site is available, only the most important references need be cited, with priority being given to recent literature containing extensive bibliographies. Reprints or copies of the most important literature should be appended whenever possible. Provide website addresses of references where available.

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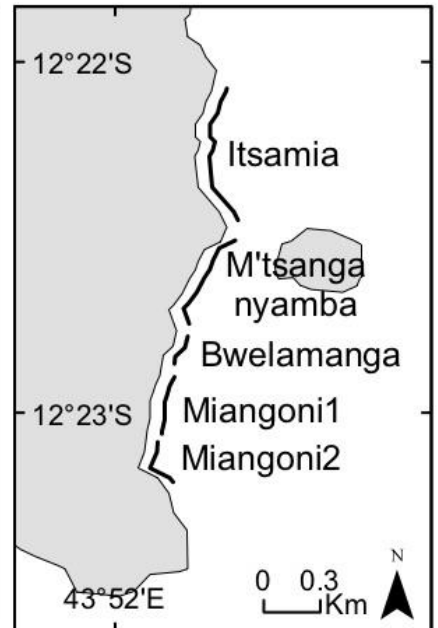
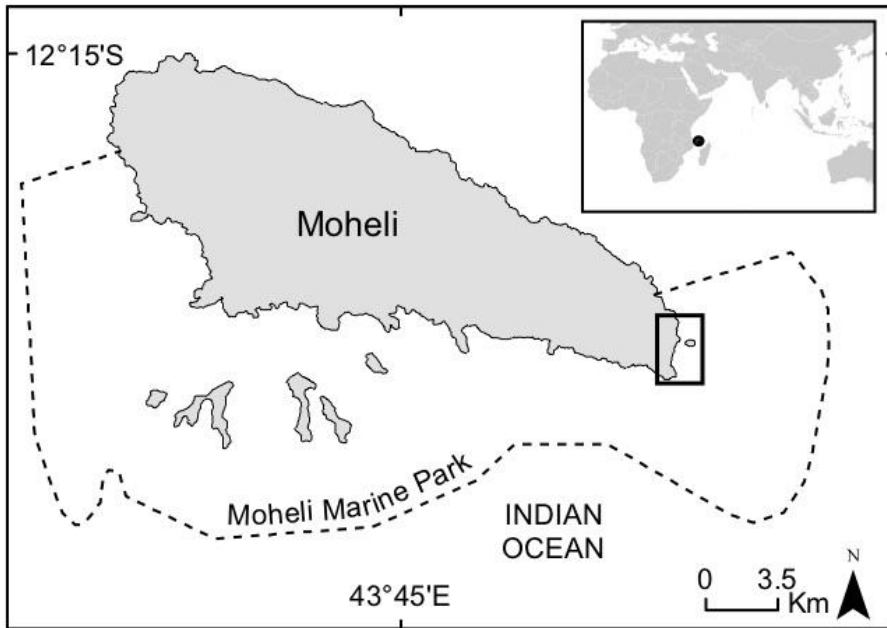
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24. Site map [N2, N3]

The most detailed and up-to-date map of the site available should be appended to the Site Information Sheet in digital and/or hardcopy format. The ideal site map will clearly show the area boundaries of the site, scale, latitude, longitude and compass bearing, administrative boundaries (e.g., province, district, etc.), and display basic topographical information, the distribution of the main site habitat types and notable hydrological features. It will also show major landmarks (towns, roads, etc.). Indications of land use activities are especially useful.

If applicable (and available), provide a zoning scheme to indicate areas where certain activities that might be incompatible with turtle conservation are permitted, buffer zones, and areas where such activities are not permitted (i.e. sanctuary areas).

The optimum scale for a map depends on the actual area of the site depicted. Generally the map should have a 1:25,000 or 1:50,000 scale for areas up to 10,000 ha; 1:100,000 scale for larger areas up to 100,000 ha; 1:250,000 for areas exceeding 100,000 ha. In simplest terms, the site should be depicted in some detail. For moderate to larger sites, it is often difficult to show detail on an A4 sheet at the desired scale, so generally a sheet larger than this is more appropriate. While an original map is not absolutely necessary, a very clear image is desirable. A map exhibiting the above attributes will be more suitable for scanning.



Map showing the areas to be considered for inclusion in the IOSEA Site Network. The green area corresponds to the five nesting beaches and the foraging area. The orange area indicates two nesting beaches that are part of the Itsamia region and could be considered for classification as well, although no data are available for those sites.