

**THE IMPACT OF THE MENAI BAY MARINE PROTECTED AREA ON THE LIVELIHOODS OF SMALL SCALE FISHING COMMUNITIES ON ZANZIBAR, TANZANIA**

Helen Davies, Sustainable Fishing Solutions Ltd, info@sustainablefisheriesandoceans.com

Dr N S Jaddawi, Institute of Marine Sciences, jaddawi@ims.udsm.ac.tz

**ABSTRACT**

This paper presents the findings of a field survey carried out within small scale fishing communities on the island of Zanzibar in 2004. The study was designed to assess the impact of the Menai Bay marine protected area on the livelihoods of fishing households located within its boundaries using the sustainable livelihoods approach (SLA) as its basis. The survey finds that although the MPA helped to reduce conflict between fishermen and provided the impetus for establishing a local management framework, pressures on natural resources caused by factors largely outside the control of the MPA management system, may have suppressed some of the biological or economic benefits that the designation could have conveyed.

**Keywords: marine protected areas, livelihoods, trade liberalization, fishing effort**

**INTRODUCTION**

The aim of this project was to investigate the impact of the Menai Bay marine protected area (MPA) in Zanzibar, Tanzania, on the livelihoods of fishing dependant communities in the vicinity of the MPA. The project compared various sources of data to examine the perceptions of fishermen, female householders and influential actors, of the success or otherwise, of the MPA. In the context of this study, the potential success criteria for the MPA were assumed to be;

- an improvement in the incomes of fishing households and the development of livelihoods assets within or around the protected area
- a reduction in the vulnerability of coastal communities to economic shocks and natural disasters
- the integration of traditional management into more formal 'institutional' management (or visa versa)
- the maintenance or enhancement of the target species and overall marine biodiversity.

In general, the arguments in favour of MPAs suggest that, in so far as they are able to promote more effective systems of governance, they can also provide greater equity in terms of the access to natural resources, increased levels of community involvement and the empowerment of fisherfolk in the operation of their economic activities. Additionally the introduction of spatial planning (also assumed to be an integral part of MPA management), often facilitates greater transparency in decision making processes and reduces conflict between fishermen and other coastal users. It follows that because fishing is managed more sustainably, catches are higher and also of greater value (i.e. bigger, better quality fish). This study sets out to try and test some of these assumptions and investigate the causes of any shortfalls in the delivery of the MPA's objectives.

**BACKGROUND**

Zanzibar<sup>a</sup> lies between 5-6 degrees south and 39-40 degrees east in the Western Indian Ocean and covers an area of 2400 kms<sup>2</sup>. At this point the continental shelf is at its widest and gives rise to the Zanzibar Channel, an area of small islands, sandy bays and fringing coral reef. The main island is surrounded by 90 kms<sup>2</sup> of fringing reefs[1] which protect it from the monsoon winds that blow from the northeast from November to early March and from the south east from June to September. In between are calmer inter-monsoonal periods when fishing can be safely carried out otherwise shelter is found in the lee of the islands, east or west depending on the time of year.

Historically the island's economy has been sustained by a thriving clove industry but this has been overtaken in importance by fishing and seaweed harvesting and more recently by tourism [2]. Fishing is the main occupation for men and women of most age groups along the coast in coral rag villages [3] where the soil is poor and opportunities for agriculture are limited. The number of full time fishermen in 2003 was 17,000-20,000[4] more than double that of ten years ago. 95% of the fisheries on Zanzibar are made up of artisanal local fishermen, 70% of who target reef fishes using simple gears in dugout canoes, outrigger canoes, dhows and small boats. The vessels are of limited

operational range not being able to withstand rougher conditions of deeper water and mostly powered by sail which concentrates fishing effort between the outer fringing reef and shore<sup>b</sup>. [5] The fishable area on the east coast is narrow (3kms wide) and exposed to large waves and strong currents. The western side (in which the Menai Bay MPA is situated) is broader and more accessible to fishers and sheltered during the north east monsoon.

The main demersal species fished are bream, groupers, parrotfish, snapper, rabbit fish and emperors caught using dema traps (woven baskets up to one metre across) and handlines. Other species include sharks, rays, lobster, octopus and squid which are increasingly being targeted for export (Table 1), or the local tourist market. Molluscs and echinoderms are collected by hand along the shore mostly by women, children and the elderly. The main pelagic species targeted are sardine, jackfish, swordfish, mackerel, kingfish and tuna. The kingfish season occurs during the north east monsoon when there are also seasonal runs of tuna and sharks. Mangrove forests, seagrass beds, sandbanks and coral reefs are the principle fishing grounds though light attraction and drift nets are used to exploit pelagic deep-water fishes [3]. All natural resources including fisheries are under state ownership and are generally open access.

Table 1. Export royalty revenue Tanzanian shillings (Tsh)

	1998	2002
Lobster	750	645,000
Shrimp	248,690	1,150
Cephalopods	378,002	3,549,655
Marine Fish	107,000	2,000

(From Wilson 2004) [17]

Fishing is practiced throughout the year in the south when the weather is favourable but increases during the northeast monsoon when the water is calmer and clearer. Normally fishers put to sea on the ebb tide and land their catch on the flood tide. However, if the high tides occur late in the day, transport to market before dark is difficult, consequently wastage can be high so fishing during these periods is not favoured. The fishing cycle is often described in terms of numbers of days since the new moon.

Patterns of consumption vary but increasingly fish is sold to buy cheaper staples such as beans which extend the diet and allow any surplus to be used for other goods such as building materials and imported goods. It has been suggested that only 30% of the catch is consumed locally by fishers and their families. Processing is limited to drying or smoking increasing costs due to wastage.

Seaweed farming was once a significant contributor to the incomes of fishing communities<sup>c</sup> on the island but has now declined due to a lack of demand from established markets such as Denmark where it is used in food and the pharmaceutical industry. The price of the main species *Eucheuma cottoni* has fallen by 40% which has had a significant impact on many female householders for whom this was (and in many cases still is) a major source of income and security. In 1991, 2000 tonnes of seaweed was harvested by about 8000 women on Zanzibar but this grew in 1995 to nearly 5000 tonnes at its peak. Some of the larger seaweed farms on the east coast measured over a kilometre in length and extended down across the shore for 150 metres, causing some conflict with hoteliers who complained about the loss of scenic amenity and beach area.

The population of Zanzibar was estimated to be 640,575 in 1988 but it now stands at around 800,000. The relatively high rate of population growth in coastal villages (3.2%), is fuelled by migration from the mainland and inland Zanzibar. This is generally as a result of labour markets, trading and also social reasons such as marriage. As a consequence of this and other more recent trends, demand for fish and other marine resources, now outstrips supply [6].

Despite plans to revive the ailing clove industry through trade liberalisation, tourism is seen by many as a possible replacement source of revenue, experiencing an 18% growth rate from 1982-1992, the biggest rise in any sector. In 1985 there were 77,700 visitors to the island but in 1994 figures rose to 226,000. Similarly in 1987 there were just 3 hotels but by 1997 this figure had risen to 104. By 1995 growth from tourism stood at 22% [1]. Hotels and guest houses are increasing the demand for high value species such as octopus, squid, crab and kingfish and local hoteliers frequently buy from local fishermen on the beach. Another growth indicator is the volume of marine transport

between the main islands and the mainland. In 1990, 40 cargo vessels visited Zanzibar whereas by 1995 this figure had risen to 190.

Zanzibar is a small island economy, typified by low economic growth rates which are highly volatile[1] leaving it vulnerable to external shocks. In the mid 1980s the Government pursued a major structural adjustment programme and from 1986 substantial devaluations in its currency increased its export trade 10-fold<sup>d</sup>. Market prices were also liberalised. Oxfam 2002 [7] reported that Tanzania cut tariff rates by a half in the 1990s, pursuing a policy of rapid liberalisation whilst protecting the economy. Despite the suspension of donor aid in 1995, inflation fell from 29% in 1995 to 6% in 2002.

Between 1986 and 1990 there was a significant rise in fish prices particularly on the mainland where 1 tonne fetched 107,451 Tsh (1000 Tanzanian shillings  $\approx$  1US\$) in 1986 whereas in 1975 1 tonne was worth only 22,478 Tsh<sup>e</sup>. Overall prices for marine fish rose 3.7% faster than general prices with lobsters and prawns commanding the highest premium<sup>f</sup>. Devaluations in the local currency also affected fishing effort as more and more fishermen deployed more efficient (and probably damaging) fishing gear in order to supply the export market. An increasing reliance on imported foodstuffs and other goods also required a greater level of income in order for daily needs to be satisfied.

Poverty is persistent and widespread on Zanzibar with <10% of Zanzibaris living without basic livelihoods needs (39% in Tanzania as a whole). Life expectancy is 48 years, mortality rates at birth are 83 per 1000 and widespread malnutrition results in 35% of children under 5 being stunted. Although the latest World Bank survey[8] revealed that many fishing communities within the Menai Bay MPA were better off than most mainland fishing communities with respect to education levels and water supplies (34% of villagers in the Bay have received primary education and most villages have a secure supply of piped water), the area does experience higher incidences of malaria with 60% of households affected within the last year. (HIV Aids is below 6%). The average household size is 6.36 against a national average of 4.7 (1988) [10].

#### **THE MENAI BAY CONSERVATION AREA**

Menai Bay includes 17 villages within a designated area of 47,000 ha and is situated in the south west of the island. It encompasses 6 islets and has a seaward boundary which is 61kms offshore at its furthest point. It supports many species of tropical fish, coral reefs, seagrass beds and mangroves and is known to be the one of the most productive fishing grounds on the island. Within the MPA is Chumbe Island a private marine reserve, home to coconut crab (one of the biggest in the world and now very rare) and the Jozani-Chwaka Conservation Area, one of the last remaining stands of coastal forest backing onto the Bay which is inhabited by the red colobus monkey. Bottlenose and humpback dolphins are commonly seen in the south around Kizimkazi which attracts tourists on day trips from the capital Stone Town. Green and hawksbill turtles are also frequent visitors during nesting season. The Bay is characterised by shallow waters of 10m depth at high tide. Coral reefs and patch reefs support lobster, fin fish, clams and many other species and are thus favoured by fishermen in small vessels. Emperors and rabbit fish (spinefish) are the most common species (by number) caught in the Bay.

The area was given statutory protection and declared a marine protected area by the Government of Zanzibar in 1997. Its purpose (as defined by legislation) is 'To conserve in perpetuity the biological processes, ecological processes and productivity of the Menai Bay area and associated ecosystems to ensure that resources are sufficient for local people to maintain their livelihoods'.

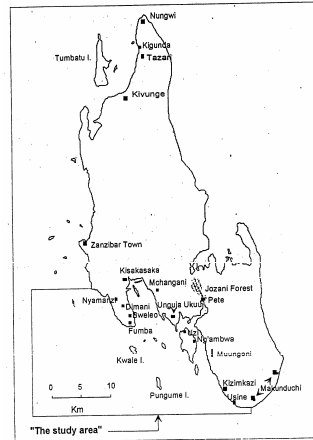


Figure 1. The Menai Bay Conservation Area

About 10% of the male population of the Bay is involved in fishing activities which in 1999 amounted to 619 vessels [9] but this doubles during the 3 month camping season when visiting fishermen from the mainland and Pemba Island camp on small islands within the Bay. The fleet consists of ngalawas<sup>g</sup> (67%), handlines and demas, mashu<sup>h</sup> (18.5%) and dhows<sup>i</sup> (14.8%). In 1995 only 6 had outboard engines. The most common type of gear used is hook and line (36.4%), nets (26.2%), dema traps (20.5%), fence traps (5%), and others (4%). Demas are used on reefs and seagrass beds [10].

Within the Menai Bay MPA is one small no take zone, The Chumbe Island Coral Park Project (CHICOP) which was established in 1991 and declared a private marine reserve in 1994. It consists of semi arid coastal forest bordered on the western fringe by a coral reef of exceptional diversity which has not generally been heavily fished. 370 species of fish and 200 species of scleractinian coral have been recorded there and it is said that 90% of all coral species recorded in East Africa are to be found in the area. The marine park extends out to about 300m offshore on the west side of the small island and extends along the coastline for a few kilometres. The other side of the island used to support extensive seagrass beds but is now heavily fished by up to 10 boats using handlines and dragnets. Fishermen from outside the area also visit the island during the camping or dago season.<sup>j</sup> The seagrass beds are now severely depleted by urchins and fishing gear.

As the coastal population has increased so has the number of fishers using near shore areas with 30,000 people living within 1 km of the coast on the eastern side of Zanzibar. This initially led to a decline in catch rates encouraging fishers to switch to more efficient (and often more destructive) gears such as beach seining and spear fishing. The use of small meshes and beach seines had the added disadvantage of removing large numbers of juvenile fish. Additionally, the destructive practice of dragging fine meshed nets over patches of coral was made worse by some fishermen smashing the coral heads with poles to frighten fish into the nets. Until the use of dynamite and bottom seines became common, the resources around the Bay were largely unexploited but by 1990 studies by the Institute of Marine Science showed that the depletion of local fish stocks and other natural resources was widespread. In 1993 certain gear such as bottom seine nets, dynamite and poison use became illegal, along with the use of spear guns and lights to attract fish at night. Improved enforcement also reduced incidents of illegal camping on the smaller islands in the Bay and the number of permits issued for camping is decreasing gradually.

In 2000 12,000 tourists visited the MPA area with 70% of the revenue obtained from entrance fees used to manage the area whilst 30% is channelled into community activities [11]. Fees for fishing permits and 3 month camping permits go directly to the Fisheries Department. Fishermen also take tourists to see the dolphins and visit the coral reefs for snorkelling. Seaweed farming is still practiced in 4 villages within the MPA but because of the decline of the seaweed farming industry and threat of over fishing, the MPA authorities provide capital investment for alternative production systems such as bee keeping and vegetable growing which has been beneficial in maintaining the financial independence of women. Management of the MPA is co-ordinated by the Fisheries Department and hosted by the Commission of Natural Resources and operates on 3 levels, village, district and national. Village

conservation committees elected by the villagers contribute to the management of the area via a steering group which is made up of representatives from all 17 villages.

## **METHODOLOGY**

The main data collection period was in October 2004 and consisted of 2 phases. First a field survey was conducted in 7 fishing villages within the Menai Bay MPA in October 2004 where questionnaire based interviews were carried out with fishermen, female householders, official beach recorders<sup>k</sup>, the head of each village (Sheha), and other key informants from institutions involved with fisheries and protected areas in Zanzibar. The field survey was designed to explore perceptions about the effectiveness of the MPA in enhancing fish stocks and improving incomes, and to test the fisher's confidence in the MPA to deliver improvements in the future.

Villages were selected from within the MPA where there was a large well-established fishing community, the presence of an official beach recorder and good communications with the MPA project and the Fisheries Department. The 7 villages were geographically dispersed throughout the MPA area and varying distances from markets and fishing grounds. A representative range of fishing gears were used. The Institute of Marine Science provided further guidance on the selection of villages.

The Sheha appointed individuals from the village for participation in the survey using an unknown set of criteria. Most of the interviews were conducted on a one to one basis through an interpreter in the open, somewhere central in the village or at the Sheha's or beach counter's house. Some were also conducted on the beach or in the beach counter's office. Whilst they were waiting to be interviewed, the fishermen sat together discussing fishing business with the beach counter, mending nets or making new demas from palm leaves. Women were interviewed separately inside their houses or at the local school. The extent of collaboration and the introduction of bias into the survey is not known. Interviews were also conducted with the project manager of the Menai Bay MPA project in the Department of Fisheries, the Country Representative of the Tanzania for WWF in Dar es Salaam (who helped establish the MPA) and the manager and the head ranger of the Chumbe Island Marine Park. Information and advice was also given by other Fisheries Department staff and scientists at the Institute of Marine Science on Zanzibar.

The second phase involved comparing and analyzing official statistics collected by the beach recorders for three of the villages within the MPA where field surveys had already been conducted. These were Fumba, Unguja Ukuu and Kizimkazi Mukononi. The data was recorded on a fortnightly basis by the beach recorders and sent to the Fisheries Department for verification and collation across the District. The analysis of the official data was limited to the last 3 months of the end of year, September to December (the peak fishing period) in years 1998, 1999, 2002 and 2003. Figures for catch by weight and value for each species were analysed spatially and temporally according to vessel type. The total number of vessels gave an indication of effort. The value of landings per fisher was taken as proxy for income. Standardised CPUE was calculated for year at each of the three landing sites.

## **RESULTS**

A total of 39 interviews with 22 fishers, 6 beach recorders, 7 Shehas and 4 women were carried out in 7 villages within the MPA. The villages ranged in size from 150 to 898 households with a population in the range of 85 to 180 fishers per village. The modal age of fishers interviewed was 39, the modal age of Shehas was 58 years. The modal size of households in the sample was 2 adults and 4 children. 18-22 questions were asked of each interviewee varying slightly in content according to their status.

### **Field survey results**

One of the questions which elicited the most unanimous response from both Shehas and fishers was about the different factors affected the price of fish. From the answers given it appears that the most important factors were the weather and competition from other fishers. The two are related because as the fishers explained, if the weather is calm, smaller vessels such as canoes can be used, therefore more fishers are likely to be actively fishing. Divers can also use spears and fishers often fish at night in calm weather when catches are reported to be higher. This produces an increase in supply and depresses the price obtained at auction. During rough weather such as the southeast monsoon, fewer fishers are able to put to sea so supply is limited which in turn inflates the price. Competition from other fishers also lowers the price because fishmongers can choose more widely from whom they wish to purchase their fish since there are large numbers of fishers trying to sell their catch. This leaves the fishers in a weaker negotiating position. A number of fishers felt that the size of fish affected its value and that the place of sale was also significant e.g. landing site, market, village etc.

Most interviewees (57%) were aware that there were restrictions on fishing in the area particularly in relation to the most damaging fishing practices. All respondents identified a different combination of measures possibly recalling those which affected them most directly or those which had the most wide-ranging effects. Surprisingly most fishers (52%) thought that there should be more restrictions though lack of or inconsistent enforcement was also raised as an issue, (28% thought no further restrictions should be applied). Some fishers explained in detail which measures would be most effective e.g. by rotationally closing off patches of coral reef to allow them to recover. More or less the same number of interviewees thought that the MPA had either made no difference to their livelihoods (46%) or had made a positive difference (39%). Restrictions on the number of visiting fishermen during the camping season and reductions in the most damaging fishing methods were seen as positive. Little or no reference was made by the respondents to their incomes in relation to the designation.

Conflict appeared to be a major issue for fishermen and Shehas with 70% of interviewees citing this as an area of concern, (Shehas are normally tasked with resolving all but the most serious offences). All respondents agreed that infringements had declined in recent years. Prior to MPA designation disputes with fishermen from neighbouring villages and the mainland were commonplace, the later often involving the police.

Asked how fishing had changed since their fathers' time, 50% of the respondents thought that catches had declined, fish were also less abundant and the composition of the catch had changed. However only 8% of respondents thought that the number of vessels and overall effort had increased and income decreased. 10% (all from Kizimkazi which is closer to deeper water and migration routes of pelagic species) thought that fishing gears had changed and become more selective. One fisherman thought that that gear had become less selective and smaller meshes were being used, although this was countered by others who complained that they could no longer fish for Indian mackerel because fine meshed nets were banned. Several fishers thought that the location of fishing activity had changed and the distance travelled to the fishing grounds had increased.

Asked if they had enough fish to feed their family and the frequency of catching a surplus, half replied that they could meet their daily living costs (\$2-3 per day) all of the time, whereas roughly the same number frequently experienced shortages. The greatest number of days in which they had to supplement their income from non - fishing activities or savings was 7 days per month. The location and the reliability of farming in the area appeared to be an influential factor in food security. Farming was the most commonly cited alternative to fishing when interviewees were asked what they did when stocks were low. A few turned to tourism or changed their fishing gear. Many of these fishers also turned to farming during the non fishing periods i.e. during the monsoon.

61% of the respondents were anxious about the future of fishing despite the presence of the MPA although 23% remained hopeful that things would improve. The answers given seemed to suggest that the profitability of their farming business (and hence their dependence on fishing) and also the effectiveness of existing enforcement measures were key factors. However 75% of those asked said that they would like to remain in fishing and that they would be happy for their sons to become fishermen.

#### **Analysis of official catch and effort data**

The analysis of fishing effort from the official data supplied by the Fisheries Department found an increase in the number of vessels in 2 out of the 3 sites and double the number of fishers at all 3 sites from over 1000 to over 2000 (this includes those visiting during the camping season). The total volume of landings increased by 30% over the 6 year period.

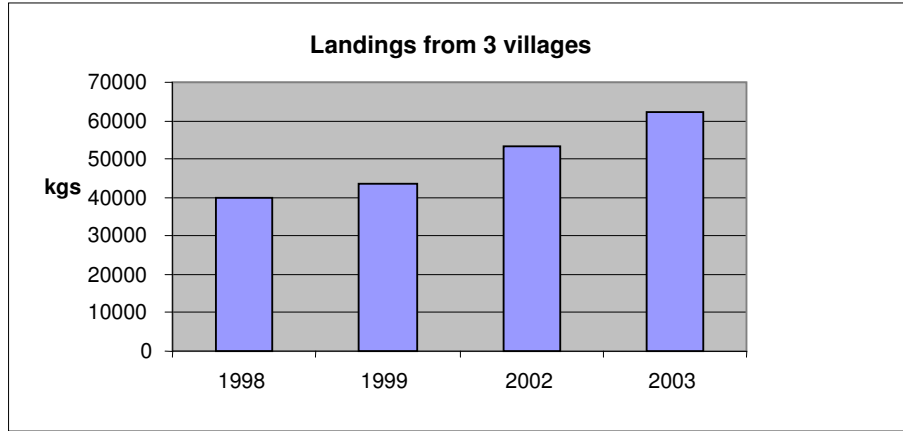


Figure 2. Volume of landings in Fumba, Ugunja Ukuu and Kizimkazi for 3 months in years 1998-2003

Likewise the pattern of CPUE at each of the villages was highly variable suggesting that some areas may be overfished and others exploited below their full capacity. However individual CPUE figures for larger vessels did show a downward trend particularly at Kizimkazi, the village nearest to the tuna and kingfish grounds.

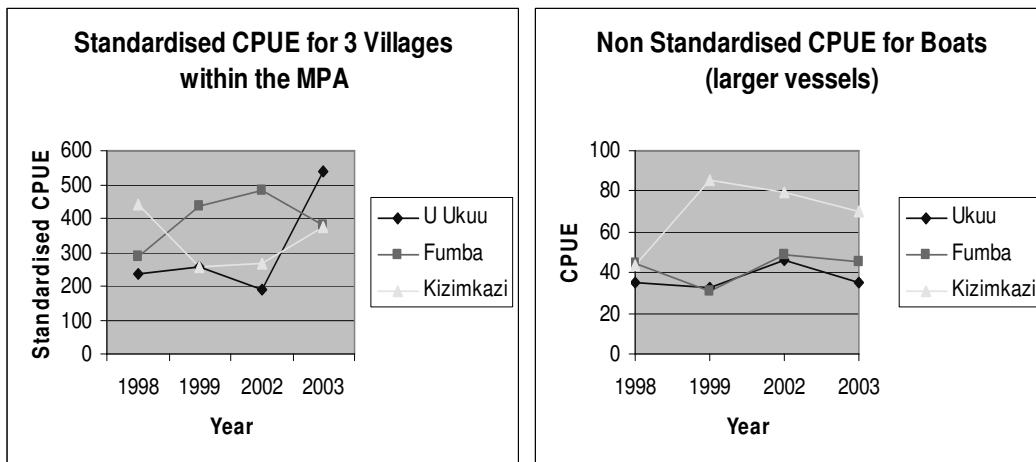


Figure 3. CPUE and Standardised CPUE for all vessel types and boats only.

The most obvious change in species composition is seen at Ugunja Ukuu where effort nearly doubled over the 6 year period. The proportion of small reef fish such as emperors has declined possibly due to a change in gear or as a result of over exploitation. High value surgeonfish have also decreased in the landings (caught by handline) possibly as a result of over exploitation. The proportion of kingfish, swordfish, sharks and rays and octopus increased in the catch, possibly reflecting a higher demand from the tourist industry.

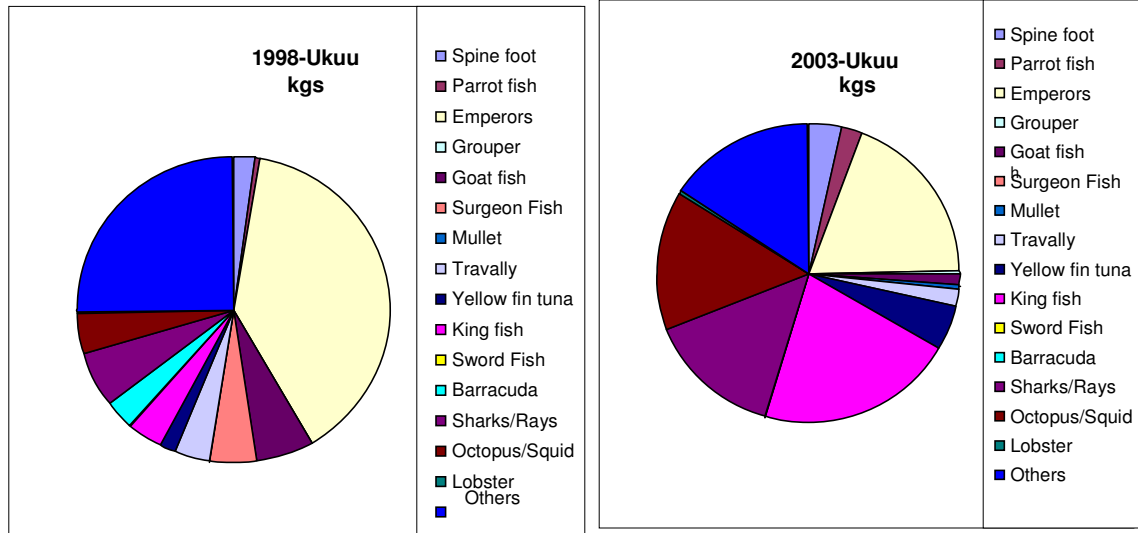


Figure 4. Species composition of the catch at Unguja Ukuu in 2 years.

The value of landings per fisher was the closest approximation to fishing generated income and shows a noticeable decline over the 6 years. Fishers in Kizimkazi have higher levels of income compared to the other two villages as they fish offshore with drift nets and so are able to catch higher value pelagic species. Overall their incomes have fallen in line with CPUE from 20,000 to 5,000 Tanzanian schillings. There does appear to be a seasonal pattern with peaks occurring in 3 out of the 4 years and usually in October, the month of Ramadan, when fishing effort is reduced (and price rises).

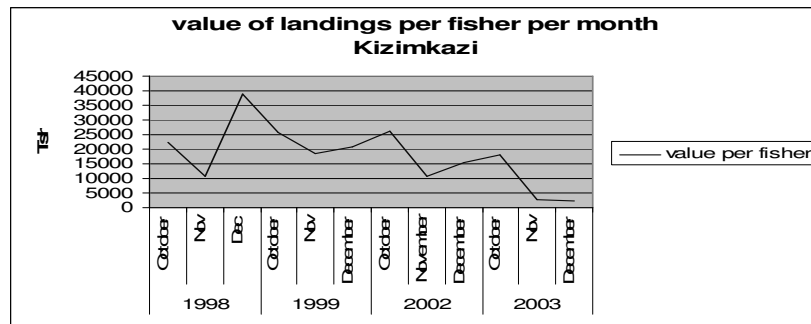


Figure 5. Value of landings per fisher in one village over the 6 year period.

## DISCUSSION

The outputs of the field survey revealed

- individual perceptions about the overall status of the fishery differed from the official figures
- most fishers understood the implications of damaging fishing practices
- fishers were concerned that competition from outside the area and problems with enforcement, were reducing the potential benefits of the MPA, reducing their confidence in it to improve their livelihoods
- income levels were not the only contributor to the sustainable livelihoods of fishers. Other factors such feelings of security, involvement in decision making and the ability to provide for their families were also valued. Although the number of incidents of conflict had been reduced since the designation had come into force, these did not appear to be directly linked in the minds of the fishers to the establishment of the MPA and therefore not attributed as benefits
- women were better organised into occupational groups and able to adapt to new or alternative income generating activities



The perception of the fishers that fishing effort (vessel numbers and numbers of individuals) had not significantly changed is not borne out by the official figures provided by the Fisheries Department. The total number of fishers using the 3 landing sites doubled over the study period and the average number of fishers per boat also increased. Trends from the mainland also showed a 5.2% increase in growth from 1980 – 1990.

Catches were thought by most of the fishers to be decreasing, again reflecting individual circumstances rather than the overall picture. The total volume of landings increased at all 3 sites but CPUE and standardised CPUE fell at 2 out of the 3 sites which suggests that individual catches are in fact declining. Official statistics for the whole of the island showed that in 1980 the catch per boat was 3.83 tonnes for the year, whereas in 1988 this had fallen to 3.67 tonnes even though the number of fishermen doubled over the same period (Zanzibar Fisheries Statistics Dept.) Nassar's work in 1995 showed an increase in catch per boat from 1980 to 1982 and then a steady decrease to 1989. Figures from the mainland also reported a decline in output per man from 1970 to 1986. Several authors including the FAO note the exceedance of MSY in Tanzanian and specifically Zanzibaris fisheries.

Overall the figures show increases in catches and levels of effort which at first glance may suggest that the fishery is in good health and that there are good levels of earnings for fishermen. However, parameters representing individual fishermen such as CPUE/standardised CPUE, output per man, value of landings per fisher, have all fallen which is perhaps why individual fishers do not feel that the MPA has benefited them or they have experienced any improvement in their livelihoods, incomes or security.

## **CONCLUSION**

Despite rising prices, many fishermen in the area remain trapped in poverty with little prospect of improvements to their income due to increasing number of fishers in the area and declining stock levels. Despite many changes in Tanzanian fisheries over the last 20 years, technical efficiency and levels of investment appear to have remained static. Although development in the export market does suggest that some obstacles can be overcome, these benefits do not seem to have pervaded the majority of small scale fleet on Zanzibar.

However the MPA at Menai Bay does appear to have had a positive effect in reducing conflict and providing a focus for community development and local institutional reform in the area. Without the designation and the targeted interventions of the Fisheries Department it is unlikely that the village committees and management steering group would have evolved so quickly (if at all). The adaptability of women in the community to secure micro credit and pursue alternative income generating schemes should be seen as an example of what can be achieved in such circumstances.

Without more effective management of fishing effort, the enforcement of existing measures and better availability of viable alternative income generating schemes, it's difficult to see how the rise in effort and decline in CPUE of the fishers in the Menai Bay area can be addressed. Rises in prices and local demand from the expanding tourist industry, from the export market on the mainland and growing numbers of middle income families regionally, will continue to attract entrants to the fishery until yields become so low that alternative supplies will be sought elsewhere. However improvements in transport infrastructure and the distribution network will be required in order for this to become feasible. Mkendo suggested that a 20% increase in the supply of fish from aquaculture will be required to meet the current demand [12].

The World Bank survey in 2003 concluded that 'fish abundance in most locations (in East Africa) has declined significantly in the last decade whilst fishing effort has increased. With essentially no deep sea fishery, the pressure exerted on fragile inshore coral reef ecosystems is persistent.' Further evidence from the Tanzanian State of the Coast report (2003) [13] shows that resources are over exploited, the size of species such as lobster and octopus has declined substantially and numbers of the higher value species of sea cucumbers have also declined. The report commented, 'given that MPAs are tools to specify the location of fishing, they do not affect incentives or replace institutional structures needed to address overfishing'. Clearly the expectations of MPAs to alleviate poverty, recover stocks and improve the livelihoods of fishers should be seen in the context of the regional economic strategies and macro economic policies.

The FAO's Advisory Committee on Fisheries research (3<sup>rd</sup> session Rome 2000) [14] highlighted the need for further research on the potential impact of effort modulating fishery management schemes on poverty in fishing communities. This work coupled with the integration of fisheries into wider social and fiscal policies should be

progressed as a matter of some urgency given the current situation. However, if the root cause of excess fishing capacity in nearshore areas is a result of rising affluence elsewhere rather than poverty levels within local communities, many interventions may end up falling short of sustainable resource management and poverty alleviation goals.

## REFERENCES

- [1] Curren S., Rosario C. (Ed), 2005, Menai Bay Conservation Area Guide Book, WWF
- [2] Zanzibar Public Expenditure Review. 2003 Revolutionary Government of Zanzibar, Ministry of Finance and Economic Affairs, World Bank
- [3] Jaddawi N.S., Stanley R., (1997). Fish Stock Assessment in the Traditional Fishing Sector: Information Needs. *Proceedings of the National Workshop on Artisanal Fisheries*. Zanzibar, Institute of Marine Science, University of Dar es Salaam, Tanzania, September 1997.
- [4] Bagachawa M. S. D., Hodd M. R. V., T.L. Maliyamkono T.L. (1994). *Fisheries Development in Tanzania*. Macmillan Press Ltd, London.
- [5] Jaddawi N.S., Yahya S.A.S. (2003). Zanzibar Fisheries Frame Survey. Department of Fisheries and Marine Resources. Ministry of Agriculture, Natural Resources Environment and Co-operatives. Zanzibar. Institute of Marine Science. Dar es Salaam.
- [6] Mohammed S. East African Action Plan
- [7] Oxfam, 2002, *Rigged Rules and Double Standards-Trade, Globalisation and the Fight Against Poverty*. Oxfam International. Available at : [http://www.maketrade-fair.com/assets/english/report\\_english.pdf](http://www.maketrade-fair.com/assets/english/report_english.pdf)
- [8] Hewawasam I., 2003 MPAs Livelihoods and Poverty Alleviation in Mainland Tanzania and Zanzibar. An Empirical Study of 24 Coastal Villages. Report for the World Bank.
- [9] Ngaga Y. M., Sharif M. H., Makoloweka S. (1999). Mid term evaluation final report. WWF, Zanzibar Revolutionary Government.
- [10] Nassar S., (1995) Socio economic consideration of villages around Menai Bay. Commission for Lands and Environment, Zanzibar
- [11] Ministry of Agriculture Livestock and Natural Resources. (2001) Menai Bay Conservation project. Proposed Activities for 2001-2003. Internal document.
- [12] Mkenda A. F., Folmer H., 2001, The MSY of Artisanal Fisheries in Zanzibar: A Cointegration Approach, *Environmental and Resource Economics*, 19 (4), pp 311-328.
- [13] Tanzanian Coastal Management Plan Partnership, 2001, Tanzanian State of the Coast 2001: People and the Environment, *Coastal Management Report*, TCMP, Dar es Salaam
- [14] FAO 2000, Poverty in Coastal Fishing Villages, *Report of the 3<sup>rd</sup> Session of the Advisory Committee on Fisheries Research, Rome 5-8 December 2000*
- [15] Jiddawi N. S., Muhando C., 1990 Summary of Marine Resources of Zanzibar, *Zanzibar Environmental Study Series no 1*. The Commission of Lands and Environment
- [16] Seabo J. K., Tol R. S. J., 2005, Technical Efficiency and Small Scale fishing Households in Tanzanian Coastal Villages: An empirical analysis.
- [17] Wilson J. D. K., 2004, Fiscal Arrangements in the Tanzanian Fisheries sector, *Circular No.1000*, FAO Rome.

## ENDNOTES

---

<sup>a</sup> Zanzibar often refers to the main islands of Unguja and Pemba in the literature but is used throughout this document as the island of Unguja only.

<sup>b</sup> Technical efficiency is estimated at 52% due to crowding of inshore waters on mainland Tanzania. [16]

<sup>c</sup> Seaweed production grew dramatically as an export crop from 35 tonnes in 1985 to 4961 tonnes in 1996 FAO 1996

<sup>d</sup> Prices for ½ kilo fresh fish bought at the market in Stone Town market show the effect of the devaluations of the Tanzanian Shilling. In 1981 ½ kilo could be bought for 26.21 Tsh, equivalent to 3.15 US\$, by 1996 the price had risen to 728.18 Tsh for ½ kilo but this was only worth 1.15 US\$

<sup>e</sup> Further evidence of rising prices is given by Jaddawi 1990 who described the prices of fish as rising from 10 Tsh in 1982 to 30 Tsh per kilo in 1988 [15].

<sup>f</sup> Contribution of fisheries to GDP varies between 2.2-10.4% (Jiddawi and Ohman 2002) Exports are valued at 0.6 million US\$ (Jidawwi 2001).

<sup>g</sup> dugout canoes up to 10m with outrigger paddles for stabilization, powered by sail with 2-4 crew using gill nets

<sup>h</sup> a wooden plank boat up to 15m with 4+crew and sometimes powered by engine when trawling gear is used

<sup>i</sup> a slender faster wooden boat usually sail driven and able to travel longer distances, again able to use trawling gear

<sup>j</sup> Before the MPA declaration, the system of open and closed camping on the islands had collapsed and semi permanent camps had become established by fishers from the mainland and outside the area

<sup>k</sup> Beach recorders are community members employed by the Fisheries Department to record details of the days catch and number of vessels