The effect of poverty on an artisanal fishery, South-West Madagascar.

1.0. Introduction:

Artisanal fisheries[1] have previously been considered benign but there is growing evidence to suggest that they are having a detrimental effect on the marine ecosystem (Hawkins & Roberts, 2004). The most recent global estimates suggest that around 36 million people are involved in fisheries and aquaculture (FAO, 1999) and around 30 million of these people originate from coral reef countries, one quarter of which are least developed countries (UNDP, 2002). Among those dependent on coral reefs the number living in poverty is significant. The number of poor living in a coastal environment is increasing, due to population growth and migration caused by the perceived opportunities of the coast (Whittingham *et al.*, 2003). As a result small-scale fisheries have grown significantly over the past two decades and have started to exert an over-fishing pressure on the environment (Mathew, 2001). With so many people dependent on artisanal fisheries for survival there is a clear need for careful management to ensure sustainability. However, before we can ensure management it is important to relive poverty, as on the edge of survival the rules will be ignored (UN, 2005). Whilst many studies have assessed artisanal fisheries using landings and catch data (e.g. McClanahan & Mangi, 2004) and many development agencies have completed poverty assessments within artisanal fishing communities (e.g. Whittingham *et al*., 2003) these approaches have never been combined to assess the effect of poverty on fishing. The link between poverty and fishing is extremely important when implementing management strategies for a fishery. Often the dependency of the local people on the marine environment is overlooked, ultimately leading to failure of the management scheme (Talbot & Wilkinson, 2001).

The aim of this project is to assess the effect of poverty on artisanal fisheries in the Bay of Ranobe, South-West Madagascar. This project will comprise of two different surveys and will be carried out in three separate villages around the Bay of Ranobe. The fishery assessment will be completed by assessing fish catch and gears used during beach landings, when the fishermen return home at low tide. A poverty assessment will form part of a household survey that will include questions about their fishing practices so the two sets of data can be compared. Focus group studies will be used to confirm any arising themes or trends and obtain background information on the fishery and villages. The findings of this project are of high priority for Madagascar and its development plans. Dynamic rural development and real poverty alleviation are at the core of the Madagascan government's endeavours (MAP, 2007).The Madagascar Action Plan (2007) aims to reduce poverty from 85% to 50% by 2012. This project will identify the poorest groups of the

[1]The FAO defines Artisanal, or small-scale fisheries (as opposed to commercial companies), using relatively small amount of capital and energy, relatively small fishing vessels (if any), making short fishing trips close to shore and mainly for local consumption. They can be subsistence or commercial.

community, those who are often excluded from development, and will enable future policy to target these groups. This project will highlight the most effective and sustainable fishing gears, enabling marine management to promote a wider use of these gears and encourage the sustainability of the local fisheries.

Madagascar is among the poorest countries in the world. It was ranked 146thout of the 177 countries in the United Nations Development Report, 2005. Madagascar has seen its inhabitants' standard of living decline dramatically over the past 25 years. Between 1970 and 1995 per capita income fell by 40 per cent, whilst the population doubled, reaching more than 18 million in 2005 (IFAD, 2006). 71 per cent of the island's inhabitants live below the poverty threshold, with the overwhelming majority of these (85 per cent) living in rural areas, while per capita GNP was a bare US$280 in 2006, compared to $37,632 for the UK (WB,2007). Toliara Province in the South-West of the island has the highest rate of poverty, with 80 per cent of its inhabitants below the threshold (IFAD, 2006). Malagasy life expectancy is just over 55 years, and 126 out of every 1,000 children die before the age of 5 (UNICEF, 2006). The coastal population of the South-West mainly belong to the Vezo tribe, who are by tradition skilled sea-farers and solely dependent on the sea for survival. The reef system in the Bay of Ranobe contributes to the third largest barrier reef in the world, 'Grand Récif de Toliara'. Therefore management of this area is important to preserve biodiversity and also to allow the Vezo traditions to continue. Understanding the relationships and dependency of the coastal people on the marine resource is key to implementing an effective management scheme.

2.0. Aim: To assess the effect of poverty on an artisanal fishery in South West Madagascar.

Objectives:

- Assess who the reef stakeholders are and their level of dependency.
- Determine what gears are used for fishing, what species are targeted, how many species & individuals are caught per gear type.
- Household surveys will assess poverty through disposable income, number of dependants within the household and reliance on the marine environment for livelihood.
- Statistical analysis will reveal if there is any correlation between poverty and fishing methods.
- Participants will be asked their opinions on the state of the marine ecosystem and any perceived change.
- Information will also be collected on migration and any change in fishing practices.

3.0. Methods: This project will assess two villages in the Bay of Ranobe, South-West Madagascar (figure 1). Data will be collected from 3rd March to 20th May 2008.

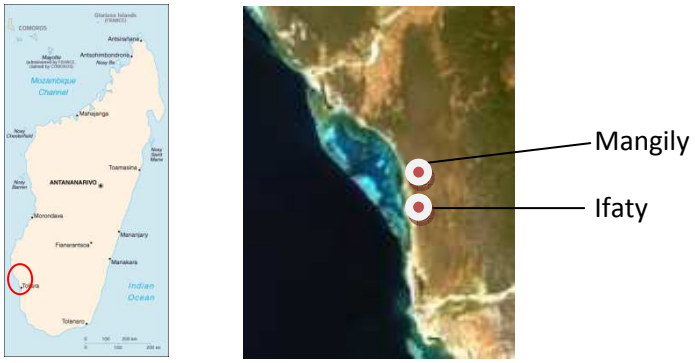

Figure 1. The study site location in Madagascar and around the Bay of Ranobe.

3.1. A brief outline of the chosen villages:

Ifaty: is located 27km North of Toliara (a journey that can last from 1.5hrs to 5hrs depending on the season and transport). There is a high dependency on reef resources. No water supply. No sanitation. Public primary school present.

Mangily: is 31km North of Toliara, and is the hub of tourism in the area with 4-5 large hotels and numerous smaller 'hotelys'. Is generally better developed with a (private) secondary school and a basic clinic present.

3.2. Prerequisites: Before any surveying can take place a meeting will be held with each of the village chiefs to request permission to carry out the survey. If permission is granted, a meeting will be held within the village for all villagers, explaining the reasoning and procedure of the project. This should increase the effectiveness of the survey as teams will not have to explain themselves for every participant. No gifts will be available for completing the survey and this will be made clear in the meeting. If permission is refused by the chief, another village will be selected and the process repeated.

Survey methodology will be standardized with other surveys completed in the East African Region and will follow the procedure set out in IMM & SPEECH (2002). The houses to be surveyed will be

determined by dividing the number of houses in the village by 60 and using the resultant number as a sampling interval. Maps of the villages will be taken from Google Earth facilitating the survey process. Information will be added to these maps during the data collection process allowing the visualization of social/economic/occupational groups within the community.

3.3. Fish catch data: will be collected when the fishermen return to shore at low tide. As many as possible fishermen will be surveyed within the time available. Fishermen will be approached and permission requested to weigh and measure their catch. If they refuse or ask for 'cadeaux' then the survey will be ended, and another fishermen approached. The fishermen will be asked a few questions and the survey completed as quickly and efficiently as possible in order not to inconvenience the fishermen. A team of two people will be required for this survey with one person asking questions to the fisherman and another recording data from the catch. Questions to the fisherman aim to understand his fishing practices and will include:

- The type of gear used
- Owned/rented gear
- Resident of village & how long as he lived there
- Time spent fishing
- How often go fishing
- Other sources of income
- Causes of loss of working days & estimate of how many

The fish catch data can be measured with no input from the fishermen and will include:

- Number of species/family,
- Total individuals
- Total weight of catch
- Length of indicator species

The trophic level of the species caught will be determined using Fish Base.
Fishermen using seine nets will be surveyed separately as this activity is completed from shore and will not coincide with the survey of boat landings, the same questions will apply.

3.4. Poverty Assessment: will be completed through a household survey using picture cards where possible and will aim to ascertain general information about the household, including:

- Number in household
- Male or Female head of household
- Dependency ratio
- Education (years, for each member of household)
- Diet (how often eat fish/meat)
- Disposable income (indirectly through owned objects e.g. radio)
- Emphasis placed on income earning activities (matches and pictures)
- Fishing gear owned/used
- Change over years
- How long resident in village, came from where
- Perceived threats to marine environment
- Opinions about future of marine environment

3.5. Confirmation of data: Focus groups with key individuals will be held to confirm information and trends arising in the data. It will also be an opportunity to gather background information on the villages.

3.6. Analysis of data: will be completed using the statistical programme 'R'. Generalized Linear Models will be employed to test the significance of the following hypotheses as determined by ANOVA. The following hypotheses represent the 'full' model, any non-significant explanatory variables will be removed through model simplification during the analysis.

H_0 = poverty~1
H_1 = poverty~fish.catch*gear

H_0 = poverty~1
H_1 = poverty~education*livelihoods*number.dependents

4.0. Expected outcomes of the project:

- Stakeholders of the Bay of Ranobe reef system and their respective levels of dependence will be identified.
- Relative wealth of people and how this corresponds to fishing gears and catch.
- The species and numbers of fish catch for the different fishing gears determined
- The effectiveness and sustainability of different gears calculated with suggestions proposed for management.
- The poorest members of community identified and possible reasons for this offered.
- Future considerations for marine management and development suggested.

The project will fall during dry season when the weather is more predictable and unlikely to prevent fishing. However, should any freak storms arise and prevent fishing the schedule will be flexible and allow household surveys to occur that day instead.

The finalized report will be available two months after data collection is completed, circa 1st August 2008. Publication will be aimed at the Journal of Fisheries Management and Ecology.

5.0. References:

FAO. (1999). Number of fishers 1970 – 1996 – revision 1. Fishery Information Data and Statistics Unit, Food and Agriculture Organization of the United Nations, Rome.

Hawkins, J.P. & Roberts, C.M. (2004) Conservation Biology. 18 (1) 215-225.

IFAD. (2006). Country strategic opportunities programme; Madagascar. EB. 89, R.13

IMM & SPEECH. (2002). Case study guidelines: Reef Livelihoods Assessment project.

MAP (2007). Madagascar Action Plan. International Monetary Fund. Washington D.C. USA.

Mathew, S. (2001) Small-scale fisheries perspectives on an ecosystem-based approach to fisheries management. Reykjavik conference on responsible fisheries in the marine ecosystem. Iceland.

McClanahan, T. R., & Mangi, S.C. (2004). Gear-based management of a tropical artisanal fishery based on species selectivity and capture size. Fisheries Management and Ecology. 11, 50-60.

Talbot, F. & Wilkinson, C. (2001). Coral reefs, mangroves and seagrasses: a sourcebook for managers. Australian Institute of Marine Science, Townsville, Australia (193).

UNDP. (2002) Human Development Report. United Nations Development Programme (292)

UNICEF. (2005). Water, Environment and Sanitation: Madagascar. WHO/UNICEF JMP.

WB. (2007). Data & Statistics:
http://siteresources.worldbank.org/DATASTATISTICS/Resources/GDP.pdf

Whittingham, E., Campbell, J., Townsley, P. (2003). Poverty and Reefs. Volume 1: A Global Overview. UNESCO, Paris, France.