Title: Bathymetric mapping and reef communities of Baixo Zâmbia, adjacent to the Pomene National Reserve, southern Mozambique

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Background: Subtidal rocky and coral reefs constitute some of the most important habitats in southern Mozambique, playing a fundamental role in subsistence and small-scale fisheries, tourism (recreational/sport fishing and SCUBA diving), as well as coastal protection. While their importance has been widely acknowledged, very few studies have been conducted to assess and document their distribution and conservation status. As part of the research and monitoring activities conducted for the Pomene National Reserve in southern Mozambique, reef surveys were conducted at Baixo Zâmbia in 2016, 2017 and 2018. The surveys aimed at providing baseline information on the nature, composition and condition of the reef communities.

Methods: Bathymetric mapping was conducted using a combination GPS/fishfinder (Garmin echoMap CHIRP 42CV) over a pre-determined grid that was superimposed on existing nautical charts. Track depth data were collected in transects along and across the reef. These data were analysed using Surfer 15 software which yielded a representation of the three-dimensional reef structure. Reef surveys were conducted using SCUBA and a digital camera (Nixon Coolpix 4800) in an underwater housing. Point intercept analysis of photo-quadrat transects of the benthos recorded in the northern, central and southern sections of the reef, covering the reef top and slopes, were used to extract cover data using CPCe software. Standard multivariate statistics (similarity percentages – SIMPER, analysis of similarities – ANOSIM and non-metric multidimensional scaling – nMDS) were performed on untransformed data. Finally, the ichthyofauna were visually assessed using a plotless, semi-quantitative method for species abundance in three categories: present (<5 individuals per dive), common (6-10) and abundant (>10). Fish observed were assigned to the following size classes: small (5-15 cm), medium (16-30 cm) and large (>30 cm). Species lists were compiled after each dive.

Results: Baixo Zâmbia is a rocky massif similar to other structures in southern Mozambique (e.g. Baixo São João, Baixo Danae) and in Kwazulu-Natal, South Africa (e.g. Aliwal Shoal), originating from submerged, fossilised dunes. The reef is about 4.3 km long and 700 m wide and is located about 6 km offshore in a north-south orientation. At its shallowest point, corals are found at a depth of about 7 m on the reef top, and the reef slopes gently to about 24 m in the east and quite abruptly to about 18 m in the west, where an extensive rubble field borders the reef. The reef is subjected to large oceanic swells, which influence its nature and biotic composition.
The coral community proved to be heterogeneous and significant differences were found in community structure within the reef sections sampled (ANOSIM, $R=0.59; p < 0.01$), with an average Bray-Curtis dissimilarity of 48.8. This was further shown by non-metric MDS, where a clear clustering of the transects within each sections was evident. SIMPER revealed that hard corals (branching, tabular and encrusting), as well as, soft corals were responsible for 69.4% of the variability. Chief among these, *Acropora*, *Pocillopora*, *Montipora*, *Lobophytum* and *Sinularia* accounted for 76.8% of the variability. A total of 69 coral species was positively identified, comprising 53 species of hard corals (32 genera) and eight species of soft corals (four genera). *Acropora* was the most speciose genus with 11 species. In general, rubble, sand and bare reef were the dominant benthic categories and ranged in cover from 51.2 to 66.7%. Total live coral cover was 33.2±11.5% (SD), ranging from 25.7±1.6% at Kitwe (an isolated pinnacle off the main reef) to 38.0±17.9% at Shallow South (reef top and western slope). Hard corals were the dominant biota, covering on average 26.4±11.4 (SD) of the reef, ranging from 20.6±8.6% at Trojan to 32.4±17.7 at Shallow South. Soft coral cover was modest, averaging 5.4±4.2% (SD). Little coral damage was evident (<5%), with negligible bleaching. No crown-of-thorns starfish (*Acanthaster mauritiensis*) were observed. A total of 110 species of reef fish (in 26 families) was recorded. Large specimens (>30 cm) were common, including species of commercial importance, as well as top predators such as barracudas (Sphyraenidae), kingfishes (Carangidae) and rockcods (Serranidae). Herbivores (Acanthuridae and Scaridae) were dominant in terms of biomass. The reef also had a diverse assemblage of ornamental species (Chaetodontidae, Pomacentriade and Labridae). Although subjected to considerable fishing pressure (e.g. subsistence, artisanal as well as recreational and sports fishing), the reef harbours and supports a rich and abundant fish community. Given the preliminary nature of this assessment, the numbers of coral and fish species are expected to rise with further research.

**Conclusion:** In view of the proposed extension of the Pomene National Reserve, the reef warrants zonation and protection due to its size, relatively good condition and remoteness. The zonation plan must make provision for recreational use (diving and fishing) and subsistence fisheries. These pressures must be addressed at once, as the bathymetry of the reef and oceanography of the area contribute to its susceptibility to climate change drivers (i.e. bleaching associated with increased sea temperatures and extreme events such as storms and cyclones).