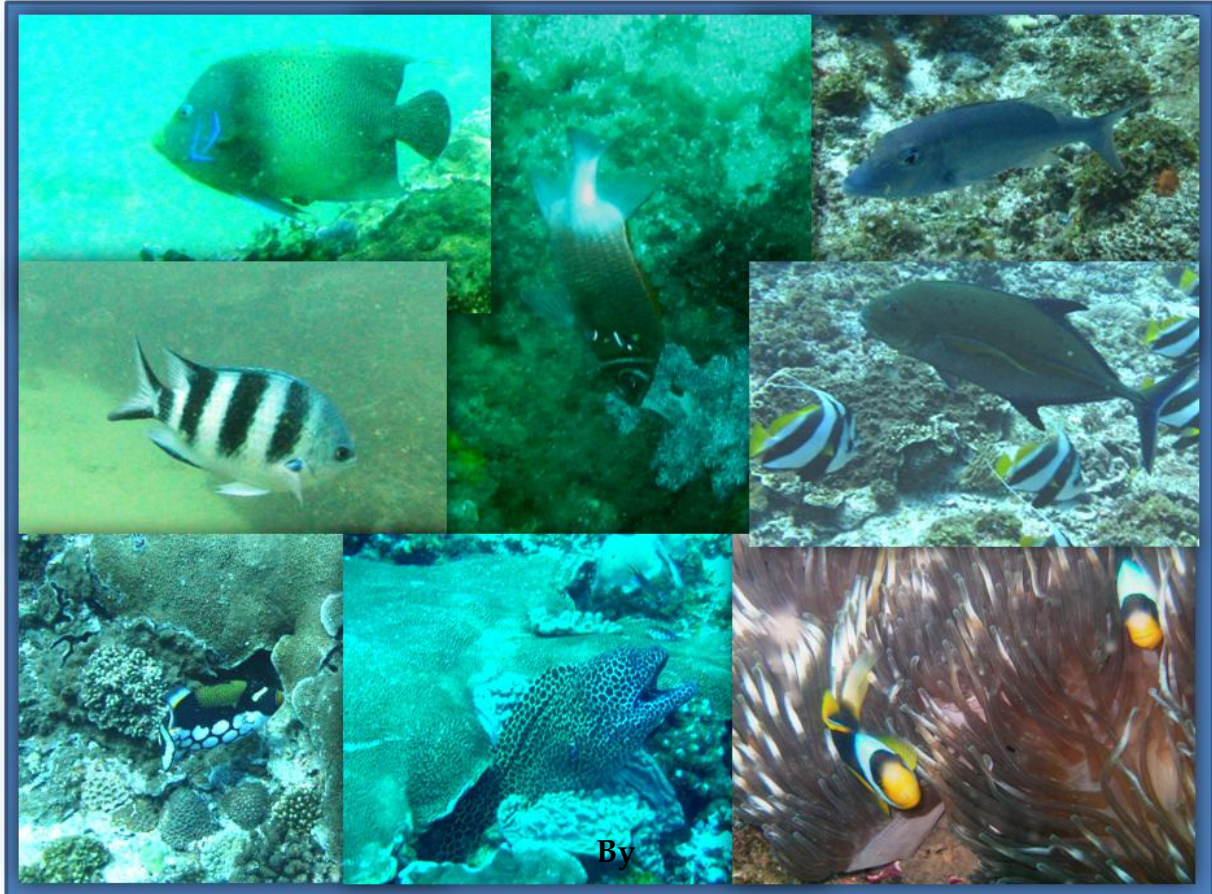


**MONITORING OF REEF COMMUNITIES AT THE
PONTA DO OURO PARTIAL MARINE RESERVE:
Preliminary Reef Assessment at the Northern Section**



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Submitted to and implemented with the support of
the Ponta do Ouro Partial Marine Reserve
and
Peace Parks Foundation



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Centro Terra Viva - Estudos e Advocacia Ambiental



Reserva Marinha Parcial da Ponta do Ouro

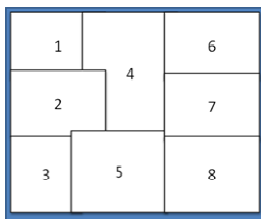
O Centro Terra Viva (CTV) e a Reserva Marinha Parcial da Ponta do Ouro (RMPPPO), assinaram em Setembro de 2013 um Memorando de Entendimento (MdE) com vista ao desenvolvimento de actividades relacionadas com investigação e monitoria de espécies e ecossistemas na RMPPPO, promovendo a sua protecção e conservação. A presente publicação resulta de actividades desenvolvidas no âmbito deste MdE.

Centro Terra Viva (CTV) and the Ponta do Ouro Partial Marine Reserve (POPMR) have established in September 2013 a Memorandum of Understanding (MoU) in order to develop several activities related to research and monitoring of species and ecosystems within the POPMR, promoting their protection and conservation. The present publication is a result of activities undertaken under the MoU.

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Cover:



1. Semicircle angelfish (*Pomacanthus semicirculatus*), Ponta Abril. Photo: Raquel Fernandes
2. Fourbar damsel fish (*Adudefiduf natalensis*), Ponta Abril. Photo: Raquel Fernandes
3. Clown triggerfish (*Balistoides conspicillum*) Baixo São João. Photo: Raquel Fernandes
4. Tailspot squirrelfish (*Sargocentron caudimaculatum*), Ponta Abril. Photo: Raquel Fernandes
5. Honeycomb moray (*Gymnothorax favagineus*), Baixo São João. Photo: Marcos Pereira
6. Green jobfish (*Aprion virescens*), Baixo São João. Photo: Raquel Fernandes
7. Bluefin trevally (*Caranx melampygus*) and pennant butterflyfish (*Heniochus acuminatus*), Baixo São João. Photo: Raquel Fernandes.
8. Allard's Clownfish (*Amphiprion allardi*), Ponta Abril. Photo: Marcos Pereira

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1. INTRODUCTION

After the proclamation of the Ponta do Ouro Partia Marine Reserve (POPMR) in 2009, a reef monitoring programme has been established, and has been implemented by the POPMR in partnership with other institutions. The monitoring programme has the following objectives:

- i. Monitor the status and condition of reef communities, based on selected indicator species/groups, including fish, corals, macroalgae, invertebrates (e.g. zoanthids, gastropods, echinoderms), with regards to their diversity and abundance;
- ii. Monitor recreational diving pressure and underwater divers' behaviour and assess diving-caused damage to benthic communities;
- iii. Assess potential threats to the reef conservation, including tourism, pollution, bleaching, destructing fishing gear, crown-of-thorns-starfish (*Acanthaster planci*), etc.
- iv. Propose management actions.

Surveys covering the southern section of the reserve, as well as two reefs in Techobanine, were conducted in 2011 (Pereira & Videira, 2011) and 2014 (Pereira & Fernandes, 2014). Under the existing MoU between Centro Terra Viva (CTV) and the POPMR, signed in 2013, a preliminary reef assessment was conducted and aimed at selecting reef monitoring stations between Ponta Milibangalala and Cabo de Santa Maria, in order to expand the monitoring programme. This report presents the findings and recommendations of the preliminary assessment.

2. MATERIALS AND METHODS

The POPMR is located in southern Mozambique at the border with South Africa. The reserve has an area of 678 km² and encompasses a variety of habitats including sandy beaches, rocky shores, subtidal reefs, mangroves, seagrass beds, as well as tidal flats. A detailed description of the area in general is presented in Kalk (1995) and Robertson *et al.* (1996). The reefs have been described in some detail by Pereira (2003), Pereira & Videira (2011) and Pereira & Fernandes (2014), and will not be discussed here (see also a revision by Schleyer & Pereira, 2014).

The survey was conducted from 23 to 27 March 2015 by marine biologists from CTV and the POPMR. The selection of reefs to survey was done using local knowledge, the literature and previous experience. On the field, reef formations were scouted using the boat's echosounder to assess the bathymetry, structural complexity and extent of the reefs. Four reefs were then visited: Baixo Santa Maria, Ponta Abril, God's Aquarium and Baixo São João (Figure 1). A single SCUBA dive was performed at each reef in order to gather general information on the benthic communities as well as the reef fish fauna. Digital photography was used to document general aspects of the fish fauna and benthos.



Figure 1. Schematic location of the reefs visited (adapted from GoogleEarth).

BSM = Baixo Santa Maria; PtA = Ponta Abril; and GA = God's Aquarium.

3. RESULTS AND RECOMMENDATIONS

The summary results are presented in Table 1.

Table 1. GPS coordinates and summary results of the preliminary survey.

Reef	GPS Coordinates	Observations
Baixo São João	26° 21.330' S 32° 58.351' E	Large subtidal reef. Reef top located at about 12 m that gradually slopes down to 25 m, interspersed with drop-offs and high structural complexity. Fish life very rich and abundant. Good representation of predators, including sharks (Figure 2), rockcods as well as species of commercial importance (both pelagic and bottom species). High coral cover (~50-60%) with good cover of both hard and soft corals (Figure 3). One hawksbill turtle observed.
God's Aquarium	26° 10.890' S 32° 57.200' E	High-energy, small and shallow reef (6-11 m). Very high complexity provided by eroding beachrock which forms the basis of the reef and presents interesting mushroom-life formations. Poor coral cover (<20%), with the benthos being dominated by sediment-tolerant soft corals (<i>Dendronephthya</i> and <i>Lobophytum</i>). Relatively poor fish fauna, probably exacerbated by the low visibility at the time of the survey.
Baixo Santa Maria	26° 05.752' S 33° 00.577' E	Pinnacle-like reef (15 m to about 25 m) surrounded by sand. Good structural complexity but very poor coral cover (<10%). Reef fish fauna relatively rich, with well represented tropicals, as well as some predators such as the giant kingfish (<i>Caranx ignobilis</i>), king mackerel (<i>Scomberomorus commerson</i>) and green jobfish (<i>Aprion viriscens</i>). The area is very popular with recreational anglers and spearfishers, given the abundance of predators. Entangled lost fishing tackle was observed.
Ponta April	26° 06.367' S 32° 57.927' E	Small and shallow reef (12 m), with relatively good cover of encrusting soft and hard corals (~25-30%). Abundant reef fish life and good representation of predators (rockcods, kingfish and green jobfish), despite their small size. One juvenile hawksbill turtle observed.

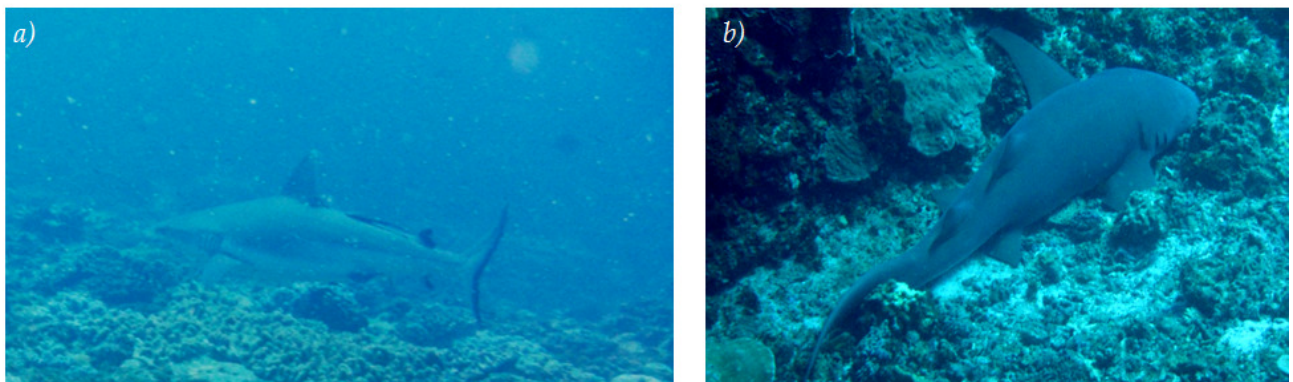


Figure 2. a) Gray reef shark (*Carcharhinus amblyrhynchos*) at Baixo São João and b) resting nurse shark (*Nebrius ferrugineus*). Photos by Raquel Fernandes and Marcos Pereira.



Figure 3. High structural complexity and coral cover at Baixo São João. Photos: Marcos Pereira.

From the preliminary survey conducted, Baixo São João and Ponta Abril are proposed as permanent monitoring stations for the northern section of the POPMR. These should be monitored on an annual basis and should be completed by two other stations, which have been monitored and surveyed in the detail in the past: Ponta Torres and Barreira Vermelha. Logistically, Ponta Abril, Ponta Torres and Barreira Vermelha should be surveyed by teams based in Maputo while Baixo São João should ideally be surveyed from either Ponta Milibangalala or Chemucane.

The methodology used for the fish fauna (point counts and random swims), as well as for the benthos (photo transects) on previous surveys, is deemed adequate for these reefs. However, especial attention should be paid to factors such as tidal currents which play an important role at Ponta Torres and Barreira Vermelha, influencing not only underwater visibility but divers safety as well.

Finally, an in-depth bathymetric and biodiversity survey must be conducted at Baixo São João as soon as possible in order to assess its conservation status and need for protection. From the nautical charts available, the reef seems to be fairly extensive and given its central location at the POPMR, it may play a fundamental role in the replenishment of nearby reefs, thus its nature and composition must be assessed.

4. ACKNOWLEDGMENTS

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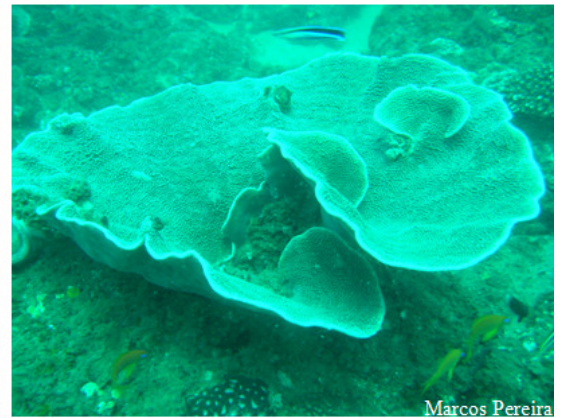
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6. ANNEXES

Annex 1. Species list of reef fish observed at each reefs located at the northern section of the Ponta do Ouro Partial Marine Reserve. BSJ=Baixo São João; GA=God's Aquarium; BSM=Baixo Santa Maria; PtA=Ponta Abril. The taxonomy follows Froese & Pauly (2015).

Family	Species	Baixo São João	Gods Aquarium	Baixo Santa Maria	Ponta Abril
Acanthuridae	<i>Acanthurus leucosternon</i>	+	+		
	<i>Acanthurus mata</i>	+			
	<i>Acanthurus nigricans</i>			+	
	<i>Acanthurus thompsoni</i>	+		+	
	<i>Naso lituratus</i>				+
	<i>Paracanthurus hepatus</i>			+	
	<i>Zanclus cornutus</i>			+	
	<i>Naso tuberosus</i>			+	
Apogonidae	<i>Cheilodipterus artus</i>				+
Aulostomidae	<i>Aulostomos chinensis</i>		+		
Balistidae	<i>Balistoides conspicillum</i>	+			+
	<i>Odonus niger</i>	+	+		+
	<i>Sufflamen chrysopterus</i>	+	+		+
Caesionidae	<i>Caesio caerularea</i>			+	
	<i>Caesio xanthonota</i>	+		+	
Carangidae	<i>Caranx heberi</i>		+		
	<i>Caranx ignobilis</i>			+	
	<i>Caranx melampygus</i>	+			
Carcharhinidae	<i>Carcharhinus amblyrhynchos</i>	+			
Chaetodontidae	<i>Chaetodon guttatissimus</i>		+		+
	<i>Chaetodon unimaculatus</i>		+		
	<i>Chaetodon kleinii</i>	+			
	<i>Chaetodon lunula</i>	+	+		
	<i>Chaetodon madagaskariensis</i>		+		+
	<i>Chaetodon meyeri</i>	+		+	
	<i>Chaetodon vagabundus</i>				+
	<i>Forcipiger flavissimus</i>		+	+	+
	<i>Hemitaurichthys zoster</i>			+	+
	<i>Heniochus acuminatus</i>	+	+	+	+
Cirrhitidae	<i>Cirrhitichthys oxycephalus</i>	+		+	
	<i>Paracirrhites arcatus</i>	+		+	
Dasyatidae	<i>Himantura gerrardi</i>	+			
	<i>Taeniura lymma</i>				+
Ginglymostomatidae	<i>Nebrius ferrugineus</i>	+		+	
Haemulidae	<i>Plectorhinchus flavomaculatus</i>	+	+	+	
	<i>Plectorhinchus playfairi</i>		+		
Holocentridae	<i>Myripristis murdjan</i>				+
	<i>Sargocentron caudimaculatum</i>	+			+
	<i>Sargocentron diadema</i>			+	+
Labridae	<i>Anampses caeruleopunctatus</i>			+	+
	<i>Bodianus bilunulatus</i>	+			
	<i>Bodianus diana</i>	+		+	+
	<i>Coris caudimacula</i>				+
	<i>Labroides bicolor</i>	+			
	<i>Labroides dimidiatus</i>	+	+	+	+

	<i>Thalassoma amblycephalum</i>		+		
	<i>Thalassoma hebraicum</i>		+	+	+
Lutjanidae	<i>Aprion virescens</i>	+	+		
	<i>Lutjanus fulviflamma</i>				+
	<i>Lutjanus gibbus</i>				+
	<i>Lutjanus kasmira</i>			+	+
	<i>Paracaesio sordida</i>	+			
Mullidae	<i>Parupneus cyclostomus</i>	+			
Muraenidae	<i>Gymnothorax favagineus</i>	+			
	<i>Gymnothorax javanicus</i>				+
Ostraciidae	<i>Ostracion cubicus</i>				+
Platycephalidae	<i>Papilloculiceps longiceps</i>		+		
Pomacanthidae	<i>Apolemichthys trimaculatus</i>	+		+	
	<i>Pomacanthus imperator</i>			+	+
	<i>Pomacanthus rhomboides</i>			+	+
	<i>Pomacanthus semicirculatus</i>			+	+
Pomacentridae	<i>Abudefduf natalensis</i>		+	+	+
	<i>Abudefduf vaigiensis</i>		+		
	<i>Amphiprion allardi</i>				+
	<i>Chromis dimidiata</i>	+	+		+
	<i>Chromis nigrura</i>	+			
	<i>Dascyllus trimaculatus</i>	+		+	+
	<i>Pomacentrus caeruleus</i>	+			
Scombridae	<i>Scomberomorus commerson</i>	+		+	
Scorpaenidae	<i>Pterois antennata</i>		+		
Serranidae	<i>Anthias evansi</i>		+		
	<i>Anthias squamipinnis</i>			+	+
	<i>Cephalopholis argus</i>				+
	<i>Cephalopholis miniata</i>				+
	<i>Epinephelus fasciatus</i>	+	+	+	+
	<i>Epinephelus tukula</i>	+			
Sparidae	<i>Rhabdosargus thorpei</i>				+
Tetraodontidae	<i>Canthigaster valentini</i>				+
Zanclidae	<i>Zanclus canescens</i>	+	+	+	
Stegostomatidae	<i>Stegostoma fasciatum</i>			+	
Total		36	25	33	38



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