

Scientific coral reef surveys

Survey sites

The coral reefs surveyed in northern Cabo Delgado under the Our Sea Our Life Project were selected to correspond to the project village sites and are shown in Figure A1. It is important to note that villages share fishing grounds and therefore these reefs cannot be seen as exclusive fishing grounds to only one village. Of further note, Vamizi reef has been afforded some protection through a local Reserve supported by the Lodge on Vamizi Island. This site also represents a fishing ground for Olumbi village. Twenty-two dives were done to survey corals and reef structure and resilience while 20 dive stations were done survey fish diversity and population abundance. The latter are aggregated to give 10 sites in total for diversity and 11 for abundance. An additional site from 2014 (Quifuki) was added in the presentation of the results because this site was surveyed for corals in 2015.

Coral species richness, reef structure and resilience

Coral species are identified in the field, and a full species list was developed based on field IDs using digital photography as a primary reference and references providing underwater photographs (see Sheppard and Obura 2004). Using species records from successive dives an accumulation curve is established that asymptotes towards a total species richness for the study area.

Estimates of coral reef resilience were made using a method developed by the IUCN working group on Climate Change and Coral Reefs (Obura and Grimsditch 2009). The method compiles data in 6 key areas, deriving simple 1-5 indices from these to enable comparison among different datasets: 1. benthic cover, providing information on general reef state and the balance between corals and algae; 2. Coral community structure (genus level), providing an overview of the coral community and its susceptibility to stress; 3. Coral population structure, measuring the size class distribution of selected genera, including recruitment; 4. Threats to corals, such as crown of thorns seastars; 5. Fish community structure, in particular herbivores; and 6. A broad suite of resilience factors are estimated from the above, or in the field, on a semi-quantitative scale from 1-5. The value of these simple indicators is in communicating on reef health for management, and simple illustrations such as tables coded red, yellow and green for reefs with poor, average and good health.

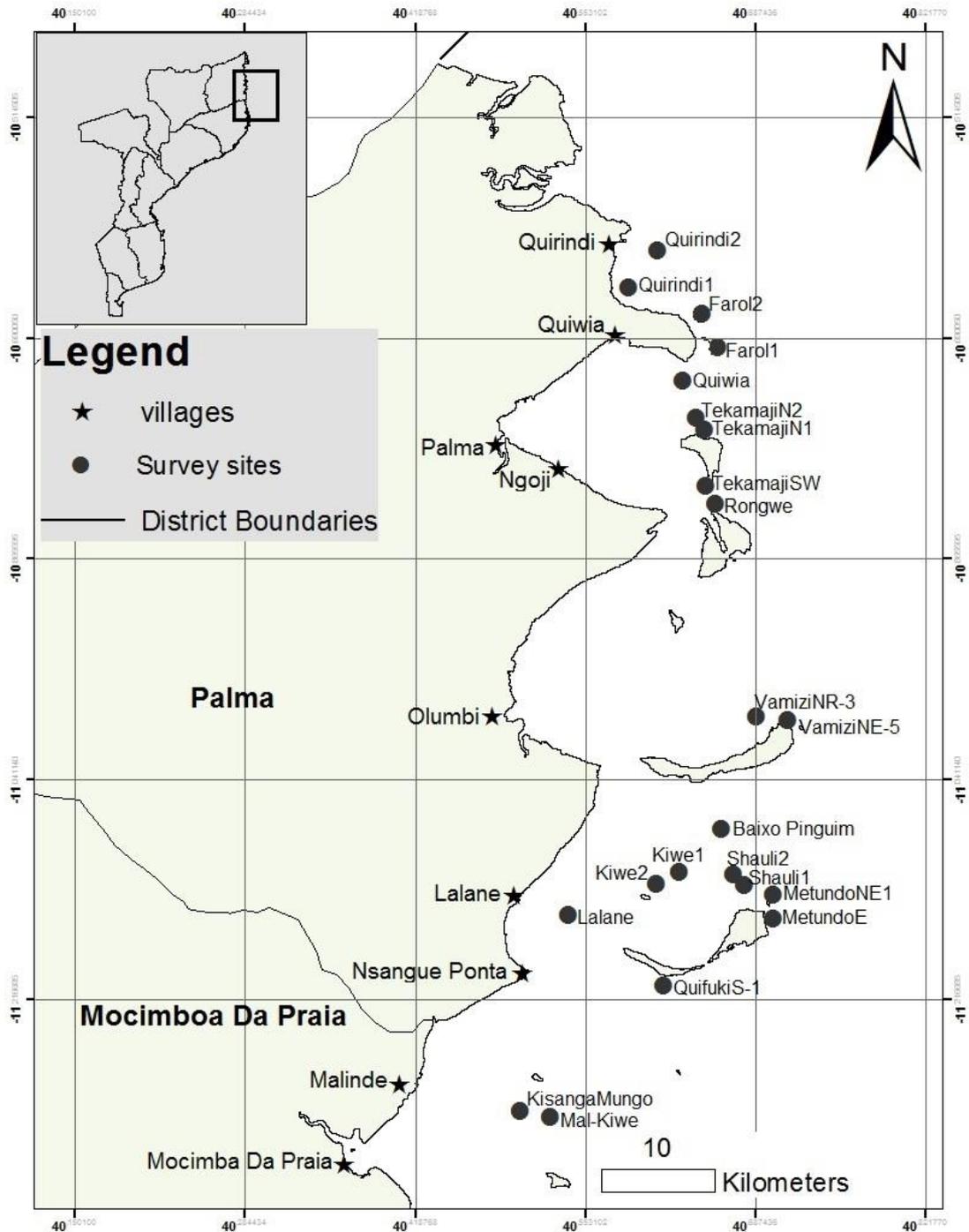


Figure A1.1. Map of all sites surveyed during the OSOL survey.

Fish diversity

To measure the diversity of coral reef fishes we compiled a complete species inventory of 19 families (Table A1.1) at each location. These families were selected based on the following criteria: largest (of all shore fishes); most diverse; known indicators of biogeographical patterns; inclusion of endemics, rare and vulnerable species (special conservation concern);

amenable to UVC (diurnal, not cryptic); of fishery relevance/reef health status (Table A1.1). This group of 19 families includes potentially around 460 species in total from the WIO (Allen 2005, Davidson et al. 2006, Obura 2004, Samoily 1988) and is considered broad enough and diverse enough to capture patterns in diversity of fishes across Mozambique's northern reefs as well as broadly within the WIO region, and has been adopted as a standard by CORDIO.

Table A1.1. Families selected for coral reef fish diversity surveys for biogeographic analyses.

Family	Notes
Labridae (wrasse)* Serranidae (groupers) Pomacentridae (damselfishes)*	Largest and most diverse families of all shore fishes
Chaetodontidae (butterflyfishes)* Scaridae (parrotfishes)* Acanthuridae (surgeonfishes)* Lutjanidae (snappers) Pomacanthidae (angelfishes)*	Known indicator families of biogeographical patterns and/or coral reef health
Lethrinidae (emperors) Haemulidae (grunts) Mullidae (goatfishes) Siganidae (rabbitfish) Nemipteridae (bream) Carangidae (trevally)	Additional families included for fishery importance
Caesionidae (fusiliers) Balistidae (triggerfish) Monacanthidae (filefish) Ostraciidae (boxfish) Tetraodontidae (pufferfish)	Additional families included to broaden taxonomic range

*= CFI taxa (Allen and Werner 2002)

Fish abundance

Surveys of fish abundance of selected taxa were done to assess the health of these coral reefs, where health can be explained in terms of the reef's ecological resilience – its ability to resist threats and to recover to a healthy state when an impact does occur. A broad range of taxa was selected for surveys that were then assigned to specific trophic groups relevant in assessing resilience. Taxa were categorised into seven functional trophic groups: piscivores, omnivores, corallivores, invertivores, planktivores, detritivores, and herbivores (Green and Bellwood 2009, Obura and Grimsditch 2009, Lieske and Myers 1996, Samoily and Carlos 2000). The herbivores were further broken down into six functional groups (Green and Bellwood 2009): large excavators, small excavators, scrapers, grazers, browsers and grazers/detritivores; each of these groups are thought to play a different ecological role in coral reef resilience to climate change.