

# REPORT ON FISH MONITORING IN QUIRIMBAS NATIONAL PARK SEPTEMBER 2004 TO SEPTEMBER 2005: EVALUATION OF FISH POPULATION WITHIN MATEMO, QUILALEA AND IBO SANCTUARIES.

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## INTRODUCTION

Sanctuaries are widely promoted as a conservation and fisheries management tool (Roberts and Polunin, 1991; Roberts and Hawkins, 2000; Gell and Roberts, 2002; Russ, 2003, Cited by Russ and Zeller, 2003; Gell and Roberts, 2002; Dayton *et al.*, 2000). From perspective of fisheries yield and sustainability, sanctuaries provide a means to preserve the breeding stocks of commercial species, increase fish catches through the emigration of adults from sanctuaries (called spill-over) (McClanahan and Mangui, 2000; Gell and Roberts, 2002, Russ and Zeller, 2003), and enhance larval recruitment in fishing grounds adjacent to them (McClanahan, 2000; Russ, 2001; Palumi, 2001; Roberts *et al.*, 2002 cited by Russ and Zeller 2003).

Inside reserves, populations increase in size and individuals live longer, grow larger and develop increased reproductive potential (Bohnsack, 1998), thus benefiting adjacent fished areas.

The Quirimbas Archipelago in northern Mozambique is made up of 28 Island, numerous reefs, extensive seagrass beds and mangroves, and stretches over a distance of approximately 400 km alongside the northernmost coastal Province of Mozambique, Cabo Delgado (Whittington and Myers, 1997).

The Quirimbas National Park includes the 11 southernmost islands of this Archipelago, giving it a total area of 750, 639 hectares of which 598,402 hectares are terrestrial and 152,237 comprise islands and marine habitats. This area has long been recognized as an area of high biodiversity of world-wide significance, and is of important historical patrimony. Many of the islands are permanently inhabited although only five have freshwater.

The local inhabitants of the islands are highly dependent on the natural resources. The over-exploitation and collapse of a variety of marine resources has led to the creation of marine fish sanctuaries, as a management tool. Marine sanctuaries can contribute to the recovery of exploited fish stocks and this is one of the reasons why, after the declaration of Quirimbas National Park (QNP) in 2002, fishing sanctuaries were established with the participation of local communities and fishermen. These were established in different years in consultation with the

local communities, as part of a programme to restore over-fished areas.

In September 2004, the park initiated fisheries monitoring programme with support of WWF Mozambique Programme Office. This programme is aim to establish the bases of scientific information on the magnitude and variation over time of the Marine Reserve within Quirimbas National Park.

Fish catches will be obtained through fish sampling within sanctuaries and adjacent fish areas, in three islands, Matemo, Ibo and Quilalea, using fish trap technique. The selected parameters, abundance, diversity, fishing effort, population size structure of target species would serve as indicator of the status of the sanctuaries and adjacent fished areas. It is expected that the study will also provide information on the optimal size and spacing of sanctuaries.

This work presents the results of the first survey of the fish population inside sanctuaries and adjacent fished area after closure, aiming to provide a baseline in the future. This study was carried out as part of the strategies to recover the declining fish stock population in Quirimbas National Park.

## OBJECTIVES

The overall goal of this study will be to ensure that the Quirimbas National Park is well-managed with a system of well-designed closed areas to restore declining fish populations and achieve sustainability in local fisheries, while contributing to the protection of biodiversity in the park. The following topics will contribute to this aim:

- Provide a standardized methodology for the evaluation and routine monitoring of fish sanctuaries and adjacent fishery areas.
- Map the habitat and resources and establish a resource base knowledge reflecting the status and trends, within sanctuary and adjacent fished area.
- Changes in the fish stocks will be monitored in the sanctuaries and adjacent fished areas using standardized methods.

## MATERIAL AND METHODS

### Study Area

The study sites will be in Quirimbas National Park (Figure 1), Matemo, Quilalea, and Ibo Sanctuaries. Matemo is the largest island within the park, being 7.3 x 3.3 km. The island has series of permanent village settlements along the eastern side of the island, populated by approximately 2000 people. Matemo sanctuary was created in 2003, lies on the NW side of the island and is approximately 3 km. Ibo Island, is 3.6 x 4.5 km, supports areas of woodland, scrub, grassland and marsh and is the administrative centre of the district. Ibo sanctuary created in 2002 lies SW and is approximately 4 km long.

Climatic conditions in the park are marked by distinct periods of rain fall and predictable changes in wind direction and strength throughout the year. Total annual rainfall is 900–1000 mm, 87–91% of which falls between December and March. There are two distinct seasons of the year, a hot season (coinciding with the rains) where average temperatures vary between 25–27°C, and a cooler period with temperatures of 22–25°C (May–October) (Whittington and Myers, 1997).

Tidal amplitude varies from 6 m (spring tides) to 2.8 m (neap tides), with strong currents especially in deeper areas (Whittington and Myers, 1997). The shallow topography on the continental side of many of the islands has led to the formation of extensive inter-tidal areas (Whittington and Myers, 1997). The islands are all low-lying and form extensive outcrops of coral. The vegetation on the islands varies from dense bush to sparse grassland, with many of the island supporting mangroves stands along their more sheltered shorelines (Whittington and Myers, 1997).

## FINDINGS AND REMARKS

### Fish inventory using trap (marema) fishing from canoe

For the monitoring, a team of principal biologist and assistant biologist as been formed with the growing participation of the local fishermen and community who collect twice a year biological- fisheries data using fish trap technique.

Data were obtained using traditional arrowhead fish big traps (locally call *marema*) constructed of bamboo sticks, with a woven mesh size of 4 cm, 1.5 m wide and 1.68 m<sup>3</sup> in volume. The collection was made in September 2004, May 2005 and September 2005. Each survey lasted 15 days with the participation of local fisherman.

Sampling was undertaken using unbaited traps placed randomly for 24 hour inside sanctuary and adjacent fished area. The number of fish, the wet weight and fork length of each species captured were recorded per trap. It is anticipated that the fish monitoring will also yield catch per unit effort (CPUE) values for both the sanctuaries and adjacent fished areas.

Traps were mark with a peace of flip-flop attached with fishing line and a GPS coordinates, so the traps could be easily located. To keep from moving the traps were weighted with a peace of a rock, avoiding being moved with tidal currents. The reason is that when the traps were placed in a sand area was easily moved and difficult to find.

Trap fishing on each site were set at low tide on one day and were emptied the following day: a soak time of 22-24 hours. A total of 20 traps (big *marema*) were used, 10 in adjacent fished area and other 10 in sanctuary area.

The result showed that after one year of study it is possible to see an increase in fish diversity, fork length, biomass and CPUE inside Matemo and Ibo sanctuaries. Quilalea sanctuary showed lower fish diversity and CPUE, on the other hand in adjacent fished area the diversity, biomass and CPUE was higher in Quilalea. The data collected in Matemo sanctuary in September 2005 were affected by the weather condition and all traps were covered by seaweed.

A total of 53 trappable species belonging to a 17 families were recorded within sanctuaries and adjacent fished area. Large predators belonging to Lethrinidae (Emperors), Lutjnidade (Snappers) and Serranidae (Groupers) were most abundant inside Matemo and Ibo sanctuaries and in adjacent fished area they were poorly represented. The mean numbers of fish per traps inside Matemo, Ibo and Quilalea sanctuaries were significantly higher than adjacent fished area.

In September 2005 we initiate the fish tag programme on Ibo and Matemo sanctuaries, two species were selected *Scarus ghobban* and *Cephalopholis argus*. Fish tagging programme it is to quantify the mobility of the selected species and to determine whether the fish movements could influence the function of sanctuaries.

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