

**An Assessment of the Stakeholders and
Resource Use in the
Dar es Salaam Marine Reserves System**

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Edited by
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International Coral Reef Action Network



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An Assessment of the Stakeholders and Resource Use in the Dar es Salaam Marine Reserves System

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1. Introduction

1.1. BACKGROUND

The Dar es Salaam Marine Reserves System (DMRS) was gazetted as a Marine Protected Area (MPA) in June 1975 under the Fisheries Act no. 6 of 1970. Since this initial step forward twenty-five years ago, the development of an effective management plan to ensure the conservation and sustainable use of the DMRS has been largely unsuccessful and, in reality, the area's status as a marine reserve remains on paper alone. At present, the reserve area is characterised by unregulated fishing and the widespread use of destructive techniques such as beach seine, drag-nets and dynamite. This pressure on marine resources has led to widespread environmental degradation, a situation that was compounded by high coral mortality during the 1998 bleaching event.

Natural systems in the DMRS have been pushed to the point where some researchers have even suggested that the area is no longer worthy of protection (UNEP, 1989; Gaudian et al., 1995). Recent studies aimed at assessing the status of the habitats in the DMRS (e.g. Kamukuru, 1998; McClanahan et al., 1999; and Muhando and Francis, 2000) have, however, contended that although resources are heavily depleted, the area is still viable as an MPA.

The history of efforts to develop a management strategy has been extremely convoluted. The DMRS was initially the responsibility of Dar es Salaam City Council (DCC). Plans were made in 1990 to lease Bongoyo Island to private investors. This was not successful and the title deeds were immediately revoked due to reactions over private ownership of 'common property'. Over the next four years, progress was finally made as Ministry of Natural Resources and Tourism (MNRT) formulated a management framework that led to the Marine Parks and Reserves Act No. 29 of 1994. The 1994 Act has been well received due to the emphasis placed on community involvement in its legislation. Under the Act, the responsibility of management of all of Tanzania's MPAs (including DMRS) was given to the Marine Parks and Reserves Unit (MPRU).

Work is now in progress to initiate strategies for the development of a management plan to promote the sustainable use of the DMRS. A considerable amount of information exists on the biological status of the reserves though several areas need further attention. In contrast, very little work has been carried out on the stakeholders and the interaction they have with the resources in the DMRS. This study aimed to examine this aspect to provide recommendations to MPRU on strategies for management.

Seven Reserves have been gazetted to date, namely, Bongoyo Island, Mbudya Island, Pangavini Island, Fungu Yasini Island, Chole Bay, Tutia Island, and Maziwi Island. As a result of sea-level rise, however, Maziwi Island Reserve disappeared in 1978 (Fay, 1992) and is not considered here. Chole Bay and

Tutia Island Reserves are also not covered in this work because under the Marine Parks and Reserves Act No. 29, 1994, they were both included in the Mafia Island Marine Park (MIMP). This study therefore concentrates on the four remaining islands of Bongoyo, Mbudya, Pangavini and Fungu Yasini.

1.2. OBJECTIVES

The objectives of this study were to:

- Identify key stakeholders (e.g. local communities, government officials, private sector representatives, NGOs, etc.) especially those living in or adjacent to or who are dependent on the resources in the marine reserves
- Assess the attitudes and interests of key stakeholders including existing uses, rights and values, existing and potential socio-economic benefits, and social attitudes relevant to the conservation and sustainable use of coastal and marine resources in the project area
- Identify capacity-building requirements for the effective management of MPA sites.

Within these overall objectives the study had the following aims:

- To produce a report detailing an analysis of the stakeholders of the Dar Marine Reserves and their perceptions of the Marine Reserves and suggestions for strategies to address any impacts
- To devise strategies to allow stakeholder participation in the management of the Marine Reserves
- To train MPRU staff through participation in data collection
- To produce recommendations for capacity building within MPRU for the effective management of the Marine Reserves.

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presumed to be an advantage when nobody was available to actively encourage participation. It was hoped therefore that the questionnaire design would maximise data acquisition. Questionnaires were distributed and interviews held with all of the major stakeholders as soon as possible during the study period to maximise the amount of information gained.

Examples of all questionnaires distributed in this study (including English and Kiswahili versions) are provided in Appendixes 7.3 to 7.8.

2.3. DATA ANALYSIS AND PRESENTATION

Field and questionnaire data were compiled onto computer spreadsheets for subsequent analysis using Microsoft Excel™. For the presentation of questionnaire data in this report, the term ‘response rate’ is used in all Tables of results to represent the overall proportion of interviewees who gave an answer from the total contacted. In all tables this is calculated separately from those that refer to the proportion who gave a particular response out of those that answered. In the Tables the latter is referred to as *n* (or number who gave the response shown).

2.4. MARINE PARKS AND RESERVES UNIT PERSONNEL TRAINING

Training was incorporated into this study for two members of the MPRU on an informal basis. Due to the field based nature of the work and the short time-scale, training was carried out as the work was being done (*in situ*) and did not follow a planned schedule. Direct involvement with all aspects of survey design, data collection and analysis was encouraged at all stages of the work. Both staff assisted with the translation of questionnaires from English into Kiswahili to give the option of both languages for local fishermen and day visitors to the island. Their bilingual skills were also relied upon for translation of the data into English for analysis. Throughout the work period both also managed to participate in data collection both at sea and on the beach.

2.5. STUDY AREA

The four islands that make up the present-day Dar es Salaam Marine Reserves System lies close to the coast north of Dar es Salaam, between 6° 35' and 6° 45' South. The islands are situated on the shallow continental shelf where the depth between the three most southerly islands is less than 20 metres. Fungu Yasini, the most northerly island of the group, is separated by a slightly deeper water-body that reaches 35 metres in places. The islands are situated close to the mainland, the closest being Pangavini, which is separated from shore only by a 1.5 km-wide channel.

A number of fishing communities situated along the coast adjacent to the DMRS depend on its marine resources. As well as fishermen in the immediate vicinity, others travel from other areas north and south of the islands to take advantage of the fishery.

The proximity of the DMRS to Dar es Salaam makes it easily accessible to visitors from around the city. Furthermore, a number of hotels, situated along the sandy coastline close to the islands bring tourists and divers to the DMRS area.

This study concentrated on stakeholders in the vicinity of the DMRS, particularly those involved in direct extraction of marine resources (fisheries) and those engaged in recreational activities. The fishing communities targeted for research were Mbweni, Unonio, Kunduchi, Mwasani and Banda beach. The recreational sites surveyed were the Kunduchi Beach, Bahari Beach, Silver Sands, White Sands, and Sea Breeze Hotels, as well as the Slipway Ferry service and the Dar es Salaam Yacht Club (DYC). Their locations are shown in Figures 1 and 2.

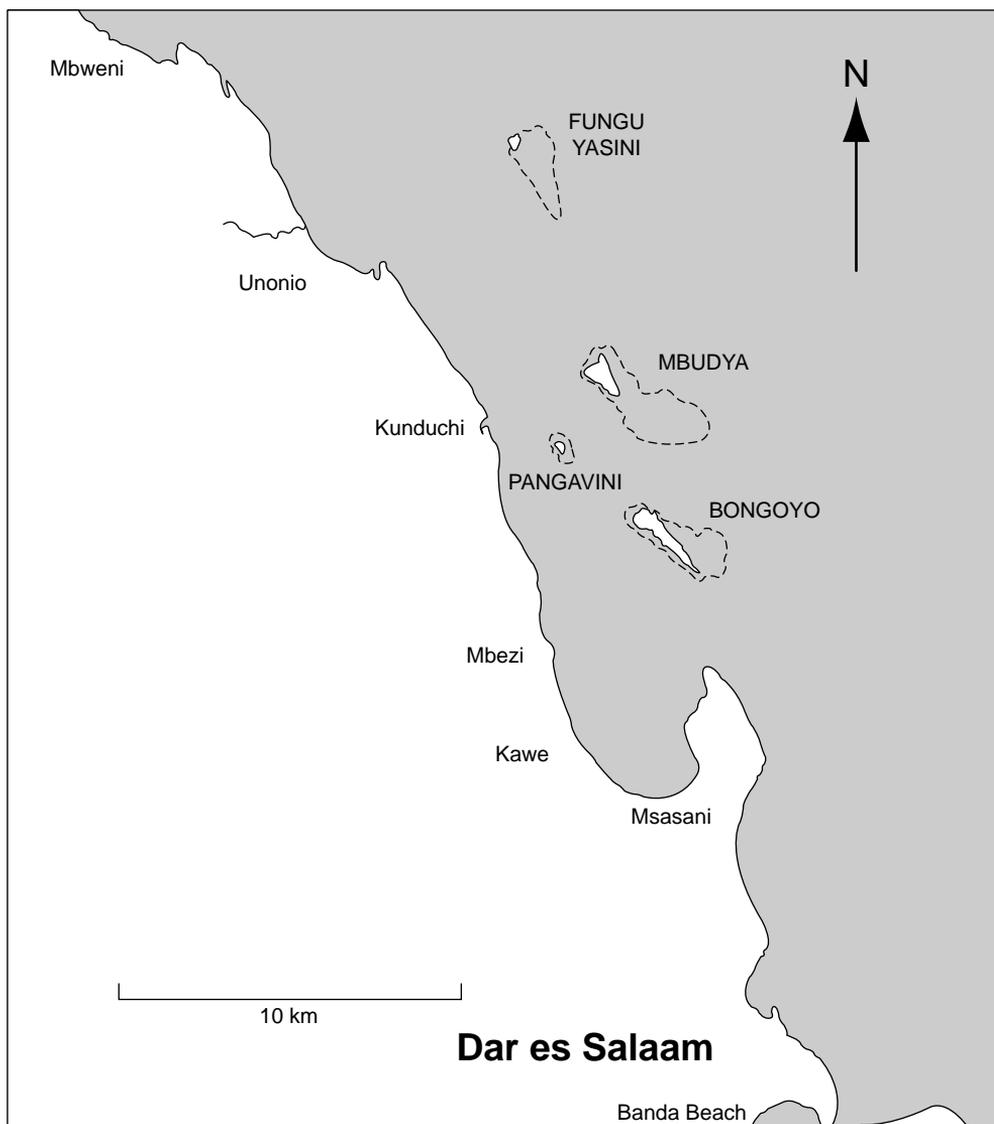


Figure 1. Map of study area showing position of fishing communities in relation to the islands in the Dar es Salaam Marine Reserves System

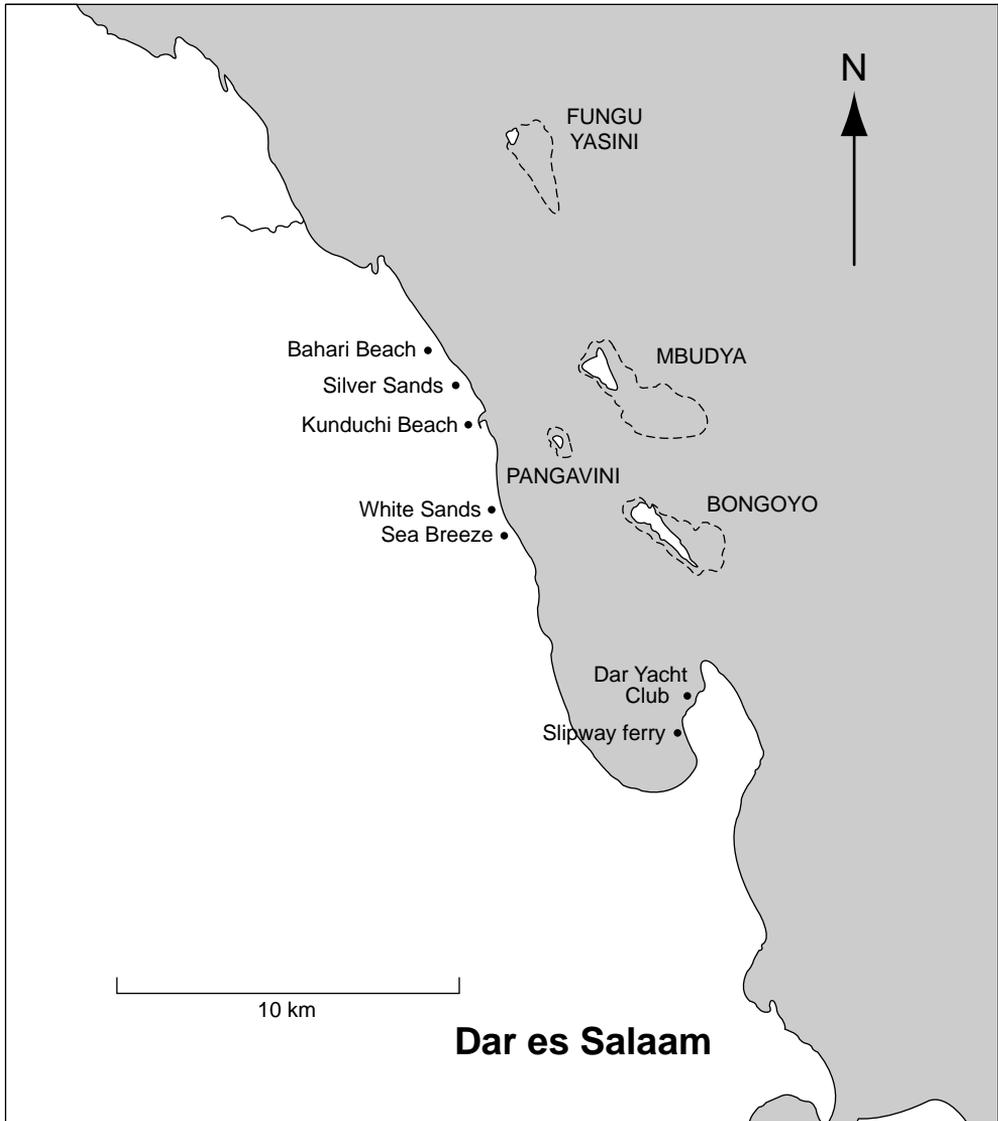


Figure 2. Map of study area showing position of the outlets involved in recreational activity in relation to the Dar es Salaam Marine Services

2.6. QUESTIONNAIRE SURVEYS

2.6.1. Visitors to the reserves

The objective of this aspect of the study was to profile the visitors to the reserves. The questionnaires were initially given to the hotels and to ferry operators to hand out to visitors on their return from the Reserves. Completed questionnaires were collected and replenished depending on demand. The questionnaires were designed to generate information on:

- demography of visitors
- frequency of visits
- purpose of visits

-
- activities carried out
 - value placed on the resources in the reserve
 - impressions of reserves environment and services
 - awareness of reserves issues
 - attitudes towards management issues.

2.6.2. Divers in the Reserves

This category of questionnaire targeted the divers who visit the Reserves, and was distributed to the hotels and to the Dar es Salaam Yacht Club (DYC). The questionnaires were designed to gather information on the following:

- demography of divers
- level of experience of divers
- cost per dive
- impressions of the Reserves environment and services
- impressions of environmental change over time
- awareness of Reserves issues
- attitudes towards management issues.

2.6.3. Organisers of visitor and dive services

A survey was carried out on the providers of ferry services and organisers of other tourist and visitor activities in the reserves area. A structured interview was carried out with the owner of the Slipway Ferry Service, whilst for the hotel owners, and the DYC, both of which are involved in a wide range of activities in the reserves, a more extensive questionnaire was designed. Interviews were also conducted with all upon collection of the questionnaire and further elaboration and discussion was encouraged during frequent informal meetings. The questionnaires and interviews were designed to produce the following outputs:

- information on the nature of services
- details on the services provided
- information on key interests within the reserves
- number of visitors received per island per day, week and over the past year
- number of participants in other activities, per day, per week and over the past year
- information on the demography of guests who use the reserve
- residency status of staff working directly with reserves activities
- costs to visitors and participants in other activities
- precise geographical locations of other activities within the reserves
- impressions of the Reserves environment and services
- awareness of reserves issues
- attitudes towards management issues
- expectations from a management plan

2.7. THE RESERVES FISHERY

A different approach was required for gathering information about the traditional artisanal fishery and more commercialised ventures taking place in the Reserves. Commercial operations turned out to be relatively isolated and harder to penetrate, and therefore information about these was gained largely from incidental observations and informal meetings with those concerned.

The artisanal fishery is, however, well established in many of the villages in the study area and a considerable proportion of the work effort was devoted to examining the interaction of fishermen with the reserves. Two main methods were used based on field surveys and interviews with the fishermen themselves. Field surveys were divided between visits by boat to the fishing grounds around the DMRS islands and visits to the landing sites as the catches arrived. Interviews were held at the major coastal villages involved in fishing in the reserves area. Introductions were first made with respective village fisheries officers, and with the Chairman of Kunduchi village, in order to gain approval to carry out the work.

Fishing on this coast is a male-dominated activity. Few women are involved in fishing although they are involved in the buying and cooking of the fish. The types of fishing activities carried out by women are, however, minor in the context of the total fishery and fall beyond the scope of this study. Those involved in fishing that were contacted during this study were all male and are therefore herein referred to as fishermen.

2.7.1. Fisheries: Questionnaire survey

The questionnaire for fishermen was used in two ways. First, information was gathered using a questionnaire as the format for a structured interview. The advantage of this approach was that it ensured an answer to every question and provided for continuous validation of responses. Second, the questionnaires were distributed around the targeted villages for fishermen to fill in their own time. As the study became established in the villages, local fisheries officers offered to assist with the task of distributing questionnaires to maximise data collection. In several cases fisheries officers assisted with this work for several days before questionnaires were collected again. The main advantage of this approach was an increase in the size of the sample.

The majority of interviews with fishermen were carried out at the same time as the fieldwork on the landing sites in the study area. Following the brief questions and use of a map to ascertain fishing location described in Section 3.9.2, fishermen were requested to spare a few minutes to participate in a more extensive structured interview in Kiswahili. Fishermen who had not fished that day were also approached randomly at the landing sites and the questionnaires administered.

2.7.2. Landing site field surveys

Field surveys were carried out on the catch landing sites of Mbwani, Unonio, Kunduchi, Msasani villages and at Banda beach, in Dar es Salaam. The main

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objective of this aspect of the study was to quantify the level of interaction of the fishing communities in the study area with the reserves. In this way it was hoped that the groups which are likely to be most influenced by management decisions in the reserve could be identified.

Boats were approached as they arrived at the landing site and, following an introduction, their occupants were asked a series of questions (Section 3.10). Most importantly they were asked if they had fished in the vicinity of the reserves. Results were written on pre-printed data sheets. Fishermen were then prompted to indicate where they fished by marking the location of their fishing site on a photocopied map of the four islands and surrounding reefs. To try and standardise answers as far as possible, assistance was given here by asking, for instance, the name of the island first, the approximate position around the island, followed by the depth of water fished in. Qualitative catch information was also collected, basically by identifying and recording the main catch species. The landing site surveys were designed to produce the following outputs for each contact:

- boat type
- place of boat registration
- gear type
- number of fishermen
- village of residence
- main catch species
- expected catch selling price
- fishing time
- precise fishing site location.

2.7.3. Fishing ground field surveys

A survey of fishing activity in the reserves was also conducted around all four of the islands using a boat hired from White Sands Hotel. The main objective of this aspect of the study was to provide further information on: fishing patterns around each island including gear types, boat types, and catches, as well as to provide photography opportunities and allow visits to the islands. Occasionally these surveys were carried out in the morning before returning to the landing site to approach boats not seen on that day. When this happened, checks were always made on the beach to ensure that the same boat was not approached twice in the same day.

At sea, fishermen were approached where they were fishing and, after an introduction, the same brief series of questions were asked as in the landing site surveys. At sea, positional information was provided using a geographic positioning system (GPS). Initially, two survey days were allocated to each of the four islands, and the intention was to approach and count all of the boats around each island.

3. Results

3.1. OVERVIEW

The resources of the Dar es Salaam Marine Reserves System are relied upon and enjoyed by a diverse range of stakeholders. The reserves' proximity to Dar es Salaam attracts many recreational visitors. A number of large hotels face the reserves and attract both domestic and international tourists to the area. Situated along the length of the Kunduchi coast north of Dar es Salaam are a number of fishing villages whose inhabitants depend entirely on fishing in the Reserves area. Whilst this category of stakeholders is perhaps the most numerous, there are many others with financial, academic and legislative interests in the area. These include government offices, academic institutions, commercial fisheries, hotel owners, and local and national businesses alike.

The three arguably most prominent stakeholder groups—the fishing communities, the visitors to the islands, and the divers from the hotels and the DYC—are discussed here. First, a brief description is provided of the stakeholders, beside fishermen, that are involved directly with the Reserves, namely the hotels and the DYC.

3.2. HOTELS AND THE DYC

The hotels and DYC are closely involved in recreation in the Reserves. Both organise dive trips to the area, and the hotels offer regular ferry services to the islands for their guests. The DYC has 560 members, many of whom own boats that they use to travel to the Reserves. Further description of the activities of the hotels and the DYC are given in sections 3.5 (Visitors to the Islands) and 3.6 (Diving in the Reserves) respectively.

Investigations revealed a high level of use of the Reserves and a vested interest in their conservation. Not surprisingly, the hotels and DYC expressed great concern over several issues concerning the Reserves, in particular dynamite fishing, and specifically to the hotels, beach erosion. The perceived lack of management action since the Reserves were gazetted had also generated a certain degree of scepticism. In the light of this, the hotel owners and representatives of the DYC showed a positive attitude towards helping to initiate projects within the Reserves and being actively involved in management. The DYC in particular, highlighted the value of their dive club as a resource, and expressed an interest in helping with scientific monitoring, the installation of mooring buoys, and perhaps as a passive police force within the Reserves.

Results of investigations into the potential role of the hotels and DYC in the collection of entry fees are given in Section 3.11.

3.3. RESULTS OF MEETINGS AND INTERVIEWS

As well as the field work techniques employed, this study relied heavily on meetings, interviews, telephone calls and informal discussions to provide further information on the stakeholders in the Reserves. Further contacts were made following chance introductions and many of these had valuable input into the discussion and may represent important sources of information for future study. A list of the contacts made is provided in Appendix 7.2.

3.4. VISITORS TO THE RESERVES ISLANDS

3.4.1. Infrastructure and transport services to the islands

The islands in the Reserves attract many recreational visitors, whose distribution within the Reserves is primarily determined by the physical and environmental characteristics of the islands. The vast majority of visitors tend to visit the only two with large and accessible beaches, i.e. Bongoyo and Mbudya. Some visitors do travel to Fungu Yasini, a sandbar with surrounding reef, but their numbers are insignificant in comparison. This is largely due to the fact that at high tide it becomes almost completely submerged, and it is also much further from the mainland. Pangavini, which has no sandy beach, appears not to attract any recreational visitors.

Visitors travelling to Bongoyo use the ferry service at the Slipway, Msasani. The outfit is a locally run business that has been granted 'agent' status by the MPRU. The ferry costs Tsh 5500 for a return ticket and departs four times a day. Included in the cost is a Tsh 500 entry fee to the Reserves that goes to the MPRU. All hotels offer ferry services to Mbudya. Two of these, namely White Sands and Silver Sands have agent status. The Silver Sands and Bahari Beach Hotels share the same boat facilities and take visitors across at the same times. All reported that they also take guests to Fungu Yasini only according to demand.

All hotels will take guests and non-guests to Mbudya for approximately \$10 return, though costs vary according to whether other extras such as food and rent of a *banda* are included. Tickets sold through the two hotel agents also incorporate a Tsh 500 Reserves entry fee.

3.4.2. Other visitors to the islands

Private boat users, the majority of whom have moorings at the DYC, also visit the islands. Other boats are also moored at the Slipway in Msasani. Reportedly, between 3–5 boats anchor off both Bongoyo and Mbudya in a typical day, though during the high season (November–January) this can increase to as many as 10 (Vice Commadore, DYC, pers. commun.).

A local ferry operator also offers transport to Mbudya on a traditional dhow, which departs on demand from the vicinity of the Silver Sands Hotel. No information on numbers or costs was made available during this study, though the numbers were reported to be lower than for the other services.

3.4.3. Distribution and scale of visitors from ferry operators

Records kept by the Slipway Ferry Service detail that 6438 people had visited Bongoyo over the last year (July 1999 to July 2000). This is shown in Table 1. Similar records were sought from the hotels in order to establish long-term trends for Mbudya, however, at the end of this study these were still unforthcoming. Nevertheless, verbal estimates from the managers of the hotels do give an approximate number on which calculations have been based for a typical year (Table 1). On the basis of these estimates it was calculated that, throughout a typical year, about 5350 visitors were taken to Mbudya by all of the hotels together. The figure does not take into account visitors arriving via the local dhow or through private means, though this is likely to increase the number only insignificantly.

Table 1. Source and approximate number of visitors to Bongoyo and Mbudya Islands per year (N.D., no data)

	<i>Number per month</i>		<i>Total per year</i>
	<i>High season (Nov–Jan)</i>	<i>Low season (Feb–Oct)</i>	
Bongoyo			
<i>Slipway</i>	<i>N.D.</i>	<i>N.D.</i>	<i>6438</i>
<i>Private boats</i>	<i>N.D.</i>	<i>N.D.</i>	<i>N.D.</i>
Total Bongoyo visitors	<i>N.D.</i>	<i>N.D.</i>	<i>6438</i>
Mbudya			
<i>White Sands</i>	<i>400</i>	<i>300</i>	<i>3900</i>
<i>Sea Breeze</i>	<i>90</i>	<i>70</i>	<i>830</i>
<i>Silver Sands / Bahari Beach</i>	<i>25</i>	<i>60</i>	<i>615</i>
<i>Local dhow</i>	<i>N.D.</i>	<i>N.D.</i>	<i>N.D.</i>
<i>Private boats</i>	<i>N.D.</i>	<i>N.D.</i>	<i>N.D.</i>
Total Mbudya visitors	<i>515</i>	<i>430</i>	<i>5345</i>

3.5. VISITOR QUESTIONNAIRE RESULTS

During the visitor survey around 200 questionnaires were produced in English and Kiswahili and distributed to ferry operators. Of these 125 were returned by respondents by the end of the study (Table 2). Although 125 represents the largest sample group examined in this study this figure was rather disappointing. For instance, during the week ending 7 July 2000, 197 visitors travelled to Bongoyo, and of these only 40 returned completed questionnaires.

Questionnaires had originally been given to all of the hotels and to Slipway Ferry Service, and it was arranged that they would be handed out to visitors on their return to the mainland and collected by Slipway staff. On a visit to check on progress it transpired that the task of distributing questionnaires to visitors had been delegated to watchmen on the islands. It is possible, therefore, that questionnaires were being handed out haphazardly, or that many visitors were simply taking the forms and not returning them. A repeat visit was made to remedy the situation but a satisfactory solution was not found during the course of this study.

Although the sample group was smaller than originally anticipated, a similar number of questionnaires was returned from each of the islands, making it possible to compare trends between the two. As such, the results from the questionnaire survey are presented for each island separately though the overall data are shown and referred to in the text where appropriate.

Table 2. Numbers of questionnaire respondents on Bongoyo and Mbudya Islands

	n	%
<i>Bongoyo</i>	63	51
<i>Mbudya</i>	62	49
Total	125	100

3.5.1. Demography of visitors

The gender of the 125 respondents from both Bongoyo and Mbudya, was split almost evenly, with 49% female and 51% male responding (Table 3). Excluding dependants, visitors to Mbudya appeared to be older—with the largest proportion (47%) falling in the 25–39-year category—than those to Bongoyo, where the majority (41%) were aged between 17 and 24.

Table 3. Gender, age and resident status of respondents visiting Bongoyo and Mbudya islands

	Bongoyo		Mbudya		Overall	
	n	%	n	%	n	%
Gender						
<i>Male</i>	28	44	36	58	64	51
<i>Female</i>	35	56	26	42	61	49
Response rate	63	100	62	100	125	100
Age (years)						
<i>0–16</i>	1	2	2	4	3	3
<i>17–24</i>	24	41	13	22	37	32
<i>25–39</i>	21	36	26	47	47	40
<i>40–54</i>	8	14	13	23	21	18
<i>≥55</i>	6	10	3	4	9	8
Response rate	59	94	57	89	117	91
Residency status						
<i>TZ citizen</i>	18	31	6	10	24	20
<i>Other African</i>	3	7	4	7	7	6
<i>Non-TZ resident</i>	18	31	24	40	42	36
<i>Other</i>	18	31	26	43	44	38
Response rate	57	90	60	97	117	94

Examination of the residency status of visitors on both islands collectively revealed that the greatest proportion (38%) fell into the ‘other’ category. Non-Tanzanian residents made up the next largest proportion (36%). The remaining categories, i.e. Tanzanian and citizens of other African countries, were less well represented. When the data for Bongoyo and Mbudya are compared, it can be seen that there was, however, a marked contrast in the predominant residency status of each. For instance, Tanzanian citizens made up a larger proportion on Bongoyo (31%) than on Mbudya (10%). Conversely, non-Tanzanian residents appeared more likely to visit Mbudya (40%) than Bongoyo (31%).

Table 4. Number and age of dependants visiting islands

	Bongoyo		Mbudya		Overall	
	n	%	n	%	n	%
Number of respondents with dependants						
<i>Yes</i>	8	17	17	31	25	25
<i>No</i>	40	83	37	69	77	75
Response rate	48	76	54	87	102	82
Number of dependants in each age category						
<i>0-3</i>	1	9	1	2	2	3
<i>4-7</i>	5	45	7	10	12	15
<i>8-10</i>	2	18	11	16	13	17
<i>11-13</i>	1	9	24	36	25	32
<i>14-17</i>	2	18	24	36	26	33
Response rate	6	75	10	89	16	64

Overall, only a quarter of respondents (25%) were accompanied by dependants on their visit to the islands (Table 4). Notably, only 11 dependants were taken to Bongoyo throughout the study period in comparison to a total of 67 to Mbudya.

Table 4 also shows that on average the dependants taken to Bongoyo were younger than those taken to Mbudya. Over two-thirds of dependants visiting Bongoyo (73%) were less than 10 years old, whereas on Mbudya the majority (71%) were aged between 11–17.

3.5.2. Visitor distribution and habits

When examining distance travelled to reach the Reserves, it appears that respondents on both islands had tended to travel different distances to make the visit (Table 5). For instance, it is clear that the largest proportion of visitors had made a journey of between 20 and 49 km, whereas respondents from Bongoyo appear to be as likely to have travelled 0 and 1 km as 20–49 km. Notably, none of the visitors contacted during this study had made a journey of

Table 5. Distance travelled and duration of current visit

	Bongoyo		Mbudya		Overall	
	n	%	n	%	n	%
Distance (km) travelled to the Reserves						
<i>0-1</i>	8	16	0	0	8	8
<i>2-4</i>	11	23	9	18	20	20
<i>5-9</i>	10	20	5	10	15	15
<i>10-19</i>	9	18	14	29	23	24
<i>20-49</i>	11	23	21	43	32	33
<i>50-99</i>	0	0	0	0	0	0
<i>≥100</i>	0	0	0	0	0	0
Response rate	49	78	49	79	98	72
Duration of visit (hours)						
<i>1-3</i>	3	8	6	11	9	10
<i>3-5</i>	7	20	14	26	21	23
<i>5-7</i>	13	36	23	43	36	40
<i>7-9</i>	12	33	5	9	17	19
<i>≥9</i>	1	3	6	11	7	8
Response rate	36	57	54	87	90	72

over 49 km. Results indicate that on average visitors stayed on both islands for 5–7 hours.

In order to ascertain trends in visitor frequency over the longer term, visitors were asked how often they had made a trip to the Reserves over the last year. The response to this question revealed, perhaps surprisingly, that the majority had only made one visit (61%). Cumulatively, a total of 82% of respondents had not visited more than 5 times. No trends were obvious between the islands.

The results in Table 6 confirm that the weekend is the most popular time to visit, with Sunday being slightly busier than Saturday. Overall only 12% of the respondents said they usually visited on a weekday.

**Table 6. Visiting patterns over the past year
(July 1999–July 2000)**

	<i>Bongoyo</i>		<i>Mbudya</i>		<i>Overall</i>	
	<i>n</i>	<i>%</i>	<i>n</i>	<i>%</i>	<i>n</i>	<i>%</i>
Number of visits						
<i>1</i>	<i>38</i>	<i>66</i>	<i>33</i>	<i>56</i>	<i>71</i>	<i>61</i>
<i>2–5</i>	<i>13</i>	<i>22</i>	<i>12</i>	<i>20</i>	<i>25</i>	<i>21</i>
<i>5–10</i>	<i>4</i>	<i>7</i>	<i>4</i>	<i>7</i>	<i>8</i>	<i>7</i>
<i>10–20</i>	<i>3</i>	<i>5</i>	<i>3</i>	<i>5</i>	<i>6</i>	<i>5</i>
<i>20+</i>	<i>0</i>	<i>0</i>	<i>7</i>	<i>12</i>	<i>7</i>	<i>6</i>
Response rate	58	92	59	95	117	94
Usual time in the week in which visits have been made						
<i>Saturday</i>	<i>10</i>	<i>30</i>	<i>14</i>	<i>33</i>	<i>24</i>	<i>32</i>
<i>Sunday</i>	<i>10</i>	<i>30</i>	<i>16</i>	<i>38</i>	<i>26</i>	<i>35</i>
<i>Weekday</i>	<i>5</i>	<i>15</i>	<i>4</i>	<i>10</i>	<i>9</i>	<i>12</i>
<i>Don't know</i>	<i>8</i>	<i>25</i>	<i>8</i>	<i>19</i>	<i>16</i>	<i>21</i>
Response rate	33	52	42	68	75	60
Any visits made to any of the other Reserves islands						
<i>Yes</i>	<i>18</i>	<i>33</i>	<i>20</i>	<i>36</i>	<i>38</i>	<i>35</i>
<i>No</i>	<i>36</i>	<i>67</i>	<i>36</i>	<i>64</i>	<i>72</i>	<i>65</i>
Response rate	54	86	56	90	110	88

Overall the majority of visitors responding (65%) had not visited any of the other islands in the Reserves. Of the proportion that had (35%), almost all stated that the other visits made were to Bongoyo and Mbudya, with only 2 out of the entire study group of 125 having visited Fungu Yasini. Two respondents from Mbudya Island stated that they had visited both Pangavini and Fungu Yasini. Both had used their own boats to get there.

3.5.3. Visitor interests

The questionnaire results confirmed that the vast majority of respondents were tourists (91%) (Table 7). When asked to describe three aspects of the islands that attracted them to visit the islands, 51% cited the beach as a primary attraction. The next most important aspect to visitors was the sea itself (36%). Contact with unspoilt nature was also important to a large proportion of visitors to both islands (30%) as was their peace and quiet (19%). It appears from these results that the natural environment stands out as the major attraction of the area to most visitors.

Table 7. Visitors' interest in the islands

	Bongoyo		Mbudya		Overall	
	n	%	n	%	n	%
Purpose of current visit						
<i>Tourism</i>	52	94	55	89	107	91
<i>Business</i>	0	0	1	2	1	1
<i>Research</i>	2	4	1	2	3	3
<i>School trip</i>	0	0	2	3	2	2
<i>Fishing</i>	0	0	1	1	1	1
<i>Work</i>	1	2	2	3	3	2
Response rate	55	87	62	100	117	94
Aspects of the island that prompted the visit						
<i>Beach</i>	18	51	23	51	41	51
<i>Sea</i>	7	20	22	49	29	36
<i>Swimming</i>	5	14	8	18	13	16
<i>Unspoilt nature</i>	9	26	15	33	24	30
<i>Ecological information</i>	1	3	0	0	1	1
<i>Forest reserves</i>	3	9	1	22	4	5
<i>Few tourists</i>	4	11	1	22	5	6
<i>Food</i>	5	14	5	11	10	12
<i>Snorkel</i>	0	0	11	24	11	14
<i>Trails</i>	1	2	1	2	2	3
<i>Beach huts</i>	3	8	0	0	3	4
<i>Inexpensive</i>	1	2	0	0	1	1
<i>Local boat ride</i>	0	0	1	2	1	1
<i>German wells</i>	2	6	0	0	2	3
<i>Caves</i>	2	6	0	0	2	3
<i>Boat ride</i>	2	6	0	0	2	3
<i>Peace/quiet</i>	2	6	13	29	15	19
<i>No beach boys</i>	1	3	1	2	2	3
<i>Close to mainland</i>	2	6	0	0	2	3
<i>Cleanliness</i>	1	3	0	0	1	1
<i>Low development</i>	1	3	0	0	1	1
<i>Word of mouth</i>	1	3	2	4	3	4
<i>Women</i>	1	3	0	0	1	1
<i>Isolation</i>	3	9	3	7	6	8
<i>Good weather</i>	4	11	6	13	10	13
<i>Peer influence</i>	1	3	0	0	1	1
<i>Safety</i>	0	0	2	4	2	3
<i>Excitement</i>	0	0	1	2	1	1
Response rate	35	56	45	73	80	64

Marked differences can, however, be seen in the interests of visitors to both islands. The most obvious is the fact that a far larger proportion of those who visited Mbudya (49%) cited the sea as an attraction than those who went to Bongoyo (20%). Further, over a quarter (29%) of those visiting Mbudya wanted peace and quiet whereas only a small proportion (6%) going to Bongoyo said the same. This may reflect the fact that there was a higher proportion of tourists from the Kunduchi hotels going to Mbudya who actively seek peace and quiet as part of their holiday.

Further differences in the interests of visitors to both islands can be seen in Table 8, which shows the activities that were carried out. Respondents from Mbudya appeared to have been more active than those from Bongoyo. For instance, whereas 93% from Mbudya noted that they swam during their visit,

Table 8. Visitors' activities during their stay at the Reserves

Activities	Bongoyo		Mbudya		Overall	
	n	%	n	%	n	%
<i>Swim</i>	42	78	51	93	93	85
<i>Snorkel</i>	4	7	31	56	35	32
<i>Picnic</i>	30	56	38	69	68	62
<i>Walk</i>	16	30	23	42	39	36
<i>Sunbathe</i>	2	4	2	4	4	4
<i>See wildlife</i>	4	7	8	15	12	11
<i>Water-skiing</i>	0	0	1	2	1	1
<i>Camping</i>	0	0	2	4	2	2
<i>Other</i>	1	2	2	4	3	3
Response rate	54	86	55	89	109	87

only 78% of those from Bongoyo did. A larger proportion (42%) also went for a walk to other parts of Mbudya Island whereas on Bongoyo fewer left the beach area (30%). Perhaps most notably, other water activities such as snorkelling were enjoyed by the majority on Mbudya (57%) and only by a very small proportion (7%) on Bongoyo.

3.5.4. Visitor impressions

From the responses of the visitors it can be seen that most felt that the beach area of both islands was either clean or reasonably clean (Table 9). Only a small

Table 9. Visitor impressions of conditions in different parts of the islands

	Bongoyo		Mbudya		Overall	
	n	%	n	%	n	%
Beach						
<i>Clean</i>	34	68	29	49	63	58
<i>Reasonably clean</i>	14	28	25	42	39	36
<i>Dirty</i>	2	4	5	9	7	6
<i>Very dirty</i>	0	0	0	0	0	0
<i>Don't know</i>	0	0	0	0	0	0
Response rate	50	79	59	95	109	87
Water						
<i>Clean</i>	32	67	34	60	66	63
<i>Reasonably clean</i>	13	27	19	33	32	30
<i>Dirty</i>	3	6	3	5	6	6
<i>Very dirty</i>	0	0	1	2	1	1
<i>Don't know</i>	0	0	0	0	0	0
Response rate	48	76	57	92	105	84
Woodland						
<i>Clean</i>	14	30	11	19	25	24
<i>Reasonably clean</i>	15	32	27	47	42	40
<i>Dirty</i>	4	8	6	11	10	10
<i>Very dirty</i>	0	0	1	2	1	1
<i>Don't know</i>	14	30	12	21	26	25
Response rate	47	75	57	92	104	83

proportion of respondents on Bongoyo (4%) and on Mbudya (8%) classified the beach as dirty. Similarly, the water around the islands was thought by most to be clean or reasonably clean. When asked about their impressions of the woodland area more confirmed that they thought the area was reasonably clean or dirty. Watchmen employed by the ferry operators tend to keep the immediate beach environment clean, though considerable amounts of litter beyond this area were noted on trips made to the islands during this study. It appears therefore that these areas may be overlooked in clean-up efforts.

The overall picture suggests that by far the majority of respondents felt that, since they first visited the Reserves, none of the aspects of the environment they were asked to comment on had changed (Table 10). Of those that had noted a change, more felt that litter had increased than decreased on the beach, in the water and in the woodland. It also appears that, increases in litter were noted by more on Bongoyo than on Mbudya.

The majority of visitors who commented on any increase or decrease in coral health or fish abundance felt that there had been no change to either. This result does seem to contradict the overwhelming amount of evidence of reef

Table 10. Visitors' impressions on changes in various aspects of the environment

	Bongoyo		Mbudya		Overall	
	n	%	n	%	n	%
Beach litter						
<i>Increased</i>	6	26	10	32	16	29
<i>Decreased</i>	1	4	8	26	9	17
<i>No change</i>	12	52	11	35	23	43
<i>Haven't noticed</i>	4	18	2	7	6	11
Response rate	23	37	31	50	54	43
Coral health						
<i>Increased</i>	1	5	2	7	3	7
<i>Decreased</i>	3	16	2	7	5	11
<i>No change</i>	8	42	16	60	24	52
<i>Haven't noticed</i>	7	37	7	26	14	30
Response rate	19	30	27	44	46	37
Fish abundance						
<i>Increased</i>	1	6	1	4	2	4
<i>Decreased</i>	0	0	2	7	2	4
<i>No change</i>	9	47	14	52	23	50
<i>Haven't noticed</i>	9	47	10	37	19	42
Response rate	19	30	27	44	46	37
Water litter						
<i>Increased</i>	4	21	9	32	13	27
<i>Decreased</i>	2	10	4	14	6	13
<i>No change</i>	10	53	12	43	22	47
<i>Haven't noticed</i>	3	16	3	10	6	13
Response rate	19	30	28	45	47	38
Woodland litter						
<i>Increased</i>	2	11	7	25	9	19
<i>Decreased</i>	1	5	4	14	5	11
<i>No change</i>	8	42	7	25	15	32
<i>Haven't noticed</i>	8	42	10	36	18	38
Response rate	19	30	28	45	47	38

degradation in the Reserves, which points to a declining status of environmental health. The reasons for this are uncertain. It is conceivable that visits once a year do not allow the observer to notice anything but the more dramatic changes in environmental conditions. Moreover, the majority of visitors were on their first trip to the Reserves (60%) so the number who were able to comment on long-term changes was small. It is therefore highly likely that this result is an artefact of the small sample size.

Most of the respondents in this study felt that the boat service was adequate. Several visitors even cited the boat as an attraction (Table 11). Visitors travelling to Bongoyo, however, appeared to be more satisfied with the service than those going to Mbudya. Overall, the number of visitors who suggested improvements was few. Of the suggestions made, the most commonly cited was to make services more frequent, though evidently some of those who visited Mbudya would like to see a bigger boat introduced.

Table 11. Visitors' satisfaction with the transport service to the islands

	Bongoyo		Mbudya		Overall	
	n	%	n	%	n	%
Adequate boat service						
<i>Yes</i>	40	91	38	72	78	80
<i>No</i>	4	9	11	21	15	15
<i>Own boat</i>	0	0	4	7	4	5
Response rate	44	70	53	79	97	74
Propose changes or improvements to the boat services						
<i>Make it cheaper</i>	1	12	1	9	2	11
<i>More frequent</i>	2	25	2	17	4	21
<i>More advertising</i>	1	12	0	0	1	5
<i>Faster boat</i>	1	12	1	9	2	11
<i>Time schedule</i>	0	0	2	16	2	11
<i>Bigger boat</i>	1	13	3	25	4	21
<i>Safer boat</i>	0	0	2	15	2	11
<i>Small boat engine</i>	1	13	0	0	1	5
<i>Respect swimmers</i>	0	0	1	9	1	5
<i>None. It's great</i>	1	13	0	0	1	5
Response rate	8	11	12	19	20	15

3.5.5. Visitor awareness

When respondents were asked to state whether or not they were aware of the status of the islands as part of an MPA, 44% stated that they were not (Table 12). When asked if they were aware of any specific regulations protecting the area, a far larger proportion (64%) revealed that they did not. No differences were noted between the visitors to either island.

Of those who were aware of the MPA status of the islands, 50% had found out by reading one of the Reserves information signs at the Slipway, Silver Sands Hotel and on both islands. Visitors had also found out by word of mouth from friends, island attendants, and also from staff at the Silver Sands Hotel and the Slipway. Notably, only three visitors had become aware of the islands' MPA status by reading the information supplied on the back of their tickets.

Table 12. Visitors' awareness of the area's status as part of a Marine Protected Area

	Bongoyo		Mbudya		Overall	
	n	%	n	%	n	%
Aware that the area is an MPA						
<i>Yes</i>	25	57	31	55	56	56
<i>No</i>	19	43	25	45	44	44
Response rate	44	70	56	90	100	80
Aware of any regulations that protect the area						
<i>Yes</i>	15	35	20	36	35	36
<i>No</i>	28	65	35	64	63	64
Response rate	43	68	55	89	98	78
How did you find out that the area is an MPA						
<i>Guide book</i>	1	7	0	0	1	3
<i>Signs</i>	7	46	10	54	17	49
<i>Friends</i>	1	7	2	10	3	9
<i>Ticket message</i>	3	19	0	0	3	9
<i>Island attendant</i>	1	7	2	10	3	9
<i>Newspaper</i>	1	7	2	10	3	9
<i>Silver Sands staff</i>	0	0	3	16	3	9
<i>Slipway staff</i>	1	7	0	0	1	2
Response rate	15	24	19	31	34	27

The overall picture painted here is one of an alarming lack of awareness, particularly of the regulations or 'code of conduct' for visitors entering the Reserves. This confirms the need for a comprehensive programme to raise the profile of the status of the Reserves and improve awareness of environmental issues. Until this is in place, the lack of information can only encourage visitors to make uninformed decisions about their activities within the Reserves.

A similar lack of awareness is suggested by the fact that, although there has been a Reserves entry fee in place since January 2000, only a small proportion, (11%) was actually aware that they had paid it (Table 13). The fact that a larger proportion of respondents from Bongoyo was aware of the fee suggests that, either advertising has been more effective at the Slipway, or the hotels that take visitors to Mbudya have not been charging the fee. Suggestions have, in fact, been made that although MPRU tickets have been issued to the two hotel agents, the system is not yet fully established. Further, no confirmation was

Table 13. Visitors' awareness of the Reserves entry fee added to the cost of their tickets (open question)

	Bongoyo		Mbudya		Overall	
	n	%	n	%	n	%
What does the cost of your ticket cover?						
<i>Boat transport</i>	45	87	46	88	91	88
<i>Access to Reserves</i>	9	17	2	4	11	11
<i>Food</i>	9	17	14	27	23	22
<i>Harbour tax</i>	2	4	0	0	2	2
<i>Equipment hire</i>	0	0	3	6	3	3
<i>Room</i>	0	0	1	2	1	1
<i>Shade</i>	1	2	0	0	1	1
<i>Don't know</i>	7	13	5	10	12	12
Response rate	52	83	52	84	104	83

obtained of payments made to the MPRU from hotel ticket sales. This system clearly needs to be addressed in order to begin the process of revenue collection.

3.5.6. Visitor attitudes

As indicated in Table 14, the majority (73%) of visitors who were contacted in this study stated that they believe that a management plan is necessary for the Reserves. Only a small proportion did not know (16%) and even fewer thought a management plan unnecessary (11%). When questioned on the principle of

Table 14. Visitors' attitudes to management and conservation issues

	Bongoyo		Mbudya		Overall	
	n	%	n	%	n	%
Is a management plan necessary for the Reserves?						
<i>Yes</i>	34	76	39	71	73	73
<i>No</i>	5	11	6	11	11	11
<i>Don't know</i>	6	13	10	18	16	16
Response rate	45	71	55	89	100	80
Agree with the principle of paying an entry fee for use and upkeep of the MPA						
<i>Yes</i>	36	90	41	76	77	82
<i>No</i>	4	10	13	24	17	18
Response rate	40	63	54	87	94	75

contributing towards the management of the Reserves, the overwhelming majority (82%) of respondents agreed. Slightly more visitors on Mbudya (24%) than Bongoyo (10%) stated that they disagreed with Reserves entry fees. These results are very encouraging and suggest that the vast majority were in favour of developing appropriate management strategies. Furthermore, it is also apparent that a comprehensive entry fee structure to raise revenue for the upkeep of the Reserves would be met with public approval.

The results gained from asking respondents to indicate how much they believe tourists, nationals and residents should contribute towards use and upkeep of the Reserves on each visit are displayed in Figure 3. It can be seen that suggestions were wide-ranging and that there appears to be some differences in opinion between visitors to the two islands.

On Mbudya the fee that the greatest proportion (30%) of respondents thought was fair to charge tourists was Tsh 1000, although a further 26% suggested Tsh 2000. In contrast, on Bongoyo the fee that the largest proportion (31%) suggested was Tsh 8000. In this instance, however, the picture is not as clear and relatively larger numbers of people suggested a lower fee. For instance, 22% suggested Tsh 5000, with the vast majority of the remainder opting for Tsh 2000 or less. The overall average was Tsh 1000.

Differences in the opinions of respondents from both islands were also seen when they were asked to suggest what Tanzanian nationals should pay. On Bongoyo, for instance, the largest proportion of respondents (45%) thought it right for nationals to pay Tsh 500. There was, however, a considerable

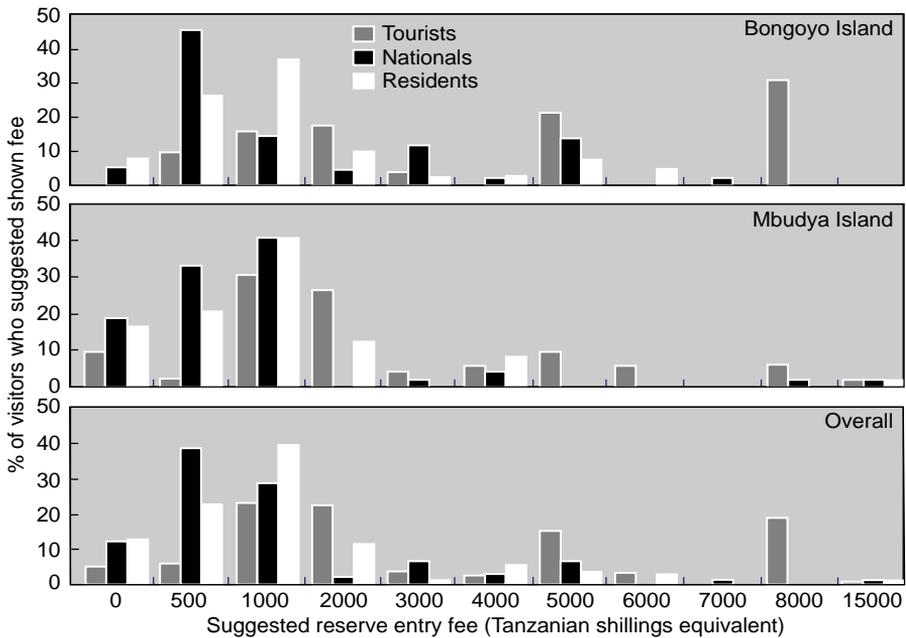


Figure 3. Visitors opinions on amount that tourists, nationals, and residents should contribute towards use and upkeep of the Reserves (note interrupted scale between Tsh 8000 and Tsh 15,000. Legend indicates suggested fees for tourists, nationals and residents. n = 104).

proportion that suggested a higher rate, e.g. Tsh 3000 (12%) and Tsh 5000 (14%). In contrast, almost all respondents from Mbudya (94%) suggested that nationals should pay Tsh 1000 or less. The overall average was Tsh 500.

Opinions on what residents should pay were in close agreement in visitors from both islands. The fee that the greatest proportion suggested overall was Tsh 1000.

In summary, the majority of respondents in this study stated that they believe nationals should pay Tsh 500 per visit, residents Tsh 1000 and tourists Tsh 1000. Consensus was only debatable in the case of the tourists, where almost as many suggested Tsh 2000 and Tsh 8000. One thing that is obvious from the results, however, is that the majority were in favour of a tiered system of payment, based on residency status.

The results of questions aimed at establishing visitors' attitudes towards the development of certain amenities and services in the Reserves are displayed in Figure 4. The graphs clearly show that the greatest proportion of respondents from both islands agree with the development of marked walking trails on the islands and marked snorkelling points on accessible reefs.

The provision of ecological and historical information is a service that the overall majority (70%) were also in favour of. Together, these results strongly suggest that the development of information centres on both islands would be an ideal way of encouraging awareness of the environment and conservation issues. On the other hand, the largest proportion of respondents overall stated that they did not mind whether or not guides were provided (33%). Although from the graph it can be seen that slightly more respondents from Mbudya were in favour of guides, this result perhaps indicates that, given provision of

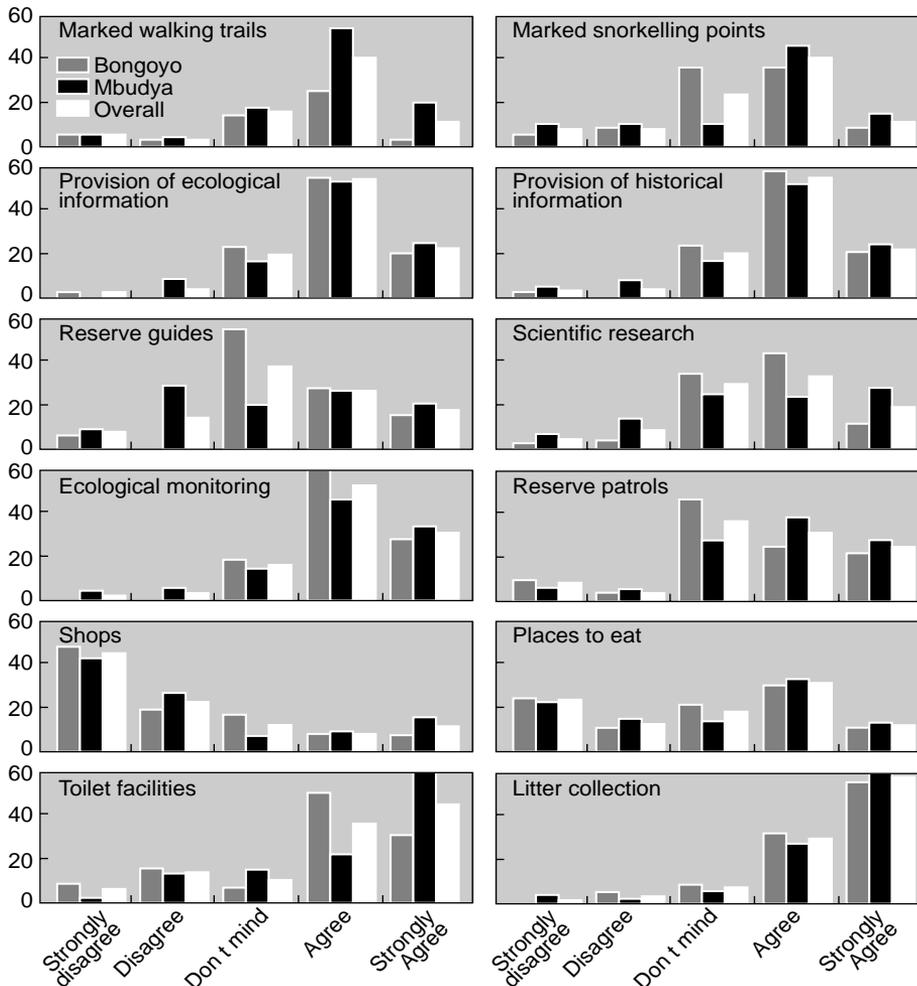


Figure 4. Visitors' feelings about the development of certain amenities and services in the Reserves (the x axis shows the response whilst the y axis shows the % of respondents, mean n = 87)

information on the ecology and environment in the Reserves, many would prefer to explore the area themselves.

The largest proportion of respondents (33%) also supported scientific research although a similar proportion (30%) indicated that they would not mind either way. Respondents stated that they would approve of ecological monitoring in the Reserves. No one on Bongoyo and only a small proportion (10%) on Mbudya were in disagreement with this. Although a large proportion stated that they did not mind either way, Reserve patrols were also felt by the majority of respondents to be a good idea (55%).

It can clearly be seen from Figure 4 that overall, the provision of toilet facilities is strongly supported by the vast majority of respondents (75%). The hotels installed permanent toilets on Mbudya, although they are in a state of disrepair. With almost 12,000 potential visitors a year staying for an average of 5–7 hours at a time, this is clearly an issue that needs addressing.

In contrast, the development of shops on the islands was something that the majority (68%) of respondents on both islands felt very strongly against. The

development of eating establishments on the islands can be seen to have divided opinion and for which trends are difficult to detect. Although a considerable proportion of respondents overall expressed their disagreement (37%), more people overall (45%) were in favour of such provision. These results indicate that most visitors are attracted to the naturalness of the area and do not want to see the over-development of the islands. It is perhaps not surprising then that the collection of litter to improve the island environment was a provision that received almost unanimous support from all visitors.

Overall it can be seen in Table 15 that the largest proportion of respondents would not be opposed to having access to certain areas of the Reserves restricted. None from Bongoyo were opposed to this suggestion, whereas a considerable proportion (14%) from Mbudya were. Nearly a third (30%) of visitors said they would need more information before forming an opinion.

Table 15. Visitors' views on having their access to certain areas of the Reserves restricted

	Bongoyo		Mbudya		Overall	
	n	%	n	%	n	%
<i>Opposed</i>	0	0	7	15	7	8
<i>Not opposed</i>	23	56	19	40	42	47
<i>Don't know</i>	7	17	6	13	13	15
<i>Need more info</i>	11	27	16	33	27	30
Response rate	41	65	48	77	89	71

The greatest proportion of respondents overall (46%) recorded 'don't know' when asked if they knew of any activities that should be restricted in the Reserves (Table 16). This is a notable point, which highlights a lack of awareness of the practices that are in conflict with the conservation and sustainable use of Reserves. As has been demonstrated by the results in Table 16, however, many visitors were anxious to find out more about the issue of restriction. This supports previous findings in this study, and suggests that education and awareness-raising would be met positively.

Table 16. Visitors' responses on whether they knew of any activities that should be restricted in the Reserves

	Bongoyo		Mbudya		Overall	
	n	%	n	%	n	%
Other activities restricted						
<i>Yes</i>	9	23	19	38	28	31
<i>No</i>	8	21	12	24	20	23
<i>Don't know</i>	22	56	19	38	41	46
Response rate	39	62	50	81	89	71

Few respondents specified activities that they believed should be restricted. Of those that were suggested, the most frequent was a restriction on jet-ski use and access for ferries to Zanzibar and Pemba. Dynamite fishing and land clearance were also cited by many as activities that need to be controlled. When asked why, most explained that it was because the practices were either

destructive to the environment or they created noise pollution. As has already been confirmed, peace and quiet is one of the primary reasons why many visit the islands, particularly for those who go to Mbudya (see Table 7). This highlights an existing conflict that could become more serious should activities such as the use of jet-skis become more widespread.

The unprompted responses given in Table 17 provide important insights into the attitudes of visitors towards the development of a management plan for the Reserves. For instance, the largest overall proportion of visitors (44%) stated that the primary reason for management would be to preserve the islands as they are now. This is an important result that puts many of the previous findings of the visitor survey into context.

Table 17. Reasons given by visitors' as to why they thought a management plan was necessary (open question)

	<i>Bongoyo</i>		<i>Mbudya</i>		<i>Overall</i>	
	<i>n</i>	<i>%</i>	<i>n</i>	<i>%</i>	<i>n</i>	<i>%</i>
Reasons for management plan						
<i>Ensure area thrives</i>	1	4	0	0	1	2
<i>Encourage schools</i>	3	11	4	14	7	13
<i>Preserve the island as it is</i>	8	30	11	38	19	34
<i>Maintain good standards</i>	2	7	1	3	3	5
<i>Kids disrupt quiet</i>	3	11	0	0	3	5
<i>Cleaning and maintenance</i>	2	7	3	10	5	9
<i>Lack of management now</i>	3	11	4	14	7	13
<i>Management not needed</i>	2	7	1	3	3	5
<i>Upkeep and improvement</i>	3	11	0	0	3	5
<i>Promote conservation</i>	0	0	2	8	2	3
<i>Good fishing monitoring</i>	0	0	1	3	1	2
<i>Keep money accountable</i>	0	0	2	7	2	3
Response rate	27	62	29	35	56	59

The overall picture suggested is that those who enjoy the islands want to see a management plan put in place. They would like to see the resource used for, among others, education, whilst maintaining it in as natural a state as possible.

3.6. DIVING IN THE RESERVES

3.6.1. Availability of information

The assessment of diving activity in the Reserves involved both questionnaires distributed to the divers themselves as well as the collection of information from the dive centres in the vicinity of the Reserves. As outlined in the Methods, enquires were made with the four hotels that were found to offer diving in the area, as well as the DYC. However, by the end of the two-week study period much of the information on aspects such as dive sites and diver numbers had not yet been provided. Only the Sea Breeze Hotel was able to provide the requested information within the time period offered.

Follow-up work is needed to fill in this important gap in the information required before a management plan can be formulated. All the hotels and DYC have verbally agreed to provide GPS coordinates of their dive sites down to 10s

of minutes, as well as numbers of divers over the last year. Compilation of this information would provide a detailed and accurate picture of dive activity throughout the Reserves.

Interviews held with all dive centre staff did, however, provide a wealth of background information and an insight into the views held by this group of stakeholders. The questionnaire survey aimed at the divers themselves was also largely successful and forms the bulk of the results presented here. A summary of the results of observations and interviews follows.

3.6.2. Dive centres and services

At present, the four hotels that offer diving in the Reserves are the Sea Breeze, White Sands, Silver Sands and Bahari Beach. All are situated on the mainland just south of Kunduchi village. All of them offer trips for qualified divers, as well as running pool and open water-based training. Diving in the Reserves takes place from rigid inflatable boats (RIBs) that are used to follow divers as they drift over a dive site. Weather permitting, the entire Reserves area and beyond to the reefs outside of the Reserves, known collectively as ‘Big T’ (Mbudya shores) is within range and dived regularly.

Another dive centre is due to open sometime in the near future and will be situated at the Kunduchi Beach Hotel. The owner stated that a full range of diving activities would be on offer there. The scale of the hotel (reportedly the largest in coastal Tanzania) may suggest that a larger number of divers will be using the facilities here than any of the existing hotels.

The Dar es Salaam Yacht Club (DYC), the other main dive facility in the vicinity of the Reserves, is located on the eastern edge of Msasani Peninsula. It is a members-only club, whose members dive on weekends. The club tended to use hard boats when diving, which suggests that they dive regularly throughout the Reserves.

3.6.3. Dynamite fishing and divers

Divers have interests that conflict strongly with the use of dynamite for fishing in the Reserves, and many of them feel very strongly about the practice. Interviews with several long term divers in the area produced a wealth of viewpoints. One of the most pressing concerns appears to be the continued removal of dynamite from quarries and road projects. For example, one interviewee reported the recent removal of 1 tonne from the Geita quarry near Dar es Salaam. Other divers reported finding unexploded sticks of dynamite lying on coral reefs around Fungu Yasini. It was even suggested that a team of navy divers was needed to clean up the dynamite before someone got injured or killed whilst diving or fishing in the area. All of the hotel owners and managers have voiced great concern over this potential threat. The success of the navy involvement in stamping out dynamite fishing is widely accepted, though many were not convinced of the methods employed. As suggested by the results of the questionnaire surveys in Section 3.7, most would prefer to see government intervention using patrol boats and the implementation of regulations. All agree, however, that they want to see action urgently, because, as one hotel

manager put it, they were “just waiting for one of their divers to be killed.” Clearly, such an eventuality would spell disaster on dive tourism in the area.

3.7. DIVER QUESTIONNAIRE RESULTS

Over the course of the diver survey approximately 150 questionnaires for divers were produced in English and distributed to the four hotels and to the DYC. At the end of the study a total of 34 questionnaires had been completed by and collected for subsequent analysis. Twenty-four of these were from hotels and 10 from the DYC (Table 18). This response rate was disappointing, in view of the fact that at least 80 dives were made from the hotels and 30 from the DYC during the study period. The reasons for the lack of response may be a combination of the fact that the study took place during the low-season in terms of diving activities, delegation of responsibility for distributing and collecting questionnaires, as well as the overall low profile of the MPA and management plans.

Because of the small sample size of the data collected, no comparisons are made between the results from the hotels and the DYC. With the exception of the information on demography of divers, pooled results are instead presented, in order to increase the reliability of any trends detected.

3.7.1 Demography of divers

As detailed in Table 19, diving appeared overall to be a male-dominated activity

Table 18. Numbers of respondents at the Dar es Salaam Yacht Club and Hotels of the Kunduchi coast

	<i>n</i>	<i>%</i>
<i>DSM Yacht Club</i>	10	29
<i>Sea Breeze Hotel</i>	18	52
<i>Silver Sands Hotel</i>	6	19
<i>Bahari Beach Hotel</i>	0	0
<i>White Sands Hotel</i>	0	0
Total	34	100

Table 19. Gender, age and residency status of divers in DMRS

	<i>Dar es Salaam Yacht Club</i>		<i>Hotels</i>		<i>Overall</i>	
	<i>n</i>	<i>%</i>	<i>n</i>	<i>%</i>	<i>n</i>	<i>%</i>
Gender						
<i>Male</i>	9	90	18	75	27	79
<i>Female</i>	1	10	6	25	7	21
Response rate	10	100	24	100	34	100
Age (years)						
<i>0–16</i>	1	10	1	4	2	6
<i>17–24</i>	0	0	4	17	4	12
<i>25–39</i>	4	40	15	65	19	58
<i>40–54</i>	4	40	3	14	7	21
<i>≥55</i>	1	10	0	0	1	3
Response rate	10	100	23	96	33	9
Residency status						
<i>Tanzanian citizen</i>	0	0	2	8	2	5
<i>Other African citizen</i>	0	0	5	21	5	15
<i>Tanzania resident</i>	10	100	11	45	21	62
<i>Other</i>	0	0	6	25	6	18
Response rate	10	100	24	100	34	100

(79% of the divers were male). This is particularly pronounced at the DYC where males made up 90% of the respondents. The majority of divers who responded in this survey were aged between 25 and 39. Almost two-thirds (62%) of the divers contacted in this study were Tanzanian residents. The 'other' group and other-African citizens accounted for only 32% and a small proportion of Tanzanian citizens made up the remainder (6%). When examined separately, the results show all of the DYC divers to be Tanzanian residents, whilst only 46% from the hotels were. The remainder of divers here were South African, other African, and Tanzanian citizens in descending order.

3.7.2. Diver distribution and habits

From Table 20 it can be seen that the largest proportion of divers from the hotels (42%) had carried out 30 or more dives in the Reserves over the past year, whereas at the DYC the largest proportion (44%) had carried out 11–20 dives. This suggests that a significant proportion of divers who dive with the hotels do so regularly as opposed to being one-time divers. Indeed, the hotels offer dive facilities to non-hotel residents.

Table 20. Total number of dives carried out in the Reserves by divers from the Dar es Salaam Yacht Club DYC and Hotels between July 1999 and July 2000

	DYC		Hotels		Overall	
	n	%	n	%	n	%
Number of dives						
None	0	0	2	8	2	6
1–5	2	22	7	29	9	27
6–10	1	12	2	8	3	9
11–20	4	44	3	13	7	22
21–30	0	0	0	0	0	0
≥ 30	2	22	10	42	12	36
Response rate	9	90	24	100	33	97

Information on the preference for dive location in the Reserves is presented in Figure 5. The general trend was that the DYC members tend to dive more

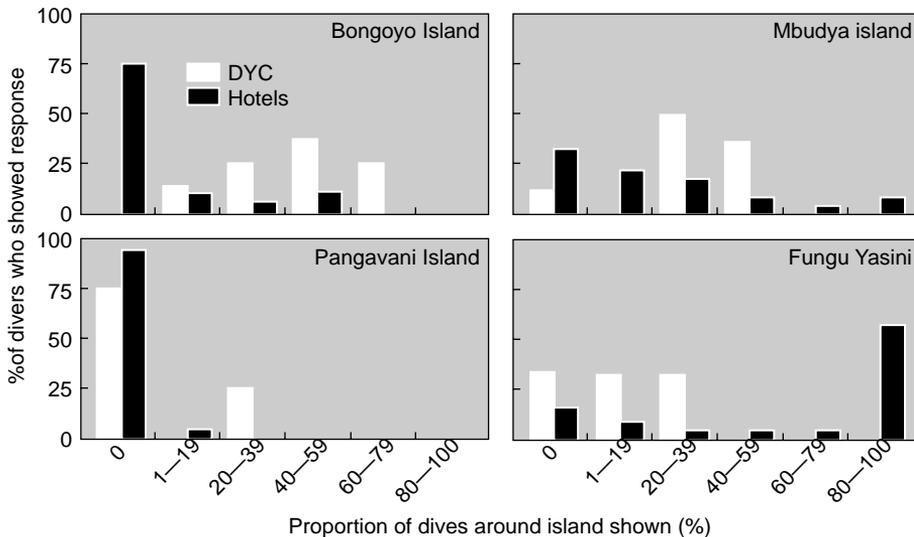


Figure 5. Proportion of dives carried out by respondents around Bongoyo, Mbudya, Pangavani and Fungu Yasini islands (x axis indicates the estimated proportion of dives made around each island by respondents, y axis indicates proportion of total number in survey. Mean n = 26.5)

frequently around Bongoyo, though divers from the hotels do visit the island. The dive sites in the Reserves used by the Hotels appear to mostly be around Fungu Yasini. Mbudya on the other hand receives perhaps equal numbers of visits from both, and the Pangavini area is rarely dived by either. The pattern indicated by these data is perhaps not surprising given that the DYC is closest to Bongoyo Island, and the hotels are located where they are able to easily access all four islands.

3.7.3. Diver interests

In order to identify what interests and values divers place on the Reserves they were asked to describe three aspects that attracted them to dive there. The question was open-ended.

From Table 21 it can be seen that the corals (53%) attract the majority of divers who visit the Reserves. The fish that are found there were cited as an attraction by 50%, whilst the next most commonly given aspect was the proximity of the Reserves (33%).

3.7.4 Diver impressions

Questions were put to the divers in order to reveal the impressions that they have of the current condition of the marine environment in the Reserves and to any long-term changes (Tables 22, 23). In response, the majority stated that fish abundance, fish diversity, coral health and the abundance of marine mammals had all become degraded (73, 58, 68 and 58% respectively). Fewer indicated that water cleanliness had shown a similar decline (32%), and, encouragingly, over half had noticed no change (53%).

Table 21. Aspects of the Reserves that attracted divers to the area

	n	%
<i>Corals</i>	16	53
<i>Fish</i>	15	50
<i>Sharks</i>	1	3
<i>Peace and quiet</i>	1	3
<i>Proximity</i>	10	33
<i>Visibility</i>	9	30
<i>Drop offs</i>	1	3
<i>Remaining good reefs</i>	1	3
<i>Diversity of corals</i>	1	3
<i>Diversity of fish</i>	3	10
<i>Water temperature</i>	5	17
<i>Soft coral diversity</i>	2	7
<i>Gamefish</i>	1	3
<i>Marine life</i>	4	3
<i>Fungu Yasini</i>	1	3
<i>Big T^r reef</i>	1	3
<i>Variety of dive sites</i>	2	7
<i>Crayfish</i>	1	3
<i>Good dive outlets</i>	2	7
<i>No currents</i>	1	3
<i>Not polluted</i>	1	3
Response rate	30	88

Table 22. Divers' impressions of the Reserves environment (N.B. Only respondents who had been diving for longer than a year. Only overall results shown)

Condition	Fish abundance		Fish diversity		Coral health		Marine animal abundance		Water cleanliness	
	n	%	n	%	n	%	n	%	n	%
<i>Improved</i>	2	11	0	0	0	0	0	0	0	0
<i>Degraded</i>	14	73	11	58	13	68	11	58	6	32
<i>No change</i>	2	11	6	32	4	21	3	16	10	53
<i>Don't know</i>	1	5	2	10	2	11	5	26	3	15
Response rate	19	84	19	84	19	84	19	84	19	84

Table 23. Divers' impressions on changes in several aspects of the environment. (N.B. Only respondents who had been diving for longer than a year; only overall results shown)

	Coral bleaching		Broken coral		Crown-of-thorns starfish	
	n	%	n	%	n	%
<i>Increased</i>	12	66	12	66	1	6
<i>Decreased</i>	0	0	0	0	2	11
<i>Not changed</i>	3	17	3	17	10	55
<i>Don't know</i>	3	17	3	17	5	28
Response rate	18	82	18	82	18	82
	Water litter		Dynamite fishing		Abandoned fishing gear	
	n	%	n	%	n	%
<i>Increased</i>	6	33	9	50	5	28
<i>Decreased</i>	1	6	3	17	0	0
<i>Not changed</i>	9	50	4	22	9	50
<i>Don't know</i>	2	11	2	11	4	22
Response rate	18	82	18	82	18	82

When asked whether incidences of environmental problems had shown any change, equal majorities (67%) stated that there had been an increase in both bleached and broken coral. Half of respondents (50%) also said that dynamite fishing was more common now than before. The majority (56%) thought crown-of-thorns starfish numbers had not changed. Half of respondents also stated that, in their view, water litter and the amount of abandoned fishing gear had not got any worse.

The overall impression that divers appear to have of the negative aspects of DMRS contrasts sharply with the fact that the majority of divers previously listed many of these exact aspects as attractions to the area. A conflict is immediately evident then, in that divers want to see a healthy environment yet the impression that the majority have of the DMRS is one of widespread degradation. To maintain the dive tourism industry in the area, improvements will need to be made.

Table 24 shows that the vast majority of divers (84%) thought boat traffic levels in the Reserves were acceptable. Four respondents did, however, add extra comments to this question, all stating that they felt the current passage of high-speed ferries to Zanzibar and Pemba was unacceptable.

Table 24. Responses of divers when asked if they thought boat traffic levels were acceptable in the Reserves

	n	%
<i>Yes</i>	27	84
<i>No</i>	5	16
Response rate	32	94

3.7.5. Diver awareness

It was found that most of the divers (61%) approached in this study were aware that the area has MPA status (Table 25). However, in a similar way to the visitors discussed in the last section, when asked if they were aware of any specific

Table 25. Divers' awareness of the DMRS area's status as a marine protected area

	n	%
Aware that the area is an MPA		
<i>Yes</i>	20	61
<i>No</i>	13	39
Response rate	33	97
Aware of any regulations that protect the area		
<i>Yes</i>	8	24
<i>No</i>	25	76
Response rate	33	97
How did you find out that the area is an MPA		
<i>Signposts</i>	6	30
<i>Word of mouth</i>	4	20
<i>Media</i>	6	30
<i>From dive instructor</i>	4	20
Response rate	20	61

regulations in place to protect the area over three-quarters stated that they were not (76%). Of those who were aware of the status of the Reserves, the largest proportion stated that they had found out from the information signs in the area or via the media (both 30%). Many also indicated that they had heard through word of mouth or were informed by their dive instructor (both 20%).

The results shown in Table 26 revealed that, of the study group, 59% had heard dynamite blasts whilst diving. More worrying still is the fact that, of these respondents, the largest proportion (42%) confirmed that they had heard blasts within the past week. Many even indicated on the questionnaire that they had heard these blasts during their last dive. These results not only confirm continued and perhaps a resurgence in the use of dynamite in the area but also draw attention to a major conflict of interest in the Reserves between fishermen and divers.

Table 26. Divers' awareness of dynamite fishing (only overall results shown)

	n	%
Have you heard dynamite blasts whilst diving?		
<i>Yes</i>	19	59
<i>No</i>	13	41
Response rate	32	94
When?		
<i>Within last week</i>	8	42
<i>1 – 4 weeks ago</i>	6	32
<i>1 – 6 months ago</i>	2	11
<i>6 – 12 months ago</i>	3	16
<i>1 – 2 years ago</i>	0	0
<i>2 – 5 years ago</i>	0	0
<i>> 5 years ago</i>	0	0
Response rate	19	58

3.7.6. Diver attitudes

The continued use of dynamite by fishermen along the coast prompted a series of questions aimed at revealing awareness of the problem amongst divers. A series of unprompted questions were asked to try and ascertain the attitudes of divers towards social and environmental issues in the Reserves. The results are shown in Table 27. For instance, when asked what they felt were the most pressing concerns in the Reserves, the majority indicated dynamite fishing (69%). Other commonly cited concerns were over-fishing (31%), anchor damage (14%),

broken coral (10%) and the sale of curios on the islands (10%).

When asked to suggest solutions to dynamite fishing the majority answer (63%) was the use of patrol boats in the Reserves (Table 28). A further 31% suggested law enforcement, whilst 19% proposed the provision of an emergency call line.

Those given in response to the next question largely explain the results given to the last question. As can be seen in Table 29, when asked if they felt that policing was effective in the Reserves now, none of the respondents said yes. Nearly

Table 27. Divers' opinions on what they felt to be the most pressing environmental concerns in the Reserves at present (N.B. Respondents who had been diving for longer than a year only)

	n	%
<i>Dynamite fishing</i>	20	69
<i>Zanzibar ferry</i>	2	7
<i>El Niño</i>	1	3
<i>Beach seine</i>	2	7
<i>Run off (due to erosion)</i>	1	3
<i>Anchor damage to coral</i>	4	14
<i>Spear fishing</i>	1	3
<i>Rubbish in river discharge</i>	1	3
<i>Broken coral</i>	3	10
<i>Dead coral</i>	1	3
<i>Selling curios on the islands</i>	3	10
<i>Catching juvenile fish</i>	2	7
<i>Overfishing</i>	9	31
Response rate	29	85

Table 28. Divers' suggestions for solutions to dynamite fishing

	n	%
<i>Patrol boats</i>	10	63
<i>Law enforcement</i>	5	31
<i>Penalties</i>	2	13
<i>Continued navy presence</i>	1	6
<i>Policing of dynamite distribution</i>	1	6
<i>Control of dynamite at quarries</i>	1	6
<i>Inspection of catch for dynamite evidence</i>	1	6
<i>Emergency call line</i>	3	19
<i>Arrest fishers caught with dynamite or dynamited fish</i>	1	6
Response rate	16	48

Table 29. Divers' thoughts on whether policing was effective

	n	%
<i>Yes</i>	0	0
<i>No</i>	14	74
<i>Don't know</i>	5	26
Response rate	19	100

three quarters (74%) said they thought it was not effective, whilst the remainder were not sure.

As indicated in Table 30, the majority (91%) of divers who were contacted in this study stated that they believe that a management plan is necessary for the

Table 30. Divers' attitudes to management and conservation issues

	n	%
Is a management plan necessary for the Reserves		
<i>Yes</i>	29	91
<i>No</i>	3	9
<i>Don't know</i>	0	0
Response rate	32	94
Agree with the principle of paying an entry fee for use and upkeep of the Reserves		
<i>Yes</i>	20	63
<i>No</i>	8	25
<i>Don't know</i>	4	12
Response rate	32	94

Reserves. There was no indecision from the respondents on this question, the other 9% having indicated that they felt it unnecessary. When asked if they agreed with the principle of paying an entrance fee to contribute towards the cost of management the majority (63%) indicated yes. Only 12% stated that they were not sure. The results from this survey are in agreement with those collected from the visitors and together they form an encouraging picture.

Questionnaire results indicate that all of the respondents who agree with a fee believe in a tiered fee structure (Figure 6). From the graph, and in order of increasing cost, it can be seen that majority of respondents thought nationals should contribute Tsh 500, residents at Tsh 1000 and tourists Tsh 2000. Here, over 20% suggested no payment through to over 10% who recommended Tsh 5000.

The pattern here again agrees almost completely with the results of the visitor surveys. The similarity is also reflected in the widely variable tourist rate suggested.

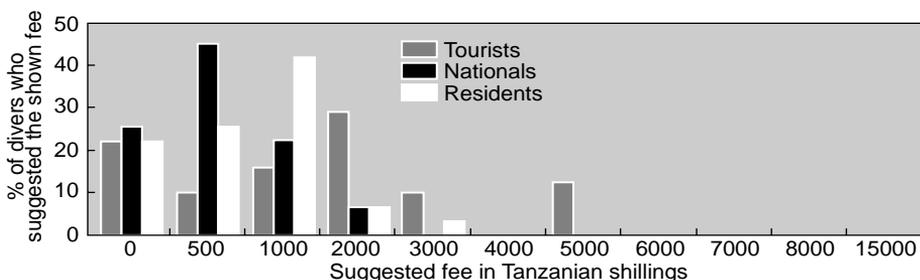


Figure 6. Responses given by divers when asked how much they thought nationals, visitors, and residents should contribute towards use and upkeep of the Reserves (note interrupted scale between Tsh 8000 and Tsh 15,000. n = 31).

The results from questions aimed at establishing visitor’s attitudes towards the development of certain amenities and services in the Reserves are shown in Table 31. Results revealed that when asked what they felt about the development of marked walking trails, the majority agreed (57%). Less showed that they were in favour of marked snorkelling points (49%).

In keeping with trends shown by the visitor surveys, the vast majority were also in favour of the provision of ecological and historical information (91% and 85% respectively). Reserves guides in this case, however, appeared to be a provision that was more favoured by divers with 52% in total being in agreement. A considerable proportion of people did, however, indicate that they were indifferent (39%).

The majority of respondents in this survey disagreed with the development of shops on the islands (68%). Provision of places to eat revealed divided opinions with 39% in total against and 36% in favour. The development of toilet facilities was, in contrast, a provision that produced agreement in the majority of respondents (67%). The collection of litter was not rejected by anyone in the sample group with a total of 93% indicating agreement.

As demonstrated in the visitor questionnaire results, it also appears that the divers view the Reserves as an area to be preserved in its present state.

The divers were then asked whether they supported the idea of restricted

Table 31. Divers' feelings towards the development of amenities and services in the Reserves

	Marked snorkel points		Marked walking trails		Providing ecological information	
	n	%	n	%	n	%
<i>Strongly disagree</i>	3	9	3	9	0	0
<i>Disagree</i>	7	21	6	18	0	0
<i>Don't mind</i>	7	21	5	15	3	9
<i>Agree</i>	10	30	15	45	13	39
<i>Strongly agree</i>	6	18	4	12	17	52
Response rate	33	97	33	97	33	97
	Providing historical information		Guides		Toilet facilities	
	n	%	n	%	n	%
<i>Strongly disagree</i>	0	0	1	3	3	9
<i>Disagree</i>	0	0	2	6	2	6
<i>Don't mind</i>	5	15	13	39	6	18
<i>Agree</i>	15	45	10	31	13	39
<i>Strongly agree</i>	13	40	7	21	9	28
Response rate	33	97	33	97	33	97
	Small shops		Places to eat		Litter collection	
	n	%	n	%	n	%
<i>Strongly disagree</i>	11	34	6	18	0	0
<i>Disagree</i>	11	34	7	21	0	0
<i>Don't mind</i>	5	16	8	24	2	7
<i>Agree</i>	2	7	9	27	11	34
<i>Strongly agree</i>	3	9	3	9	19	59
Response rate	32	94	33	97	32	94

diver access to some parts of the Reserves for conservation purposes (Table 32). In a similar way to previous questions about other management strategies the result was very encouraging with 53% in agreement and only 13% opposed.

Divers were then asked questions relating to management practices within a marine protected area in order to reveal further insights into their attitudes towards key issues (Table 33). On the subject of exclusion zones, 65% of respondents were against using them to keep divers out of an area. The subject of fishing exclusion zones produced a different response entirely, with 94% agreeing with their use. The overwhelming majority was also in favour of park patrols (94%) and carrying out scientific research (87%) within the Reserves.

Table 32. How divers would feel about having their access to certain areas of the Reserves restricted

	n	%
<i>Opposed</i>	4	13
<i>Not opposed</i>	16	53
<i>Don't know</i>	8	27
<i>Need more info</i>	2	7
Response rate	30	88

The largest proportion of respondents agreed with meetings between stakeholders as well as the implementation of private boat registration and fees (47 and 36% respectively). In these instances, however, many also stated that they needed further information on these subjects before being able to decide (30 and 29% respectively). On the other hand, commercial boat registration

Table 33. Divers' agreement/disagreement with the development of the following as part of a management plan for the Reserves

	Diving exclusion zones		Fishing exclusion zones		Park patrols	
	n	%	n	%	n	%
<i>Yes</i>	10	32	29	94	29	94
<i>No</i>	20	65	1	3	1	3
<i>Don't know</i>	0	0	1	3	1	3
<i>Need more info</i>	1	3	0	0	0	0
Response rate	31	91	31	91	31	91
	Scientific research		Stakeholder meetings		Private boat registration/fee	
	n	%	n	%	n	%
<i>Yes</i>	27	88	14	47	11	35
<i>No</i>	2	6	2	7	8	26
<i>Don't know</i>	1	3	5	17	3	10
<i>Need more info</i>	1	3	9	30	9	29
Response rate	31	91	30	88	31	91
	Commercial boat registration/fee					
	n	%				
<i>Yes</i>	17	55				
<i>No</i>	2	6				
<i>Don't know</i>	4	13				
<i>Need more info</i>	8	26				
Response rate	31	91				

and fee as a policy was thought to be more acceptable by the majority of respondents (55%) and only 26% requested more information.

3.8. THE RESERVES FISHERY

3.8.1. Availability of fisheries statistics

Fisheries reports were sought to provide information on the number of fishermen, numbers and types of boats, and number of fishing gears for all of the (NDF) fish landing sites in the vicinity of the Reserves. The National Department of Fisheries was contacted initially. Statistics from this source for individual villages, however, go only until 1998, as a result of the delay in data being transferred from district to higher offices. Indeed, national catch statistics are only available up until 1995 from the NDF office.

The two district fisheries offices serving the study area were then contacted, Kinondoni for the landing sites on the Kunduchi coast and Ilala for Banda beach. Information was available for individual villages from these offices up until 1999. Unfortunately, at the end of the study, the information from the Ilala district office remained incomplete and consisted of boat and gear types alone. No quantitative comparisons can therefore be made between the number of fishermen at Banda beach and other areas.

3.8.2. Distribution and scale of fishing in the Reserves
(from Fisheries records)

When evaluating the interaction of communities with the Reserves, the number of active fishermen was the first consideration. Kinondoni district office records show a total of 1701 fishermen operating from the villages on the Kunduchi coast (Table 34). Extrapolation from the number of boats operating from Banda beach (Table 35) implies that there may be in the region of 1.5 times the number of fishermen operating from there than the other study villages put together. This may be a figure in the region of 2500 fishermen, and an approximate total of 4200 in both districts combined.

Of the villages on the Kunduchi coast, Mbweni landing site was reported as having hosted the largest number of fishermen throughout 1999, with a total of

Table 34. Numbers of resident and non-resident fishermen at the landing sites in the vicinity of the DMRS for 1999 (source: District Department of Fisheries statistics)

Landing site	Number of fishermen		
	Resident	Non-resident	Total
<i>Mbweni</i>	114	412	526
<i>Unonio</i>	143	116	259
<i>Kunduchi</i>	178	189	367
<i>Kawe</i>	93	0	93
<i>Msasani</i>	427	29	456
<i>Banda beach</i>	N.D.	N.D.	N.D.
Total	955	746	1701

Table 35. Numbers per boat type at the landing sites in the vicinity of the DMRS for 1999. (Source: Kinondoni and Ilala Municipal Department of Fisheries statistics)

Landing site	Number of boats					Total
	Engine	Canoe	Mashua	Outrigger	Dhow	
<i>Mbweni</i>	8	34	5	29	34	110
<i>Unonio</i>	5	4	9	30	6	54
<i>Kunduchi</i>	5	13	5	36	13	53
<i>Kawe</i>	1	6	0	15	1	40
<i>Msasani</i>	6	26	11	44	21	91
<i>Banda beach</i>	251	137	N.D.	120	33	541
Total	276	220	30	274	108	889

526. Most of these were non-resident. Msasani, the next largest, had a total of 456 fishermen, who in contrast were mostly residents. Kunduchi also had a large number with a total of 367, and showed an even split between resident and non-residents. The fleets in the other villages were smaller in comparison, Kawe being the smallest of all.

The majority of the non-resident fishermen in the villages of the Kunduchi coast (44% in total) are likely to be seasonal fishermen who travel from Mafia, Pemba, Tanga, and even as far as Mtwara. Many travel to the region in order to take advantage of the periodic abundance of species such as sardine, fusilier

and kingfish between the months of March and November. Many of these fishermen were observed fishing in the Reserves during this study suggesting that an understanding of the movements of the non-resident sector is important when attempting to quantify resource use in the Reserves. Concerns over the numbers of seasonal fishermen operating in the area have led to attempts at restriction (M. Kiwia, pers. commun.). A three-month fishing limit has reportedly been set to many boat crews, though no evidence was found to show whether this dictate has been effective or not.

The different boat types used in this region, from canoes to engine-driven vessels, all have different characteristic ranges over which they can fish. The numbers of each type of vessel at each landing site therefore further modifies the extent to which the fishermen from these communities interact with and depend on the Reserves.

Fisheries figures indicate that engine-driven boats and outriggers were the most common types of boat in the region in 1999 (Table 35). The vast majority of the engine boats had, however, been recorded at Banda beach where it was the most common type of boat. In contrast, the landing sites on the Kunduchi coast remain dominated by artisanal fleets, where the outrigger was the most common, followed by canoes and dhows. This would imply that the Banda beach community is able to fish over a wider area than the smaller villages further north. On the other hand, Kunduchi and Msasani, for example, are far closer to the Reserves and would therefore expect to have a greater relative proportion of fishermen who travel to the Reserves to fish. Indeed, the field surveys carried out for this work do suggest that each of the Reserves islands are visited more often by certain communities, the results of which are discussed further in this section.

An understanding of the types and numbers of gear used in the Reserves is also a major factor in determining the specific habitats fished, the species caught, and their rate of removal. Knowledge of the geographical distribution in fishing gear types is therefore of utmost importance in the long-term sustainable management of the Reserves.

As can be seen in Table 36, lines and traps are by far the most common types of gear used in this region, the next most common being shark nets followed by gill nets. Provided that these figures are accurate, it appears that several notable changes have taken place since last year. For instance, during this study approximately 18 non-resident boats using large purse seine nets

Table 36. Numbers per fishing gear type at the landing sites in the vicinity of the DMRS for 1999 (source: Kinondoni and Ilala Department of Fisheries statistics)

Landing site	Number of fishing gears									
	Beach seine	Shark nets	Gill nets	Scoop nets	Hand lines	Box traps	Seine Spear	Cast nets	Total	
<i>Mbweni</i>	0	153	0	7	124	575	12	3	0	874
<i>Unonio</i>	4	29	0	4	110	171	0	4	0	322
<i>Kunduchi</i>	0	78	6	3	153	240	0	0	0	480
<i>Kawe</i>	0	0	0	7	64	37	21	0	0	129
<i>Msasani</i>	0	125	5	16	230	120	13	1	14	524
<i>Banda beach</i>	39	59	380	49	951	315	50	58	0	1901
Total	43	444	391	86	1632	1458	96	66	14	4230

were on a three-month stay in Kunduchi. Around seven motorised fishing boats, using scoop nets at night, were also observed operating from the same landing site. Spear fishing was also observed to be common in Kunduchi during this work, as was scuba collection. None of these, however, was recorded in figures from 1999.

3.8.3. Use of beach seine in the vicinity of the Reserves

The fisheries statistics in Table 36 would indicate that only four beach seine nets were recorded on the stretch of the coast between Mbweni and Msasani Reserves, and all of these in Unonio. The field observations during this study paint a totally different picture, however. At least 10 teams fishing daily off the shallow seagrass beds along this stretch of coast, particularly between Kunduchi and Msasani were observed. Fisheries officers suggested that, collectively, they were aware of twice as many beach seine teams who regularly fish the area. With up to 20 fishermen in a team, there may be as many as 400 that use this method daily. From the Banda Beach statistics from Ilala it can also be seen that 39 were also recorded fishing south of Ras Kankadya in 1999. No observations were made to verify this figure, but confirmation of the continued use of beach seines in Msasani bay suggests that the practice remains widespread.

Beach seine activity often takes place over shallow seagrass beds, a habitat that is important for both spawning, and as a nursery ground for fish larvae. Benno (1992) studied beach seine catches in the Msasani bay area and confirmed that almost 90% of fish caught by this method had not had a chance to reproduce. The removal of large quantities of juveniles in this way may be reducing recruitment to offshore reefs, thereby contributing to the decline in catches throughout the Reserves. In this sense, this issue clearly needs to be addressed under a more integrated approach taking into consideration activities outside of the current Reserves boundaries. The use of beach seines has been illegal since 1997 (under amendment regulation G.N. 189 to the original 1970 Fisheries Act) so legislation is already in place. Further research is also required. Of particular importance are comprehensive surveys of the Reserves area to map the distribution of seagrass beds, and to identify spawning areas and seasons (see Muhando and Francis, 2000 for recent summary).

3.8.4. Commercial fishing in the Reserves

Hand picking, free diving, and using scuba to collect sea cucumbers and crayfish (lobster), have been noted along this coast (e.g. Wagner et al., 1999). This has led to severe over-fishing to the point that both species have almost disappeared in the Reserves (Mohammed et al., 2000). Many divers who have been visiting the Reserves for years agreed with this observation and have stated that many sites that were teeming with crayfish several years ago, are now completely devoid of them. Commercial extraction of sea cucumber and crayfish in the Reserves using scuba is therefore of great relevance to this study and justifies a brief description of the stakeholders and the scale of their activities.

The Prime Ocean business is one example. The business is based in Dar es Salaam, though the team of trained Tanzanian divers fish daily from Kunduchi using two fibreglass boats fitted with outboard engines. The business deals mainly with export of lobster and sea cucumbers to the Far East market. The two boats take eight divers out every day (there are 20 available divers in all) in the Reserves area. It was stated that collection takes place from as deep as 30 m but usually between 10 and 20 m depth. Catches of 25–30 crayfish and a similar number of sea cucumbers, per boat, per day, was reported to be typical. The company has briefed its divers to collect only those weighing more than 300 g, though many instances of small crayfish being collected were observed (25–30 cm approx. 200 g). A large number of egg-bearing females were also noted in catches.

Ocean Safaris is another commercial fishing business, in this case based in Msasani. At present it is primarily involved in sport fishing but it is reported to be expanding its current activities into scuba collection. Once running this will be the largest in the area. Amongst the items of equipment noted during a visit to the site were a refrigerated truck and a number of large cold storage units though no catches were seen. The owner stated, however, that crab, sea cucumber and crayfish are the main species that will be targeted and will be fished throughout the Reserves and up the Kunduchi coast. Again all are for the export market. These are two of four commercial fishing operations reported to be active in the Reserves.

Most collection by those businesses already operating was stated to be taking place below 10 m depth, perhaps due to the depleted numbers in shallower water. These animals are therefore outside of the Reserves according to current legislation, though should any be taken from shallower areas, there would be no practical way of policing this. The potential for the abuse of the 10 m boundary is evidently large in instances such as this. The presence of continued extraction such as this reinforces the need for a broader approach in order to promote efficient regulation of activities over a wider area than just within the current boundaries of the Reserves.

3.9. FISHERIES FIELD SURVEY RESULTS

The fisheries field surveys were on the whole successful at achieving their objectives. Several aspects of the work did, however, not proceed as anticipated and affected the validity of the results obtained. For instance, at the end of the study, the number of fishermen approached at the landing sites of Mbweni, Unonio, Kunduchi, Msasani, and Banda beach, varied, and hence produced unequal sample sizes (Table 37).

Moreover, samples obtained in most of the villages were too small to draw firm conclusions. This was largely due to unexpected problems of vehicle transport.

Table 37. Number of fishermen approached during the landing site surveys

Landing site	Number of fishermen approached
<i>Mbweni</i>	15
<i>Unonio</i>	12
<i>Kunduchi</i>	51
<i>Msasani</i>	18
<i>Banda beach</i>	20
Total	116

The results thus cannot be compared reliably between landing sites, say, to infer which make more use of the Reserves for fishing. The conclusions that could be drawn are discussed in Section 4.6.

The field surveys carried out at sea in the fishing grounds also encountered similar problems. Seven days in total were dedicated to carrying out surveys around the islands, two days each for the islands of Bongoyo, Mbudya, and Pangavini, and on one day for Fungu Yasini. Bad weather unfortunately prevented a second day being carried out around the latter. Sample size in terms of the number of boats approached around each island is therefore also variable (Table 38). Further, the quantification of boat numbers around each island was not always possible due to sea conditions, and therefore those approached represent a sample rather than the total number of fishermen on that particular day.

Table 38. Number of boats approached around each of the DMRS Islands during fishing grounds surveys

Island	Number of boats approached
<i>Fungu Yasini</i>	14
<i>Mbudya</i>	33
<i>Pangavini</i>	32
<i>Bongoyo</i>	27
Total	106

It was originally anticipated that the field surveys to the landing sites would produce the main picture on the distribution of fishing through the Reserves. Boat survey-derived data were planned to supplement this in terms of verification of gear type, boat types, and catches around each island. The data collected is not, however, as clear as this. The boat-collected data, with its relatively consistent samples forms the main picture, whilst trends indicated by the remainder are discussed to support these findings.

Much of the field element of this work can be seen as forming the basis of a preliminary study. Besides providing an insight into use of the Reserves resources by fishing communities, the experimental techniques, the size of the study area, the contacts needed, and the materials required for a larger scale project are now clearer. Section 5, at the end of this report, details several recommendations for further work.

3.9.1. Field survey logistics

The field procedure of approaching fishermen was found to be workable although heavily dependent on the weather. Sea conditions occasionally made boat approaches impractical on the seaward side of the islands. When the work relocated to the lee shore it did naturally affect the type of data collected on those days. As has already been mentioned this included compromising the quantification of the exact numbers of boats around each island.

The most notable problem encountered logistically was that of transport. Without having a readily available vehicle for the duration of the fieldwork period it was very difficult to rely on being able to reach the landing site at a certain time. Catches were landed twice a day, early in the morning by night fishermen, and in the early afternoon following the morning fishing effort. On a number of occasions catches were missed because of transportation problems.

3.9.2. Distribution of fishing in the Reserves and dependence of local communities

Table 39 shows the results of the fishing ground surveys for all boats approached around the islands collectively. Most strikingly, it can be seen that almost three-quarters (73%) of the 106 boats were from Kunduchi suggesting that this community may be the most dependent on the Reserves of all noted. All of the other communities featured far less, with the second largest proportion being from Msasani at 10%.

Table 39. Current residence of fishermen in boats around the DMRS (fishing ground data only)

Landing site	n	%
<i>Mbweni</i>	2	2
<i>Unonio</i>	4	4
<i>Kunduchi</i>	77	73
<i>Mbezi</i>	5	5
<i>Kawe</i>	3	3
<i>Msasani</i>	11	10
<i>Banda Beach</i>	4	4
Total	106	100

Mbweni and Katapumbe reefs. Similarly, at Banda beach, only 15% had fished there. The majority of the remainder at this landing site had visited either Makatumbi or Sinda Islands and reefs. These results suggest that other fishing grounds are perhaps equally or even more important to communities this far away from the Reserves.

Surveys in the villages located in between these extremes, i.e. Unonio, Kunduchi and Msasani, revealed a different pattern. The majority of fishermen approached in these communities stated that on their last trip they had fished around one of the four islands (100, 96, and 89% respectively). Here then, a picture of strong dependence on the resources in the Reserves is much clearer.

Using this information, together with records of the number of fishermen in Mbweni, Kunduchi and Msasani, a ballpark figure of the number fishing in the Reserves from these landing sites in 1999 was calculated (N.B. these sites were the only three for which both types of information was available). The results are shown in Table 41. As can be seen, there may have been in the region of 568 resident and 277 non-resident fishermen using the Reserves in 1999 from these three communities alone. Those from the remaining landing sites of Unonio, Mbezi, Kawe and Banda Beach would have increased this total further. These figures, though strictly qualitative, serve to illustrate the potentially large size of this stakeholder group. Further work is needed to provide a more quantitative picture and is discussed in Section 5.1.

Although the number of fishermen approached during the surveys at each of the landing sites varied widely (i.e. sample size), the results do reveal certain trends (Table 40). For instance, in Mbweni, the furthest north of all the communities visited, only 20% of fishermen approached had fished in the Reserves. Most of these stated that they fish either off the beach or around

Table 40. Proportion of boats approached that had fished in the Reserves for each of the landing sites visited (landing site data only)

Landing site	n	%
<i>Mbweni</i>	3	20
<i>Unonio</i>	12	100
<i>Kunduchi</i>	49	96
<i>Msasani</i>	16	89
<i>Banda Beach</i>	3	15
Total	83	

Table 41. Number of fishermen using the Reserves in 1999 from Mbweni, Kunduchi and Msasani. Based on Fisheries records and results of landing site surveys in this work (*results of landing site surveys, **total numbers from District Fisheries records – see Table 34)

Landing site	% Fishing in Reserves*	Number of fishermen			
		Total**	Resident Total fishing in Reserves	Non-resident Total fishing in Reserves	Total**
Mbweni	15	114	17	412	70
Kunduchi	96	178	171	189	181
Msasani	89	427	380	29	26
Total		719	568	630	277

When examined by island, the results of the field surveys also suggest a number of distribution patterns that may be indicative of wider trends (Figure 5). The results discussed are those from the fishing ground surveys only. The variable sample sizes obtained during the landing site surveys preclude their use here and are not discussed.

From Figure 5 it can be seen that the largest proportion of fishermen approached around Bongoyo Island were from Msasani (37%), followed closely

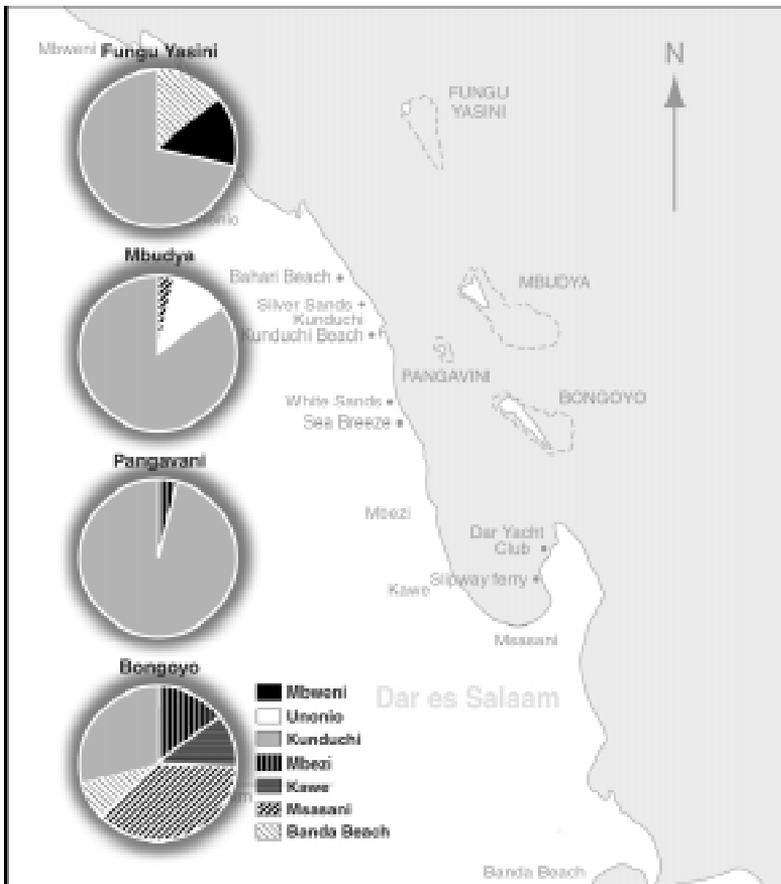


Figure 5. Current residence of fishermen in boats around the islands of the DMRS. Data from fishing ground surveys only (n = 106)

by Kunduchi (29%). This is perhaps not surprising since they represent two of the closest (ca 5.2 km each) and largest fishing communities in the vicinity. It is also worthy of note that Bongoyo had the highest proportion of fishermen from Msasani out of all four islands, suggesting a greater dependence by this community on the resources there. Smaller proportions of the boats were also from the villages of Mbezi (15%) and Kawe (11%). Apart from one boat from Mbezi around Pangavini, no other boats from these two communities were recorded anywhere else in the Reserves. The remainder had travelled to Bongoyo from Banda beach (7%), the main landing site in the Dar es Salaam harbour. All of these boats were outriggers with sails, or engine-driven.

In contrast, almost all of the boats around Pangavini Island were from Kunduchi (97%). Only one was from Mbezi (3%). Sixty-five percent of these boats were canoes and 35% small outriggers. This pattern is perhaps not surprising since Pangavini is the island closest to Kunduchi at ca 2 km away. This represents the shortest journey made from any of the communities to the Reserves and is easily reached by those fishermen in small boats.

Around Mbudya, the largest proportion of boats approached was again from Kunduchi village (85%), though not quite to the extent seen around Pangavini. A proportion (11%) of the boats surveyed was also from Unonio. Only one fisherman was from Msasani.

The majority of boats sampled around Fungu Yasini Island were again from Kunduchi (71%). Most were outriggers with sails, though one canoe was recorded. A number of boats around Fungu Yasini were fishing from Mbweni (14%) suggesting that it is a village that makes use of resources that far north in the Reserves. The remaining boats were engine-driven wooden boats (14%) based mainly at Kunduchi, although two were travelling back to Banda beach.

3.9.3. Distribution of fishing gear types in the Reserves

Table 42 shows the observations of gear type from boats surveyed both at the fishing grounds and at the landing sites. It can be seen that, from a total of 189 observations, line fishing was by far the most commonly used method with over half choosing this gear (57%). The next most popular were seine nets (18%) followed by spears (10%). All of the seine nets recorded had a mesh size of no more than 1 cm.

When examined by island, several trends can be seen in the distribution of fishing gear in the Reserves. These are shown in Figure 6. The results shown are those from both landing site and fishing ground surveys combined to maximise the number of observations.

Line fishing was by far the most commonly used method around Bongoyo Island (54%). A wide range of other gear types were also used, but to a lesser extent. For instance, seine nets (20%), spear fishing and box traps (10% each). Collection of invertebrates and octopus was also noted and involved the use of both snorkel and scuba.

Table 42. Types of fishing gear used in the DMRS (combined landing site and fishing ground data)

Gear type	n	%
<i>Line</i>	108	57
<i>Trap</i>	15	8
<i>Seine</i>	34	18
<i>Shark</i>	3	2
<i>Spear</i>	19	10
<i>Snorkel</i>	6	3
<i>Scuba</i>	4	2
Total	189	100

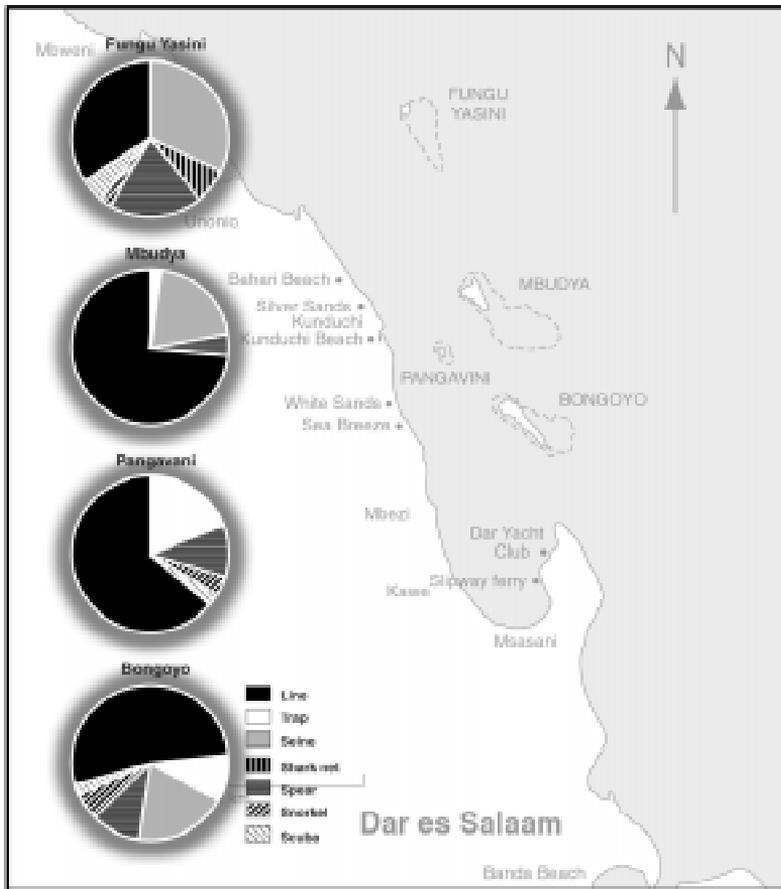


Figure 6. Gear types used around the islands in the DMRS. Results combined from both landing site and boat surveys (n = 189)

Although handlines were again the most common gear (64%) around Pangavini Island, the biggest distinction that can be seen in Figure 6 is the complete absence of net fishing here. Larger boats (i.e. those more likely to use nets) appeared to travel further to fish, perhaps finding that returns increase with distance away from the main fishing communities. This was not, however, quantified. Another notable feature was that traps were used there by a far larger proportion (19%) than around other islands.

Similarly, the most commonly used fishing gear around Mbudya were hand lines (73%). Seine nets were used more widely here than Pangavini at a similar proportion to fishermen on Bongoyo (20%). Many of the boats surveyed here were using drag seine towed by a boat under sail along a section of shallow reef for 300 m or more, before being gathered. Spear fishing was used by fishermen on 4% of the boats approached. Catches ranged from octopus to collections of reef fish depending on whether spears were hand-held or fired using rubber bands. At only 2%, traps were much less frequent around Mbudya than Pangavini.

Of all of the islands, Fungu Yasini saw the smallest proportion of boats using hand lines (36%). In contrast, seine was used by a larger proportion here than any other island (33%). Sixty percent of these were used by non-resident

fishermen, and the remainder by crews from Kunduchi and Msasani. All were equipped with outboard engines and fishing for sardine and fusilier with either purse seine, or regular ring-type seine nets. Spear fishing also accounted for a relatively large proportion here compared with the other islands (17%). The remainder of fishing gears comprised shark nets (7%), scuba (5%), and snorkelling (2%). Notably, traps were not seen at all around Fungu Yasini during the study. The distance to the reef and the difficult sea conditions at this time of year perhaps make it difficult to transport them.

3.9.4 Qualitative catch composition observations

Table 43 shows the qualitative results of catch composition observations from both the fishing ground and landing site field surveys combined. The most distinctive result is perhaps that rabbitfish (Siganidae) were present in more catches landed during this study than any other fin fish family (32%). The next most commonly observed were snapper (Lutjanidae) and emperor (Lethrinidae) which were present in 19 and 18% of catches respectively. These three groups were primarily caught using handlines and traps. Parrotfish

Table 43. Number of observations of finfish and invertebrate families / groups in catches (results from both landing site and fishing ground surveys)

Family/ group recorded	Number of catches in which family/ group was recorded	% of catches
<i>Rabbitfish</i>	60	32
<i>Surgeon</i>	3	2
<i>Goatfish</i>	3	2
<i>Parrotfish</i>	22	12
<i>Unicorn</i>	1	1
<i>Mojarra</i>	2	1
<i>Emperor</i>	34	18
<i>Snapper</i>	36	19
<i>Sweetlips</i>	6	3
<i>Grouper</i>	2	1
<i>Sardine</i>	4	2
<i>Fusilier</i>	7	4
<i>Needlefish</i>	5	3
<i>Jack</i>	14	7
<i>Tuna</i>	10	6
<i>Kingfish</i>	9	5
<i>Barracuda</i>	4	2
<i>Shark</i>	3	2
<i>Flying fish</i>	1	1
<i>Ray</i>	2	1
<i>Moray</i>	1	1
<i>Sea cucumber</i>	4	2
<i>Crayfish</i>	9	5
<i>Octopus</i>	20	11
<i>Squid</i>	2	1
<i>Red helmet</i>	2	1
<i>Giant clams</i>	1	1
Total catches examined	189	100

(Scaridae) were also frequently observed in catches (12%). Most had been caught using drag-seine nets around Mbudya and Bongoyo and were dominated by small individuals between 8 and 15 cm in length.

Of the remaining fin fish groups recorded, jack (Carangidae), tuna (Scombridae), and kingfish (Scombridae) were noted in 19% of all catches collectively. In terms of numbers landed, these groups appeared to be very important to the Reserves fishery. Many of these were caught using hand lines, though they also featured in net catches.

Fusilier (Caesionidae) and sardines (Clupeidae) were also landed in abundance. Though only present in 6% of catches collectively, these latter two families were caught in very large quantities by boats with seine and purse-seine nets. The majority of boats that landed these fish were reported to have fished off Fungu Yasini.

Among the invertebrates, octopi were the most commonly caught (present in 11% of catches examined). Indeed, the octopus fishery appears to be well developed in the Reserves with an estimated 120 to 150 individuals being landed daily at Kunduchi alone. Total catches landed at Msasani appeared a little smaller at between 50 to 80 per day. Thus, from these two villages alone, perhaps more than 50,000 octopi are being collected from the Reserves each year. Crayfish and sea cucumber were not recorded as often (5 and 2% respectively), most of these being accounted for by scuba divers. Collection of gastropods was only noted very occasionally (2% collectively), all by opportunistic snorkel fishermen.

3.9.5. Earnings from fishing

Results from both the landing site and fishing ground surveys combined revealed that the average earnings made by fishermen on each trip was Tsh 2859 (n=189). This was calculated from catch sell price (this was estimated by those approached at sea) and the number of fishermen in each boat. The average amount of time spent fishing per trip was 6 hours and 50 minutes. This result is in agreement with Wagner et al. (1999) who noted that most fishermen spent between 6 and 9 hours fishing each day. As was suggested, this illustrates the demanding nature of fishing as a way of earning a living.

3.10. FISHERIES QUESTIONNAIRE RESULTS

Over 150 questionnaires in English and Kiswahili were produced and distributed during this study. Approximately 40 of these were used as the basis for structured interviews with fishermen by Frontier or MPRU staff and the remainder distributed to Fisheries Officers in the villages of Unonio, Mbweni and Msasani to be completed by respondents alone. Though a large number of completed questionnaires were all collected again from Mbweni village, the response rate was low at Msasani and Unonio. Even though several attempts were made by MPRU staff to collect them a large number remained unreturned by the end of the study.

Nevertheless, 75 questionnaires were completed, the majority in Mbweni, Kunduchi and Msasani (Table 44). As can be seen in the table, a considerable

Table 44. Number of fishermen contacted in each of the villages visited

Village	n	%
<i>Mbweni</i>	16	21
<i>Banda beach</i>	2	3
<i>Msasani</i>	10	13
<i>Kunduchi</i>	25	33
<i>Unknown</i>	22	29
Total	75	100

number of the questionnaires were returned with the village name unspecified. This is of no consequence, however, as the differentiation between the views of fishermen from different villages was beyond the scope of this study from the outset. All the results presented here are therefore collective.

3.10.1. Age of respondents

As detailed in Table 45, the largest proportion of fishermen who were contacted were between 25 and 39 years old (47%). All fell within the ages of 17 and 54. All were from the Kinondoni or Dar es Salaam area except for one from Zanzibar.

Table 45. Age of fishermen in the study

Age category	n	%
<i>0–16 years</i>	0	0
<i>17–24 years</i>	15	26
<i>25–39 years</i>	28	47
<i>40–54 years</i>	16	27
<i>55 years or more</i>	0	0
Response rate	59	79

3.10.2. Distribution and fishing habits

Results revealed that of 75 respondents only 31% had been fishing for less than 10 years (Table 46) and 19%, beyond 25 years. The results indicate that fishing is an occupation that is continued late into life.

Though many fishermen land their catch at a different landing site to their home village, the majority of the fishermen contacted were from the Kinondoni and Dar es Salaam districts (71%, not shown). The remainder (29%) were seasonal fishermen from other locations including Zanzibar, Pemba, Tanga and Mtwara (Table 47).

When asked which island the fishermen usually fish around, the results, shown in Table 48, show that more tended to visit Fungu Yasini (56%), whilst slightly fewer went to Bongoyo (47%) and Mbudya (39%). Pangavini was the least popular amongst the respondents in this study (29%). The variable questionnaire sample size does not, however, allow analysis for trends between villages in terms of preference for each island. These results do support the view noted in Section 3.9.3 that perhaps Pangavini is a less preferable site for fishing.

Table 46. Total number of years that respondents had been fishing

	n	%
<i>0–4</i>	7	9
<i>5–9</i>	16	21
<i>10–14</i>	9	12
<i>15–19</i>	12	16
<i>20–24</i>	17	23
<i>25–30</i>	13	18
<i>≥ 30</i>	1	1
Response rate	75	100

Table 47. Area where fishermen had been living before moving to the Kunduchi coast

	n	%
<i>Zanzibar</i>	5	33
<i>Pemba</i>	4	27
<i>Tanga</i>	3	20
<i>Mtwara</i>	3	20
Response rate	15	52

Table 48. Distribution patterns of fishermen around the Reserves islands (N.B. some indicated more than one island)

	n	%
Which island do you usually fish around		
<i>Bongoyo</i>	35	47
<i>Mbudya</i>	28	39
<i>Pangavini</i>	21	29
<i>Fungu Yasini</i>	40	56
Response rate	72	96
How often do you fish there		
<i>Daily</i>	53	76
<i>Every few days</i>	8	11
<i>Weekly</i>	0	0
<i>Rarely</i>	9	13
Response rate	70	93

In this study the majority of the fishermen stated that they worked every day (76%), though from the numbers returning to landing sites, it did appear that most took Fridays off. This was confirmed by Fisheries Officers as being the standard and it was suggested that most in fact work in the region of 26 days a month. This is similar to the result reported by Wagner et al. (1999) who found that the majority worked at least 20 days per month (69%).

When asked what affects their choice of fishing ground (Table 49) the majority of responses understandably focused on catches as the primary factor. The other main reason given was the distance to the fishing site. Almost a quarter of the respondents (23%) cited proximity to their

village as the main reason why they visit one island over another, whilst 11% said that the type of boat that they have plays a major part. As the results from field surveys have already shown, the limitations imposed by the maximum range of particular boat types results in different fishing communities along the coast fishing in different areas.

3.10.3. Interests of fishermen

When asked a series of questions aimed at revealing the level of dependence that fishermen have on the fishing around the islands, the majority (54%) stated that they had no other source of income (Table 50). Further details were not requested though unprompted comments written

on the questionnaires suggested that small businesses and shops were the most common forms of alternative income.

When asked how many people depend on the fish they catch all said that they had at least one dependent. The largest proportion (26%) indicated that they had three or four dependants. No categories were made available for more than 10 dependants though 10% of respondents indicated that at least

Table 49. Reasons that fishermen chose to fish around a certain island (unprompted responses; more than one answer given)

	n	%
<i>Better catches</i>	23	36
<i>Because many fish live there</i>	12	19
<i>Quality fish</i>	6	9
<i>I fish for specific types of fish</i>	1	2
<i>Fish are seasonal</i>	3	5
<i>Big fish</i>	1	2
<i>Fish spawn here</i>	4	6
<i>Proximity to village</i>	15	23
<i>It is near the market</i>	1	2
<i>I move around</i>	1	2
<i>Because of the type of boat that I have</i>	7	11
<i>Because I have an engine</i>	1	2
<i>Because of the gear I use</i>	1	2
<i>Good reefs</i>	4	6
<i>Shallow water</i>	1	2
<i>I get more money here</i>	2	3
<i>Don't know</i>	2	3
Response rate	64	75

Table 50. Responses given when fishermen were asked if fishing was their only source of income

	n	%
Is fishing your only source of income		
Yes	38	54
No	32	46
Response rate	70	93
Number of people who depend on your catch of fish		
1	5	7
2-3	5	7
3-4	18	26
5-6	15	22
7-8	9	13
9-10	9	13
More than 10	7	10
Response rate	68	91

this number of people depended on their fish catches.

3.10.4. Impressions of fishermen

A series of questions were asked in order to reveal the impressions that fishermen have of the condition of the fishery resource. In response, a massive 87% stated that, since they began fishing there, catches have declined in size (Table 51). When asked why they thought this had happened using an unprompted question, a wide range of responses were given. The most commonly cited was dynamite fishing (58%) though a large proportion also suggested that seine nets (44%) were the underlying cause. Other

Table 51. Impressions of fishermen about the state of the fishery around the Reserves islands

	n	%
Has there been a change in the size of fish catches since you began fishing there and if so have they decreased, increased, or stayed the same		
Decreased	65	87
Increased	2	3
Same	8	10
Don't know	0	0
Response rate	75	100
Why do you think this has happened		
Seine nets	27	44
Dynamite	36	58
Small mesh nets	9	15
Fish traps	1	2
Spear fishing	2	3
Poison fishing	1	2
Seasonal changes	4	6
Bad fishing methods	9	15
Too many fishermen	7	11
Overfishing	1	2
New fishing methods	1	2
Don't know	10	16
Response rate	62	83

fishermen cited small mesh nets in general (15%) or summarised their reason under the overall term of bad fishing methods (15%).

In order to gain an insight into how declines in fish stocks are affecting communities, fishermen were asked to express how concerned they were over reduced catches (Table 52). The vast majority replied that they were concerned with this problem (90% total) with most indicating that they were very

concerned (67%). When asked to express why they were concerned, almost all gave answers related to how it affected them directly (Table 53). The majority cited the knock on effects of reduced income as the main cause for concern (41%), whilst many other answers focused on their dependence on fishing (35%) and the income it brings (31%). The next most commonly given reason was a concern over the use of destructive fishing practices (13%). These results support the well-documented decline in fish stocks in the Reserves, and confirm that the communities in the study area are being widely affected. In view of the fact that the majority depends daily on fishing as their only source of income, this is a very worrisome picture.

Table 52. Fishermen’s level of concern about decreased fish catches

	n	%
<i>Not concerned</i>	7	10
<i>A little concerned</i>	13	19
<i>Very concerned</i>	46	67
<i>Don’t know</i>	3	4
Response rate	69	92

Table 53. Reasons for concern about decreased fish catches

	n	%
<i>I depend on fishing for a living</i>	16	35
<i>I depend on the income</i>	9	31
<i>My income has decreased</i>	19	41
<i>I cannot travel far in my boat</i>	2	4
<i>The use of destructive fishing methods</i>	6	13
<i>There are no fish left</i>	1	2
<i>I have a poor life</i>	1	2
<i>I may lose my job</i>	3	7
<i>I don’t meet my daily needs</i>	1	2
Response rate	46	94

3.10.5. Awareness of fishermen

It was found that the majority of fishermen (71%) are aware of the Marine Protected Area status of the islands and the surrounding waters (Table 54). When asked whether they were aware of any specific regulations protecting the area the result was very different, with 52% of respondents stating that they were not. When asked how they found out about the protected status the most commonly cited sources were the media (19%) and other people in the villages (17%). From the responses given, it is possible that some respondents may have misunderstood this last question. Alternatively, this result may indicate that the concept of a marine protected area means many things to fishermen in the area. Indeed, this would explain the fact that a fair proportion found out about the area’s status by the good fishing that was to be had there (13%) and by looking (10%).

3.10.6. Attitudes of fishermen

Though over half of the fishermen were not aware of any regulations protecting the Reserves, 72% stated that they agreed with them in principle (Table 55). This result strongly suggests, that although not observed widely in the fishery at present, if moves were made to implement them they would be well received.

Fishermen were then asked questions that pertained to fisheries management on a broader scale. In response to the question as to whether they

Table 54. Awareness amongst fishermen of the DMRS islands' status as a Marine Protected Area

	n	%
Aware that the area is an MPA		
Yes	48	71
No	20	29
Response rate	68	91
Are you aware of any regulations that protect the area		
Yes	20	48
No	22	52
Response rate	42	56
How did you find out that the area is an MPA		
Other villagers	8	17
Media	9	19
Fisheries officer	4	8
Because islands belong to government	1	2
Island worker	1	2
Just think so	1	2
Science researchers	3	6
Community workers	4	8
From other fishermen	3	6
Chairman	2	4
By looking	5	10
Because fishing is good	6	13
Ocean depends on coral reefs	1	2
Response rate	48	0

Table 55. Fishermen's responses when asked whether they agreed with fisheries regulations

	n	%
Yes	28	72
No	11	28
Response rate	39	52

were happy with paying a licence fee, 78% said that they were (Table 56). When those who were not happy with licensing fees were asked to explain, most cited inability to pay as the primary reason. Other reasons mentioned were a belief that Tanzanians should not have to pay, and that they did not know what the money was being spent on. These results, however, have not been displayed graphically due to the small sample size.

Those who agreed that licensing was a good idea were also given a chance to explain what they felt the revenue collected should be spent on (Table 57). In response, a large proportion stated that they would like to see licensing fees being spent on rescue services to help fishermen in trouble at sea (78%). This

Table 56. Responses given by fishermen when asked if they were happy to pay a licence fee

	n	%
Yes	49	78
No	14	22
Response rate	63	84

result may conceivably be influenced by the fact that two separate incidents did occur during the study period involving fishermen drowning whilst fishing near Kunduchi. Undeniably, it is an issue that fishermen feel strongly about. The majority also stated that they believed licence fees should be spent on buying new fishing gear for fishermen (61%) and grants for the same reason (52%). Others suggested new fish-markets (35%), community development (17%) and hospitals (9%). These results indirectly suggest what fishermen see as pressing concerns in the fishery.

Table 57. Views of fishermen who agreed with licensing about what revenue from licensing fees should be spent on

	n	%
<i>Government should decide</i>	2	9
<i>Community development</i>	4	17
<i>New fishing gear</i>	14	61
<i>Hospitals</i>	2	9
<i>Rescue services for fishing boats</i>	18	78
<i>Fish market</i>	8	35
<i>Grants</i>	12	52
Response rate	23	47

The success of a marine management plan in the DMRS will be built on an understanding of conservation in local communities. It is important therefore to first reveal the attitudes of fishermen to the concept of sustainable use. This information will ensure that any educational strategies that are implemented to increase community awareness and change current fishing practices are aimed at the right level.

To reveal attitudes, fishermen were first asked what they thought the effect would be on fish catches all around the islands if fishing were restricted in areas where fish breed. The majority (68%) responded by suggesting that they would expect to see an increase in catches from the use of such a management strategy (Table 58).

Table 58. Responses of fishermen when asked what they thought would happen to catches all around the islands if fishing were restricted in areas where fish breed

	n	%
<i>Increase</i>	47	68
<i>Decrease</i>	13	19
<i>Same</i>	4	6
<i>Don't know</i>	5	7
Response rate	69	92

The next question was aimed at revealing the attitude of fishermen to the idea of restricted fishing areas and seasons when it affected them. As shown in Table 59, the largest proportion stated that they would be happy with zonal or seasonal fishing restrictions (43%) if they thought that fish catches would increase. Twelve people out of the total respondents (18%) stated that they needed more information on the subject before they could give an answer. The results of both questions are encouraging, as they suggest that the use of management strategies such as restricted areas and seasons would be appropriate.

Table 59. Fishermen's responses when asked if they would be happy not to fish in certain areas of the Reserves or at certain times of year if they thought that fish catches would increase

	n	%
<i>Yes</i>	29	43
<i>No</i>	22	33
<i>Don't know</i>	4	6
<i>Need more information</i>	12	18
Response rate	67	89

The examination of attitudes to management issues was taken further,

and fishermen were asked if they believed there were any fishing methods which should be restricted in the Reserves (Table 60). Almost all (97%) stated that dynamite fishing should be restricted whilst the vast majority also wanted restrictions to be placed on seine netting (84%) and the use of poison for fishing (70%). Spear fishing (34%) was also given as a method to be considered. Almost all other techniques in use in the region, such as line, trap, gill nets, were also cited although by a relatively insignificant number. When asked to justify their answers the response was low and the results are not shown graphically. By far the majority, however, gave replies that addressed the destructive nature of specific techniques such as seine and dynamite.

In order to give fishermen an opportunity to express their opinions on the design of a management plan, a series of suggestions were offered and an open-ended comments section to add and elaborate on any others of their choice. Of the suggested options, two focused on the type of management structure. Table 61 shows divided opinions on government and community-based management at 60 and 63% respectively. Some cited reservations about a purely community-based management structure, for fear of selfish behaviour of some individuals leading to unfair treatment of villagers.

Of those who indicated community management alone, no elaboration was provided. The most important features amongst the other prompted points appeared to be regular meetings (68%) and patrols (68%).

Concern over the use of dynamite and seine nets featured highly in the unprompted responses and a large proportion elaborated extensively on the exact reasons why they thought their use should be stopped immediately. Most of the reasons given again reiterated the issue of dependence on the fishery for their livelihood. A quarter of fishermen contacted (25%) stated that they would like to receive financial support from the government to help them buy new fishing gear. Many suggested that this would help prevent people resorting to more destructive methods. Nine percent of the fishermen expressed concern over army involvement in the management of the Reserves. They were anxious to avoid any conflict, and many suggested

Table 60. Fishermen's thoughts on the fishing techniques that should be restricted in the Reserves

	n	%
Methods to be stopped in the Reserves		
<i>Dynamite</i>	65	97
<i>Seine net</i>	56	84
<i>Poison</i>	47	70
<i>Spear fishing</i>	23	34
<i>Line fishing</i>	4	6
<i>Nets</i>	4	6
<i>Fish traps</i>	1	1
<i>Gill net</i>	1	1
<i>Don't know</i>	2	3
Response rate	67	89

Table 61. Fishermen's views on the aspects they would like included in a management plan (prompted points shown only)

	n	%
Management plan inclusions		
<i>Community-based management</i>	25	63
<i>Government-based management</i>	24	60
<i>Meetings</i>	27	68
<i>Patrol boats</i>	27	68
Response rate	50	67

that the government should intervene when problems arise. The large proportion in favour of seeing the presence of patrol boats actively operating in the Reserves hoped that this might discourage dynamite fishing and therefore negate the need for harsh army activities. Many of the 67% in favour of patrols mentioned the issue of rescue services again and suggested a dual role for the patrol boats. Four fishermen were anxious of the ownership bid on Mbudya Island by a businessman in the area, fearing that they may be excluded. One person did however, imply that he was happy to let the islands be run by the hotels in the area.

Table 62. Responses given when the fishermen were asked if they thought that they would carry on fishing to earn a living

	n	%
Will they continue to fish		
Yes	18	26
No	38	55
Don't know	13	19
Response rate	69	92
Why not		
It is difficult work	3	10
It is a low income job	10	32
I will go into business	4	13
I will find a new job	1	3
Less fish now	2	6
Depends if I can get a new job	11	36
Response rate	31	82

The fishermen (19%) also said that they did not know what would happen in the future regarding work.

Table 63 illustrates that the proportion of fishermen who thought that their children would not fish for a living was even larger (65%). Again, the largest percentage (34%) cited low income as the primary reason behind their feelings along with the assertion that it is arduous work (9%). The largest proportion of fishermen (54%), however, stated that this was a decision for their children to make. Many of those spoken to directly hinted at a belief that the next generation would be more interested in western values and would not find fishing attractive.

In order to examine the attitude that fishermen had towards their future, they were asked if they thought that they would carry on fishing to earn a living (Table 62). The response was very negative and 55% stated that they did not expect to continue fishing. When asked to explain the reason why they felt that way, the largest proportion (35%) stated that it was dependent on the availability of alternative work. Though perhaps not a direct answer to the question asked, it is still a very revealing one. The other primary reason given was that fishing is a low-income job (32%).

Table 63. Responses given by fishermen when asked if they thought their children would fish

	n	%
Will children continue to fish		
Yes	15	22
No	43	65
Don't know	9	13
Response rate	67	89
Why not		
Difficult work	3	9
Not a job with good prospects	1	3
Low income job	12	34
Less fish now	2	6
Their decision	19	54
Response rate	35	88

3.11. FUTURE REVENUE POTENTIAL FROM RESERVES FEES

3.11.1. Visitors

Following an interview with the owner of the Slipway ferry operation it was discovered that a visitor fee system has been established there since January 2000. Payments have been made on a monthly basis to the MPRU following the collection of visitor fees to the figure of approximately Tsh 800,000. This has been paid directly to the MPRU Conservation and Development fund for purposes as detailed in the Marine Parks and Reserves Act, 1994 (Anon., 1994). To date, however, no funds have been collected from the other agents (M. Kiwia, pers. commun.), i.e. the hotels. These facts suggest that there is a large source of Reserves-related revenue that is potentially available for the upkeep of the DMRS. The results of this work and success of the existing system at Slipway support this.

One of the first questions to tackle would be a fee structure. The initial pricing structure detailed that Tanzanian nationals and non-Tanzanian residents are liable for an entry fee of Tsh 500, whilst non-Tanzanians would pay \$10. Reportedly, attempts made to collect fees at this rate from tourists were met with criticism. As a result MPRU shelved the idea and resorted to the common Tsh 500 price.

The findings of this study do, however, suggest that such a tiered fee structure is appropriate. The results from visitor and diver questionnaires not only reveal that the vast majority are in favour of Reserves fees, but also that the greater proportion believe that tourists should pay more than residents and nationals. No evidence was found to suggest that Tanzanian nationals and Tanzanian residents should be distinguished, and the majority thought that both should be actively encouraged to visit the Reserves by a suitable fee structure. From the opinions expressed in the questionnaires it is apparent, however, that a \$10 or Tsh equivalent entry fee is above what most tourists would be happy to pay. Indeed, this has already been tried and did not appear to work.

Using the suggested fee rates and the percentage split in status recorded in this study period, a calculation of the amount of revenue that would be generated over one year from visitors alone was carried out. Using the approximate total of visitors during 1999 this works out at a total figure of Tsh 10,589,910 or over \$13,000. Furthermore, a contribution from the divers, the boat users in the area, and the business interests in the reserves, would provide important input towards the upkeep and management of the Reserves and become one step towards the creation of a self-sustaining MPA.

3.11.2. Dar es Salaam Yacht Club

Interviews with managers of the DYC have revealed that all felt strongly that the DYC institution in itself should not be liable for any form of fees because of its non-profit making nature. Questionnaire results have, however, indicated

that the majority of dive club members at least (other groups were not contacted directly during this study) would be happy to contribute towards the upkeep and management of the Reserves. This raises several potential logistical problems.

For instance, it would be impractical to charge a per-visit fee to the divers who dive the Reserves using the club's or their own transport, because it would be practically difficult to collect. Similarly, those who travel to the Reserves in their own boats to stop on the islands would have no convenient way of paying. In instances such as these, a different kind of contribution may be necessary.

The Commodore and Vice Commodore of the DYC have both suggested that an annual membership fee may be workable. Again this would have the advantages of reducing collection costs and minimising cash transactions. Payment could, for instance, provide the boat owner with a sticker which, out at sea around the Reserves, would be clearly visible to patrol boats.

Though the majority divers at the DYC expressed that they would be happy to pay some form of Reserves fee, addressing the issue of boat owners was not possible within the time period of this work so no conclusions can be drawn. A future study could, however, be carried out easily. Provision is in place at the DYC to e-mail all members, with questions aimed at establishing the attitudes of boat users to a Reserves fee (see Appendix 7.2 for contacts).

4. Discussion

From the number and diversity of its stakeholders, the present-day DMRS can be described as a truly multi-user area. In terms of interests held, there appears to be a distinction between those who enjoy the Reserves on a purely recreational basis and those who depend on it for a livelihood. Although conflicts between stakeholders were identified, many areas of common interest also emerged.

The survey methods employed were largely successful although, in several instances, the time period over which the study was carried out was inadequate. Further research over a longer period was felt necessary. For instance, a repeat of the questionnaire and fisheries surveys is advised in order to provide a larger sample size and take into account seasonal changes. Further work is also needed to fill in gaps such as the dive site and frequency information from the hotels and DYC. These recommendations are summarised in Section 5.1.

4.1. INTERESTS, ACTIVITIES AND IMPRESSIONS OF RECREATIONAL USERS

The interests that divers and tourists showed in the Reserves focused primarily on the naturalness of the area. Both groups cited attractions such as the beaches and the sea, as well as biological features such as the coral reefs, fish and wildlife. The proximity of the islands to Dar es Salaam and to the hotels on the coast makes it easy for visitors to escape the city and enjoy peace and quiet in a natural environment.

The impression given by the visitors in the study is that conflict of interest was uncommon. Where it did occur, it was mainly over activities such as jet-ski use, the passage of ferries through the Reserves, and the continued trade of marine curios on both islands and adjacent to several of the hotels. Enquires on Mbudya and Bongoyo resulted in local traders revealing baskets of corals and rare gastropods for sale. The Dar es Salaam market traders stated that their stock came mainly from Mafia Island Marine Park, although all had also bought or collected pieces from the DMRS. These included the rare and threatened triton shell (*Charonia tritonis*) and horned helmet (*Cassis cornuta*), as well as large quantities of branching and mushroom corals. This trade, especially where it continues within the MPA and in hotels that take guests to the islands, is completely inappropriate, in conflict with the sustainable use of resources, and needs to be addressed immediately.

A number of respondents felt that the ferries that regularly travel close to the islands compromised their enjoyment of the area. Conceivably, small fishing boats may also find this a problem in that they share the same areas of

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water and are subject to the effects of boat wake (no direct enquires were made about this). Moreover, Mohammed et al. (2000) and Wagner et al. (2000) contend that high-speed boats may increase sedimentation on reefs by creating turbulence that re-suspends bottom sediment. Here then, there may be a case for examining whether the benefits gained by the ferry companies (calmer passage, shorter journey and reduced travel cost) are outweighed by the environmental problems caused. Further research is required.

Although jet-ski activity was not noted during this study, during the high season (November until January) jet-ski use was reported by several hotel owners to be common around Mbudya (e.g. Hannes, pers. commun.). Several of the hotels offer jet-ski hire and the owner of the Kunduchi Beach hotel confirmed that they plan to provide this service when open for business (Gulam, pers. commun.). In view of the fact that jet-skis appear to compromise the interests of a proportion of visitors, restriction of jet-skis in certain areas around the islands and reefs should perhaps be considered.

The interests that people have in the Reserves are shaped further by the activities that they prefer to carry out. Though the visitors who went to the islands during this study did go snorkelling (mainly on Mbudya) and swimming, the general trend suggested that most were content to stay in the vicinity of the beach.

Divers are exposed to different aspects of the environment from the visitors and they gave distinctly different impressions of what they had seen. For, instance almost all visitors thought the island and marine environments were clean and that there had been no change in conditions since they had first visited. In contrast, the divers revealed that they felt the marine environment was heavily degraded.

The consensus amongst divers was that, primarily, the use of destructive fishing methods (dynamite and small mesh seine) had caused this change. These fishing activities are hence in direct conflict with the interests of divers. This was manifest in two ways: First, their use has been directly associated with the decline in fish stocks and the transformation of whole reefs from world-class dive sites into 'graveyards'. Second, fishermen are drawn to the same reefs as divers who both want to carry out their activities in areas of highest fish abundance. This exacerbates the problem by bringing both groups into direct contact. This appears to be happening around Fungu Yasini where the hotels organise most of their dives in the Reserves, and where the majority of dynamite fishing has been reported to take place.

Dynamite fishing is extremely distressing to witness whilst underwater and many expressed concern that it may lead to injuries, if not fatalities. Its use appears to be increasing again after being almost eradicated through navy involvement. This is effectively and alarmingly demonstrated by the fact that the largest proportion of divers contacted in this study had heard blasts within the last week, if not on their last dive. Besides the environmental and safety aspects, this is also very bad press for the Reserves in the international dive tourism market. This is a pressing issue amongst divers and hotel owners alike and clearly needs urgent attention. Suggestions are covered in Section 4.4.

4.2. AWARENESS OF CONSERVATION ISSUES

Whilst it was encouraging that the majority of recreational users appeared to be aware of the MPA status of the Reserves, it was of great concern that far less actually knew of any regulations protecting the area. This lack of awareness highlights the need for a programme of education in all visitors to the Reserves.

It would seem that, at present, educational information is not readily available, the only examples being the MPRU signboards and ticket messages from ferry agents. These notices have been criticised by some in that they do not inspire people to take interest in the reasons behind the rules in place. There is thus perhaps a need for a more user-friendly approach. First, to raise awareness and second, to generate interest in and understanding of environmental and conservation issues. In turn, this may help to encourage visitors to cooperate with regulations.

One method that has been suggested is the construction of an information and interpretation centre on each island. Several owners of hotels, UDSM, and TRAFFIC expressed a willingness in providing financial and/or technical support for such a venture. Other types of development that have been suggested in this study include forest trails to encourage visitors to enjoy the entire island, and marked snorkelling sites to provide a practical introduction to the marine environment. All educational material should be aimed at a wide audience and age range, and also be multilingual. Given suitable coverage, the facilities could be used to actively encourage schools to take part in conservation projects and thus reach the next generation of stakeholders.

The encouraging response to the provision of educational facilities in the Reserves suggests that this type of development would be well received. The positive feedback that this would bring would have the added benefit of raising the profile of the MPRU. This is vital in securing the respect and trust of the community and stakeholders and will no doubt assist greatly in promoting participation in the management of the Reserves.

4.3. ATTITUDES TOWARDS DEVELOPMENT IN THE RESERVES

At present, there is relatively little development in the Reserves. A number of small *bandas* have been put up by the hotels for shade and for the local staff who provide food for guests on demand. From comments made by visitors, these developments appear to be well approved and accepted. Mr Pamba, of the Ministry of Tourism, revealed that enquires had been made by private investors interested in developing shops, restaurants and bars on the islands. The owner of the Kunduchi Beach Hotel also made it clear that, given permission, Mbudya would ultimately be managed as an amusement park. In view of the statements made by the respondents in this study when asked about future developments, these kinds of changes would not be well received. Indeed, the results in this study clearly suggest that visitors want as little impact on the islands as possible.

There may be a considerable amount of potential revenue to be made through increasing the numbers of tourists visiting to the Reserves. However,

alteration of the fundamental character of the islands by development may lead to a decrease in the emphasis placed on conservation. A precautionary approach is therefore necessary when seeking the balance between promoting development and tourism in the Reserves and preserving the integrity of the original resource.

Any development that takes place in the Reserves will need to be managed carefully. Even the development of ecological information centres may have the effect of increasing the number of visitors to the area. It is thus imperative that, before any development takes place, comprehensive habitat surveys are carried out (terrestrial and marine) along with an assessment of the visitor and diver carrying capacity of the islands and reefs.

4.4. ATTITUDES TOWARDS CONSERVATION ISSUES

The desire of recreational users to preserve and promote conservation in the area can be seen in the overwhelming support for the provision of toilet facilities, litter collection, regulations, scientific monitoring and above all an appropriate management plan. The visitors may be satisfied with the provision of educational material and limited, low-impact development, although the divers appeared to have concerns over a wider range of issues.

The restriction of access to certain areas of the Reserves is likely to feature in the future MPA. The success of this management tool will rely on public understanding and support. It was encouraging, therefore, that very few respondents were opposed to having their access to some areas of the Reserves restricted. Nevertheless, a considerable proportion of the remainder did not appear to know or understand the concept, again supporting the view that education will play a vital role in the successful functioning of the MPA.

An issue that needs to be tackled is the scepticism of the hotel owners and of the DYC towards management of the Reserves. Here, the value of prompt action by the MPRU on projects with realistic short-term goals may pay great dividends in reassuring all stakeholders. These include high-profile initiatives such as mooring buoys, interpretation centres and patrols. In establishing these projects the positive attitude of the hotels and the DYC towards active involvement should be harnessed as a source of expertise and assistance.

4.5. THE RESERVES FISHERY

All of the recent studies carried out in the DMRS using underwater visual census techniques (scuba), document an unprecedented change in the ecological structure and a dramatic decline in stocks as a result of over-fishing (e.g. Kamukuru, 1997; McClanahan et al., 1999; Wagner et al., 1999; Mohammed et al., 2000). These disturbing facts are mirrored in the results of this study that examined the situation from the perspective of fishermen. In the communities visited, an alarming 87% had seen their catches decrease since they first began fishing in the Reserves. The majority of these fishermen were solely dependent on daily fishing in the Reserves. Not surprisingly, they voiced

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great concern over the effect that the decline in catches is having on their ability to earn a living.

District Fisheries statistics document a decline in the number of fishermen in Kunduchi and Msasani over the last decade. In 1999, a total of 823 resident and non-resident fishermen were operating from these two villages (see Table 34), whereas in 1989 the total was 1443 (see Kamukuru, 1997 for summary). It must be borne in mind, however, that although a definite trend appears evident, the system in place for collection of statistics is poor and prone to variability (Linden and Lundin, 1996).

What is clear, however, is that the last decade has seen major changes in the character of the fisheries sector. For instance, the introduction of destructive techniques such as dynamite fishing, widespread use of small mesh nets, and an increase in the number of motorised vessels. The continuing reduction in fish stocks and catch weights illustrates that fishing pressure clearly remains above sustainable levels and needs to be reduced.

4.6. THE CAUSES OF ENVIRONMENTAL DEGRADATION

Much of the problem centres on poverty as both a cause and effect of environmental degradation (Wagner et al., 1999). The overuse of coastal resources and decline in fish stocks has led to a reduction in earnings and ability of fishermen to buy suitable fishing gear. This, in turn, has forced many fishermen to use fishing methods that provide better short-term rewards for their cost but are also environmentally degrading. Hence, this perpetuates the problem by contributing towards the further decline in the marine resources available.

The destructive effects of dynamite and small-mesh seine are well publicised. The problems stem mainly from the fact that they are both non-discriminatory in that they lead to removal of juveniles and other non-target marine life as by-catch, thus reducing recruitment. It has also been suggested that the sheer volume of fish caught has merely 'fished out' many sections of reef. Moreover, these methods are also acknowledged to cause damage to the structure of the reef either by direct (drag-seine) or by indirect (dynamite) physical pressure. This further leads to a reduction in available habitat for all marine life.

Fisheries records, a study by Wagner et al. (1999), and the results of this work indicate that the fishery in the Reserves is primarily characterised by relatively low-impact methods such as line and trap fishing. However, this study has confirmed the widespread use of dynamite and small mesh nets. For instance, 18% of boats approached around the four islands in the Reserves had used seine nets with 1 cm mesh. Kamukuru (1998) also noted beach seine off the Islands of Pangavini and Fungu Yasini. Observations and enquires during this study also confirmed the daily use of small mesh nets in the shallow-water seagrass beds all along the Kunduchi coast, especially in Msasani bay.

Fishing techniques displayed distinct distributional trends within the Reserves. For instance, the use of small mesh nets was not observed around

Pangavini but appeared to be common around Bongoyo, Mbudya and particularly Fungu Yasini. The responses from divers also suggested that dynamite use is more common around the latter. Although recent assessments of habitats have shown that the level of degradation also varies spatially in the reserve, gaps in the information exist.

For instance, it is not known whether sea conditions on the exposed side of the islands have prevented dynamite fishing and left the reefs in a more pristine state (Muhando and Francis, 2000). Further studies are required to assess the effect of gear type and level of use on the ecology of fishing grounds (Jennings and Lock, 1996, cited in McClanahan et al., 1999). Information such as this would be useful in assessing the priority areas in critical need of close protective management (e.g. fishing restriction).

4.7. AWARENESS OF CONSERVATION ISSUES

This study confirms that a large proportion of fishermen in local communities was aware of the underlying causes of resource degradation. This would seem to reaffirm the fact that destructive techniques have only been adopted because of the need to survive and through lack of available alternatives (see Wagner et al., 1999).

The vast majority was not, however, aware of any specific regulations protecting the Reserves. This is an issue that needs to be addressed, for in order to implement management strategies such as restrictions, the community must first understand the rationale and concept behind them. There is thus an urgent need for a comprehensive programme aimed at raising awareness of conservation and management issues in fishing communities.

4.8. DEPENDENCE OF FISHING COMMUNITIES ON THE RESERVES

Before management decisions are made it is imperative that both the impacts of communities on the Reserves and the impacts of regulations and restrictions on the communities themselves is understood. The results of this work have provided an insight into which communities interact most closely with the Reserves though it is important to bear in mind the limited duration over which this picture was gained. In many ways this work may be considered a pilot study, and further recommendations are outlined in Section 5.1.

The results demonstrate that the fishing communities that operate from Mbweni, Unonio, Kunduchi, Mbezi, Kawe, Msasani and Banda beach, all make use of resources in the Reserves. Due to the differing proximity of each to the Reserves and the limitations imposed by the range of fishing boats, the level of dependence was also observed to vary. For instance, Mbweni and Banda beach appeared to primarily use other fishing grounds whilst the remainder appear almost entirely dependent on the Reserves as the closest and most accessible sites.

If representative of wider trends, these facts have great implications for future management decisions. For instance, without considering the

dependence of local communities on local resources, the closure of certain fishing grounds or the restriction of certain gear types may:

- criminalise fishermen who do not have suitable boats and gear to reach alternative fishing grounds or obey gear restrictions
- increase pressure on areas without protection, pushing them beyond their carrying capacity and degrading them to unrecoverable levels
- sustain and increase poverty and environmental degradation through a cycle of low income, lack of access to resources, use of destructive methods, over-exploitation, leading to further reductions in income (poverty).

To avoid problems such as these, the management of the MPA should be carried out in a sensitive manner towards local communities. The majority of fishermen contacted fished daily and were solely dependent on it for income. Compensation may be appropriate where access is restricted to resources. Fundamentally, the success of the MPA is likely to rely on the development of alternatives to fishing and the provision of gear exchange and improvement schemes. These are needed to both reduce the overall level of fishing pressure and to allow those who continue to fish to do so in a more sustainable manner. Preliminary investigations by Wagner et al. (1999) concluded that mariculture (seaweed farming) and eco-tourism represent two potential alternative income-generating activities. Further work is needed to examine the success of the small-scale seaweed farms set up in the wake of the study by Wagner et al. (1999) and to investigate the potential involvement of communities in eco-tourism. Investigations should also focus on identifying further alternatives.

4.9. ATTITUDES TOWARDS MANAGEMENT

The majority of fishermen that were contacted during this study agreed with the need for regulations and felt that they would benefit the fishery in the long-term. They also agreed that closed areas and seasons would be a good idea, demonstrating a considerable awareness of several key management issues. Above all there seemed to be an overwhelming support for the development of a management plan from all three stakeholder groups contacted by questionnaire. The high level of concern over continued destruction of the coastal resources was also highlighted.

- The majority of divers, visitors and fishermen contacted in this study stated that they are anxious to see patrols in the Reserves, primarily to combat the use of destructive fishing practices. This step is one that should be taken as soon as possible to act as a deterrent to those involved in illegal activity, especially in view of the fact that, at present, the Marine Police do not have a boat to carry out their duties (Kitonka, pers. commun.- Marine Police). Prompt action on this issue will also boost stakeholder confidence in the MPRU by demonstrating that steps are being taken.
- Though only mentioned by several respondents in this study (all of whom were divers) consideration should be given to regulation of the production and sale of fine mesh fishing nets. Enquires revealed that nets with meshes of 1 cm are freely available in any amount from the Dar es Salaam-based Tanzania Fishnets Industries Ltd. (one of two companies reported to supply

most of Tanzania). Though this is undeniably a difficult task, especially since much of the production is for export, such regulation would help attack the problem at source.

- Many respondents (divers and hotel staff) also suggested that mining and construction operations need to be more closely monitored to prevent what is almost certainly the corrupt sale of dynamite for the purpose of fishing. Many believe that patrols alone would not be effective. Instead they stated that the government should be looking at strict controls and accountability of mining and construction companies, with a view to introducing alternative substances that cannot be detonated underwater (e.g. TNT). It was contended that this long-term solution would solve much of the problem by curtailing the availability of dynamite from the outset.
- A fair proportion of the fishermen who responded during this study suggested that increased vigilance on the part of fisheries officers would be of help. Dynamited fish are relatively easy to distinguish due to the amount of damage that they sustain in a blast and can be checked when officers take catch data and sale price information. Reportedly, officers have been aware of dynamited catches but have done nothing to stop their sale. Fisheries officers appear, therefore, to need encouragement to take action along with the provision of the means to enforce regulations. An atmosphere of community support and participation will make this easier, and this can only be generated through awareness, educational and capacity building programmes.

4.10. MARINE RESERVES OR MARINE PARK?

Current legislation under the Marine Parks and Reserves Act 1994 states that no person shall perform any kind of recreational activity or extract resources within the Reserves. The visitors who swim or snorkel, the divers, and the fishermen are thus breaking the law, suggesting that the Reserve status is outdated and needs to be changed to that of a multi user Marine Park. This is especially true given the large number of people that depend on the DMRS resources for their survival.

The design of the Reserves (i.e. the boundary demarcation) also raises several further concerns, all of which support the view that the status should be reviewed: First, the boundary follows the 5-fathom (ca 10 m) depth contour hence the edge is convoluted and irregular in shape. This method of demarcation would make it difficult, or even impossible, to recognise when out on the water in a boat. In agreement with A.T. Kamukuru (pers. commun.) this may lead to problems for fishermen, recreational users and patrols in terms of regulatory enforcement.

Second, the boundaries do not obey sound ecological principles. In tropical marine ecosystems, the three main components of seagrass, mangrove and coral reef are all closely linked through various processes in an 'open system' (Agardy, 1995). Within the area demarcated by the current boundary, however, only coral reef and seagrass appear to be represented and little is known about the extent of the latter (Muhando and Francis, 2000). Moreover, the actual area demarcated by the current boundaries is small and fragmented into four

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separate parts. In reality, activities such as beach seine and mangrove clearance along the Kunduchi coast are thus also likely to be affecting the ecology of the DMRS but are not covered by its legislation.

Third, similar problems of resource overuse are undoubtedly occurring around the islands of Makatumbe and Sinda. Fishermen contacted in this study at Banda beach revealed that 85% had fished in these areas, and the sheer size of the fleet operating from this landing site would also suggest that there is enormous pressure on the resources there. Should the boundaries remain as they are now, restrictions in the DMRS may also have the effect of directing more fishing pressure onto adjacent reefs. Moreover, the inevitable growth of the population of Dar es Salaam will only compound these problems.

Fourth, from the results of interviews with the DYC and hotels, Mbudya shores attract more divers than the islands within the Reserves, suggesting that management of this activity should also cover these reefs.

In view of the above facts, it is apparent that an integrated approach is needed for the management of the coastal resources in the Dar es Salaam region. A new boundary should be devised encompassing a far wider area to include the coastal margin (i.e. mangroves, beaches and shallow seagrass beds) and extend outwards to cover the reefs of Mbudya shores, Makatumbe and Sinda. Ras Ndege would represent a suitable boundary in the south and the MPA should perhaps extend northwards past the Katapumbe reefs in the north. The offshore limit should be imposed at a point that provides a wide enough buffer zone to ensure that any activity taking place in the immediate coastal area comes under the authority of the MPRU.

The move would require a change in designation from Marine Reserves to Marine Park. Further discussion through the forum of stakeholder meetings is vital in order to share ideas and establish a checklist of the necessary actions needed in order to make this a reality. Several recommendations are given in Section 5.2.

Though the change of status and demarcation of the boundary should perhaps be the ultimate goal for management of the marine resources in the Dar es Salaam area, it should not sideline the initiatives that are urgently needed to protect those areas covered by existing legislation. Efforts should begin immediately on promoting the sustainable use of the Marine Reserves as they stand now. All developments would be ultimately compatible with the creation of a larger MPA with Marine Park status. Much work is needed, recommendations for which are laid out in Section 5.2.

4.11. DISTRIBUTION OF INFORMATION

From the outset, within the objectives of the study, many people were called in to share reports, papers, statistics, and other findings, to help collate a picture of the stakeholders in the Reserves. This did not, however, always produce results due to a lack of awareness on current research in coastal management.

The problem is best described as a decentralisation of information. One of the symptoms is the duplication of work efforts, because few are fully aware of other studies proposed or being carried out. Indeed, all of the stakeholders from government or academic offices contacted during this study (list of

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contacts supplied in Appendix 7.2) cited this as one of the major stumbling blocks to efficient coastal management.

For instance, several proposals for future work are also of great relevance to the management plans of the MPRU. For instance the Kinondoni Coastal Area Management Plan (KICAMP) and Marine Action Conservation Tanzania (MACT) both have plans to carry out work within the Reserves. The study area of KICAMP incorporates all four islands as well as coastal habitats and local communities, and details both socio-economic and biological surveys (Anon, 1999). It is imperative that these organisations work closely with MPRU in order to avoid duplication of efforts and maximise the efficient use of resources. This requires immediate effort again, through the forum of stakeholder meetings where all parties concerned are invited to discuss proposals and intentions.

Some long-term progress does appear to have been made by TCMP in the form of a database on coastal research. However, few stakeholders contacted in this study were aware of this resource. It was also reported recently that Institute of Marine Sciences (IMS) of the University of Dar es Salaam is establishing a similar database in order to tackle the issue. This again raises the issue of duplication because, after all, the centralisation of information should result in its availability to anyone who requests it. Centralisation from the outset should perhaps be coordinated by one body, which will be responsible for its maintenance and updating.

These are all challenges that face those charged with management of the Dar es Salaam Marine Reserves system. For the efficient development and implementation of a management plan, it is necessary to tackle these issues, and to achieve this will need assistance from all of the other players.

5. Conclusion

On the basis of the questionnaire and field survey results, along with observations gained during meetings, interviews and informal discussions, the following conclusions can be drawn:

- A diverse range of stakeholders use the Reserve resources.
- The most prominent groups, in terms of number using the resources in the Reserves, are visitors, divers and fishermen.
- The islands are an important amenity to visitors, the majority of whom are tourists. They are attracted largely by their naturalness and want to see it preserved as it is.
- Little environmental impact was noted on the islands by visitors.
- Few conflicts were apparent between the interests of visitors and other stakeholders. Where conflict arose it was over the issues of jet-ski use, passage of ferries through the Reserves, and the continued sale of marine curios in both islands and several of the hotels.
- Divers, on the other hand, had noted a severe degradation of the marine environment, including a decline in the abundance of fish and coral health, and an increase in dynamite fishing.
- The use of destructive fishing methods in the Reserves creates a conflict of interest between divers and fishermen.
- Whilst the majority of divers and visitors were aware of the protected status of the Reserves, there was a distinct lack of awareness concerning regulations. This highlights the need for a comprehensive programme for raising awareness amongst recreational users.
- The impression given by many was that the existing notices were uninteresting and inadequate. This suggests that an alternative approach is needed that heightens interest in the marine environment in order to encourage visitors to cooperate with restrictions. UDSM, TRAFFIC, and several hotel owners have offered to assist with the development of interpretation centres.
- The fishing communities of Kunduchi, Unonio and Msasani all appear to be heavily dependent on the resources in the Reserves, whilst those operating from Mbwani and the Banda beach landing site appear to rely primarily on other fishing grounds.
- The majority of fishermen had seen a decline in fish catches since they began fishing in the Reserves. The use of small mesh nets (beach seine in particular) and dynamite were responsible for this change.
- Observations during this study confirmed the continued use of beach seine and the impression given was that fishermen feel unable to control the problem effectively without intervention.
- Though many suggested reasons as to why the fishery was in decline, the vast majority were not aware of any regulations protecting the Reserves.

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This confirms the need for a programme of education in all of the communities that use the Reserves.

- The majority of fishermen was in favour of regulations and felt that they would benefit the fishery in the long-term. They also agreed that restrictions on areas and seasons would be a good idea.
- Hotels and the DYC rely on the Reserves as a recreational resource for their guests and members.
- Both organise dives in the Reserves area from their premises.
- Both were willing to become actively involved in management issues.
- The number of visitors, divers and fishermen who use the DMRS suggest that the complete exclusion Reserve status is not appropriate.
- All stakeholder groups showed an overwhelming support for the development of a management plan.

5.1. FURTHER RESEARCH

On the basis of the findings of this study, further research is recommended in the following areas:

1. Recreational activity:

- Collect quantitative data on frequency and sites of dives and produce a map of distribution. Contacts in Appendix 7.2.
- Investigate private and commercial boat use in the Reserves
- Repeat questionnaire surveys for visitors and divers, featuring:
 - larger samples
 - longer time period
 - multiple seasons
 - use of other sources of assistance, e.g. UDSM in collection and supervision of questionnaires.

2. Dependence of fishing communities on marine resources:

- Using a large sample size (or entire group) quantify number of fishermen from each community using particular fishing sites.
- Using a large sample size, quantify gear type used at particular fishing sites.
- Quantify sustainable yield of the Reserves fishery.
- Take into account seasonal variation.
- Investigate gear exchange and improvement schemes to allow fishermen to use sites further offshore.
- Investigate alternative sources of income (e.g. agriculture, eco-tourism, mariculture).

Observations made during this work have also identified a need for:

3. Distribution and relevance to the DMRS of:

- Areas of high productivity, i.e. seagrass and mangrove.
- Courtship or spawning areas.
- Migratory routes.
- Nursery areas.

4. Understanding of the significance and dynamics of the seasonal fisheries sector

- Biological surveys of the terrestrial habitats on the islands off Dar es Salaam.
- Impacts of coastal land use on marine habitats.
- Beach erosion mitigation measures and their effects on other parts of the coast.
- Extent and sources of marine pollution and potential solutions.
- Impacts of commercial ferry traffic in the Reserves.

5.2. RECOMMENDATIONS

It is recommended that the status of the current Marine Protected Area be changed from 'Marine Reserves' to 'Marine Park'. This should lead ultimately to a multi-user system within a framework of integrated coastal management for the Dar es Salaam coastal area. This process should begin with:

- Assessment of the status of marine habitats currently outside the Reserves boundary but within the wider potential MPA. Surveys should focus on:
 - The reefs of Katapumbe, Mbweni, Mbudya shores, Makatumbe, and Sinda.
 - Quantification of resource use by local communities and their level of dependence on specific habitats/sites.
- The establishment of a practical MPA boundary encompassing all of these areas as well as the islands within the existing DMRS along with examples of all marine habitats (e.g. mangrove, seagrass and coral reef).

However, steps also need to be taken simultaneously to promote the sustainable use of coastal resources within the existing DMRS. To achieve this, it is recommended that the following actions are taken, all of which are compatible with the long-term objective of establishing the area as a Marine Park:

- Reduce fishing intensity:
 - Provide incentives and assistance to promote alternative sources of income and improvement of fishing gear.
 - Halt immediately the use of destructive fishing methods (beach seine and dynamite).
- Develop a plan for restricted fishing areas and seasons based on:
 - results of habitat assessments (i.e. ecological importance);
 - importance of particular reefs to local communities;
 - feasibility of alternative fishing grounds and success of alternative income development programme.
- Establish a comprehensive programme of ecological monitoring including:
 - permanently marked sites;
 - standardised methods.
- Improve existing system of fisheries monitoring:
 - incorporate fisheries data collection into overall habitat monitoring programme;

- standardise and validate data collection procedure;
- extend range of data collected (e.g. site fished);
- increase facilities available for fisheries officers;
- standardise format of reports;
- maintain availability of records per landing site as well as national averages.
- Halt immediately the sale of marine curios on the islands in the Reserves and Hotels on the Kunduchi coast.
- Monitor all recreational activity in the Reserves (e.g. jet ski, boats, diving).
- Establish a central database for information under the management of one institution/organisation. All research and proposals should be registered there.
- Organise regular stakeholder meetings.
- Ensure efficient cooperation between all parties to avoid duplication of efforts.
- Consult regularly with KICAMP and MACT to ensure efficient organisation of work efforts in the Kunduchi coastal area.
- Use hotels and DYC to assist with conservation initiatives.
- Enforce regulations by establishing high-profile and regular patrols in the Reserves.
- Re-introduce telephone service for reporting illegal activity in Reserves.
- Install mooring buoys in sites that receive large numbers of visitors (e.g. Bongoyo and Mbudya).
- Develop and implement a structure for the payment and collection of MPA entry fees:
 - use tiered structure based on residency status for visitors to the islands;
 - consult hotels, divers, and boat owners on feasibility of other types of fee where appropriate;
 - develop efficient advertisement of fee structure rationale and collection methods;
 - provide regular information on total revenue collected spending plans, and targets to all stakeholders.
- Raise awareness of marine conservation and management issues:
 - set up interpretation centres on visited islands, e.g. Bongoyo and Mbudya (e.g. in conjunction with Frontier-Tanzania, UDSM, TRAFFIC, and/or private sector);
 - encourage school groups to visit and assist with conservation initiatives;
 - initiate a comprehensive programme to raise awareness in fishing communities.
- Involve local communities in all management decisions.

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7. Appendices

7.1. APPENDIX 1. CALENDAR OF EVENTS

Date	a.m.	p.m.
19.6.00	Stakeholder / user group identification	Introduction of work effort and request for reports from IMS and UDSM (E-mail). Literature search
20.6.00	Stake holder/ user group identification. Literature search	Literature search. Work programme plan
21.6.00	Questionnaire design—Divers	Questionnaire design—Divers
22.6.00	Questionnaire design—Visitors	Questionnaire design—Visitors Meeting with DYC Dive club members
23.6.00	Questionnaire design—Divers/ Fisheries	Questionnaire design—Divers/ Fisheries. Meeting with MPRU. Map search
24.6.00	Meeting with Kunduchi Village Chairman (Hamadi Mwinyi), Fisheries Officers (Sarah), Hotel Managers, Director of TAFIRI (Prof. Bwathondi)	Questionnaire design—Dive Centre
25.6.00	Beach fisheries surveys (Kunduchi). Meeting with Sylvester, Boat Operations Manager—Slipway	Meeting with Managing Director of White Sands Hotel (Paul Ferguson) Presentation of study to DYC
26.6.00	Boat fisheries (Pangavini/Mbudya). Stationery purchase Questionnaire design/translation Telephone enquires with Simon Milledge (TRAFFIC)	Beach fisheries (Kunduchi) Meeting with Kunduchi Village Chairman
27.6.00	Boat fisheries (Bongoyo). Kiswahili questionnaire translation. Distribute dive centre	Beach fisheries (Kunduchi) Meetings with TAFIRI (Prof. Bwathondi) and DYC Commodore

Date	a.m.	p.m.
	questionnaires. Chart and catch statistics sourcing. Distribute visitor questionnaire	(Henk Nouwens)
28.6.00	Boat fisheries (Bongoyo). Beach fisheries (Kunduchi). Hydrographic office for charts. Fisheries office for catch statistics. Meetings with TAFIRI (Prof. Bwathondi and Mr Kumukuru)	Beach fisheries (Kunduchi). Boat fisheries cancelled – no boat. Redistribute dive centre questionnaires
29.6.00	Boat fisheries (Mbudya). Beach fisheries (Kunduchi). Distributed diver questionnaires. Interviews with fishermen (Msasani). Meeting with District Fisheries Officer (Sohari Mkwawa)	Meeting with Banda Beach Fisheries Officer (Juma Msangi). Photocopy Navigational charts. Meeting with DYC dive club. Redistributed diver questionnaire. Interviewed prominent sport fisherman
30.6.00	Beach fisheries (Msasani). Translation of fisheries interview results. Meeting with Banda Beach Fisheries Officer (Juma Msangi)	Beach fisheries (Msasani). Enquires with boat owners to arrange boat for 1.7.00. Meeting with Simon Milledge (TRAFFIC)
1.7.00	Distribute fisheries questionnaires (Msasani). Meeting with Mbweni Fisheries Officer (Rajabu Shabuka). Structured interviews with Mbweni fishermen	Slipway to collect and resupply questionnaires. Beach fisheries (Msasani)
2.7.00	Distribute fisheries questionnaires (Msasani). Rajabu Shabuka travel to Unonio to interview fishermen. Data entry and spreadsheet design	Data entry and spreadsheet design
3.7.00	Boat fisheries (Fungu Yasini)—bad weather. Photos taken. Meeting UDSM (Greg Wagner) Informed of MACT work	Beach fisheries (Msasani) Data entry and spreadsheet design
4.7.00	Interview with Mr Sylvester, Boat Operations Manager at Slipway. Collected questionnaires. Data entry and spreadsheet design	Boat fisheries (Mbudya/Bongoyo). Interview with commercial lobster outfit setting up for export from Dar region. Photos taken for slide show. Interview with Mr Kamukuru (TAFIRI)

Date	a.m.	p.m.
5.7.00	Boat fisheries (Pangavini). Beach fisheries Unonio and Banda Beach. Questionnaires collected from Unonio, Banda beach, and Msasani. Photos of beach seine for slideshow	Mbudya and Bongoyo island visit. Walk – service / litter appraisal. Photos of islands for slideshow
6.7.00	Boat fisheries (Mbudya). Beach fisheries (Unonio). Interviews with all hotel dive centre representatives. Collected questionnaires from hotels	Mbudya and Bongoyo island visit. Sorted out problems of bad questionnaire response. Meeting with DYC dive club to discuss problems with questionnaires
7.7.00	Data entry and report preparation	Data entry and report writing
8.7.00	Data entry	Data entry
9.7.00	Data entry	Data entry
10.7.00	Data entry. Interview with Mr Pamba (MNRT). Collected questionnaires from Slipway	Data entry. Telephone interviews with Mr Kitonka (Marine Police) and Mrs Shao (Tanzanian Tourist Board)
11.7.00	Data entry. Collection of questionnaires from Slipway and Msasani. Interviews with Mr Kiwia (MPRU) and Mr Daffa (TCMP)	Data entry. Collection of questionnaires from hotels. Interview with Mr Gulam (Kunduchi Beach Hotel). Telephone enquires: Tanzania Fishnets Industries Ltd and Geita mines
12.7.00	Data entry. Collection of questionnaires from hotels	Data entry
13.7.00	Data entry. Collection of questionnaires from hotels	Data entry. Collection of questionnaires from DYC. KICAMP report obtained from TCMP
14.7.00	Data entry. Report production	Data entry. Collection of questionnaires from Banda Beach. Report production
15.7.00	Data entry. Report production	Data entry. Report production
16.7.00	Data entry. Report production	Data entry. Report production

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7.2 APPENDIX 2 - CONTACTS

Name	Position / Organisation	Phone / E-mail
<i>FRONTIER-TANZANIA</i>		
Ms Catherine Northing	Country Coordinator (Tanzania)	022 2600796 frontier@twiga.com
Ms Liz Humphreys	Programme Manager Development (UK)	(000 44) 020 76133061 liz@frontierprojects.ac.uk
<i>MARINE PARKS AND RESERVES UNIT</i>		
Mr Chikambi Rumisha	Manager/Secretary	022 2120117/8 marineparks@raha.com
Mr Modest Kiwia	Chief Conservation Warden	022 2120117/8 marineparks@raha.com
Ms Anita Julius	Principal Conservation Assistant	022 2120117/8 marineparks@raha.com
Mr Nassor Mvoulana	Principal Conservation Assistant	022 2120117/8 marineparks@raha.com
<i>ACADEMIC/RESEARCH</i>		
Dr Greg Wagner	UDSM / MACT (Dept Zoology and Marine Biology)	gwagner@udsm.ac.tz
Dr Tim McClanahan	Coral Reef Conservation Project (CRCP)	crcp@africaonline.co.ke
Dr Julius Francis	Director, IMS	024 2230741
Mr Chris Muhando	Researcher, IMS	024 2230741
Prof. Bwathondi	Director General, TAFIRI	022 2650045 tafiri@africaonline.co.tz
Mr Kamukuru	Researcher, Kunduchi Fisheries Institute	tafiri@africaonline.co.tz
<i>HOTELS</i>		
Mr Audie	Dive Shop Manager, Bahari Beach Hotel	0811 327018 divemaxx@twiga.com
Mr Jens	Director, Silver Sands Hotel	022 2650231
Mr Phil Reader	Assistant Manager, Silver Sands Hotel	divemaxx@twiga.com
Mr Hannes	Dive Shop Manager, Sea Breeze Hotel	0812 783241 seabreeze@afsat.com
Mr Paul Ferguson	Managing Director White Sands Hotel	022 2647621 0811 339403 gap@raha.com
Mr Gulam Ismail	Owner/Director, Kunduchi Beach Hotel	0812 786920

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APPENDIX 2. cont'd

Name	Position / Organisation	Phone / E-mail
<i>FISHERIES DEPARTMENT</i>		
Ms Limo	Director General	022 2116159
Ms Johari Mkwawa	Municipal Fisheries Officer (Kinondoni)	022 2116159
Ms Sarah	Kunduchi Village Fisheries Officer	022 2116159
Mr Juma Msangi	Banda Beach Fisheries Officer	022 2116159
Ms Frida Shayo	Msasani Village Fisheries Officer	022 2116159
Mr Rajabu Shabuka	Mbweni Village Fisheries Officer	022 2116159
<i>OTHER</i>		
Mr Kitonca	Marine Police	022 223091/ 2111960
Mr J. Daffa	Project Leader, TCMP	022 2667589 jdaffa@epiq.com.tz
Mr Sylvester	Operations Manager Slipway Ferry, Msasani	
Mr Nouwens	Commodore, DYC	022 2118566 hebevm@intafrica.com
Mr Ger Steenberg	Dive section, DYC	022 2667644 germar@intafrica.com
Mr Simon Milledge	TRAFFIC	022 2700077 traffictz@raha.com
Mr Pamba	Ministry of Natural Resources and Tourism	022 2132302 tourism@africaonline.co.tz
Ms Shao	Tanzania Tourist Board, Tourism Services Manager	022 2111345
Mr Hamadi Mwinyi	Kunduchi Village Chairman	

7.3. APPENDIX 3. VISITORS QUESTIONNAIRE (ENGLISH)

The waters surrounding the islands of Bongoyo, Mbudya, Pangavini and Fungu Yasini host a rich diversity of marine life and have been granted special status as a Marine Protected Area (MPA). Work is under way to gather information on those who make use of the resources within the reserves, from visitors who enjoy a day relaxing on the beach, to those who depend daily on the productive fishing grounds. We would appreciate the few minutes of your time that it would take to fill out this questionnaire, the results from which will contribute directly towards the formulation of a long-term management plan.

Day of the week: Date: / / 2000

1.1 Please indicate the island visited.

- Bongoyo Mbudya Pangavini Fungu Yasini

VISITORS

2.0 Nationality.....

Gender M F Age.....

2.1 Please indicate your status at the present time.

- Tanzanian citizen Kenyan/Ugandan citizen
 other African citizen non-Tanzanian resident
 other (please specify)

2.2 Have you any dependants with you on today's visit? YES / NO (please specify number)

2.3 Please indicate the number of dependants per age category.

- 0-3 yrs 4-7 yrs 8-10 yrs 11-13 yrs 14-17 yrs

2.4 Please indicate the approximate number of visits you have made to the Island over the last year, i.e. June 1999 – June 2000 (including this visit).

- 1 2-5 5-10 10-20 20 or more

2.5 Unless it is your first visit, please indicate on which day of the week you usually go to the island.

- Saturday Sunday weekday (please specify)
 don't know

2.6 Please indicate approximately when you first visited one of the islands.

- less than 1 month ago less than 1 year ago
 less than 3 years ago more than 5 years ago
 don't know

2.7 Have you ever visited any of the other islands. YES / NO (if NO please go to question 2.9)

2.8 Please specify which reserve and the number of visits

- 1 2–5 5–10 10–20 20 or more visits
 don't know

2.9 Approximately how far have you travelled from your home today in order to visit the reserve? km

2.10 How much did it cost to visit to the island? \$ or TSH

2.11 What does this cost cover?

- don't know

ACTIVITIES

3.0 Please indicate the purpose of your visit to the island.

- tourist business research
 other (please specify)

3.1 Please indicate what activities you carried out in the reserves today.

- swim snorkel picnic walk see wildlife
 other (please specify)

3.2 How long was your visit from when you left the mainland to when you returned?hrs

IMPRESSIONS

4.0 Please indicate how you would describe the condition of the following areas on the island.

	clean	Reasonably clean	very dirty	dirty	don't know
Beach	<input type="checkbox"/>				
Water	<input type="checkbox"/>				
Woodland	<input type="checkbox"/>				

4.1 Please indicate if, since your first visit to the islands, you have noticed any change in the following (If it is your first visit please go to question 4.2).

	increase	decrease	no change	haven't noticed
Beach litter	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Coral health	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fish abundance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Water litter	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Woodland litter	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4.2 Please describe three aspects of the reserve that attracted you to visit today.

4.3 Do you think that the boat transport to the island is adequate?YES / NO (if NO please proceed to question 5.0)

4.4 Please describe what changes or improvements you think could be made to the service.

MANAGEMENT

5.0 Are you aware that the island is a Marine Protected Area. YES / NO (if NO proceed to question 5.2).

5.1 How did you find out this information?

5.2 Are you aware of any regulations protecting the island. YES / NO (If YES please specify)

5.3 Do you agree with the principle of paying an entry fee for the use and upkeep of the reserves? YES / NO

5.4 Please indicate your feeling towards the development of the following in the reserve.

	1	2	3	4	5
Marked snorkelling points	<input type="checkbox"/>				
Marked walking trails	<input type="checkbox"/>				
Providing ecological info	<input type="checkbox"/>				
Providing historical info	<input type="checkbox"/>				
Scientific research	<input type="checkbox"/>				
Ecological monitoring	<input type="checkbox"/>				
Guides	<input type="checkbox"/>				
Toilet facilities	<input type="checkbox"/>				
Small shops	<input type="checkbox"/>				
Places to eat	<input type="checkbox"/>				
Litter collection	<input type="checkbox"/>				
Park patrols	<input type="checkbox"/>				
Suggestion boxes	<input type="checkbox"/>				
*Other (Please specify)	<input type="checkbox"/>				

1, strongly disagree; 2, disagree; 3, don't mind; 4, agree; 5, totally agree

5.5 Please indicate the amount in equivalent Tanzanian shillings that you think tourist, national and resident visitors should contribute towards the upkeep of the reserve (per visit).

	a	b	c	d	e	f	g	h	i	j	k
Tourists	<input type="checkbox"/>									
Nationals	<input type="checkbox"/>									
Residents	<input type="checkbox"/>									

a, 0; b, 500; c, 1000; d, 2000; e, 3000; f, 4000; g, 5000; h, 6000; i, 7000; j, 8000; k, Other (specify)

5.6 If you have suggested different entry fees for tourists, nationals, and residents, please comment on the reasons why? (if not go to question 5.7)

5.7 Please indicate if you think there should be local school group concessions for educational purposes?

YES NO don't know

.....

5.8 Please indicate if you think a management plan is necessary for the reserve?

YES NO don't know (please go to question 5.10).

5.9 In either case, please explain the reasons why?

5.10 Were there any other activities taking place in the reserve that compromised your enjoyment of the resource? (please comment on your answer)

5.11 What do you suggest could be done to reduce this conflict?

5.12 How would you feel about your access to some parts of the reserve being restricted for conservation purposes?

opposed not opposed don't know need more information

5.13 Do you think that any other activities should be restricted in the reserve?

YES NO don't know.

5.14 What are these?

5.15 Please explain why you believe they should be restricted?

Thank you for taking your time to fill in this questionnaire. Please feel free to use the space below to voice any further suggestions that you may have concerning the Marine Protected Area. If you would like to know more about the project or have any other points you believe are important for this discussion, please contact Frontier-Tanzania on: (22) 2600796, or write to: P.O. Box 9473, Dar es Salaam, or e-mail: frontier@twiga.com.

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2.8 Tafadhali elezea hifadhi gani na idadi ya safari

1 2–5 5–10 10–20 20 au zaidi sijui

2.9 Kadiria ni umbali gani umesafiri ili kuja kuona hifadhi za bahari (ktk kilometa)km?

2.10 Umelipa kiasi gani cha fedha ili kukitembelea kisiwani?

\$ au TSH

2.11 Unajua kwa nini unalipa pesa hizo?

sijui

MADHUMUNI

3.0 Tafadhali eleza madhumuni ya kutembelea kisiwa

utalii biashara utafiti

vinginevyo (elezea)

3.1 Tafadhali eleza ulichokifanya kwenye hifadhi leo (unaweza kujaza zaidi ya kiboksi kimoja)

kuogelea kuogelea na kioo pikiniki

kutembea kuangalia wanyama pori

vinginevyo(elezea).....

3.2 Muda gani ulioutumia hadi uliporudi kutoka kisiwani

masaa

MTAZAMO

4.0 Je unaelezeaje hali ya maeneo yafuatayo kisiwani?

	safi	inaridhisha	chafu	chafu sana	sijui
Ufukwe	<input type="checkbox"/>				
Maji	<input type="checkbox"/>				
Msitu	<input type="checkbox"/>				

4.1 Tangu safari yako ya kwanza kisiwani umeona mabadiliko yeyote (kama ni safari ya kwanza endelea na swali 4.2)

	ongezeka	pungua	hakuna mabadiliko	sijui
Takataka ufukweni	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hali ya matumbawe	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hali ya samaki	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Takataka baharini	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Takataka msituni	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4.2 Tafadhali taja vitu vitatu vilivyokuvutia kutembelea visiwani leo

4.3 Unafikiri usafiri wa boti kwenda kisiwani unatosha?

NDIYO / HAPANA (kama HAPANA endelea na swali la 5.0)

4.4 Tafadhali eleza mabadiliko muhimu yanayopaswa kufanywa

UTAWALA

5.0 Je unajua kisiwa hiki kipo kwenye maeneo tengufu ya bahari?

NDIYO / HAPANA (kama HAPANA endelea na swali la 5.2).

5.1 Ulijuaje habari hizi?

5.2 Unajua sheria au kanuni yoyote inayotuka kukilinda kisiwa?

NDIYO / HAPANA (kama NDIYO fafanua)

5.3 Je unakubaliana na wazo la kulipa ada unapoingia ndani ya hifadhi kwa ajili ya kuhifadhi maeneo hayo?

NDIYO/ HAPANA

5.4 Tafadhali toa maoni yako kuhusu uendelezaji wa vitu vifuatavyo katika hifadhi

	nakataa		nakubali		
	kabisa	nakataa	sijali	nakubali	kabisa
Alama sehemu za					
kuogelea kwa kioo	<input type="checkbox"/>				
Alama mapito ya wanyama	<input type="checkbox"/>				
Habari za ekologia	<input type="checkbox"/>				
Habari za kihistoria	<input type="checkbox"/>				
Taarifa za utafiti	<input type="checkbox"/>				
Waongozaji	<input type="checkbox"/>				
Huduma za vyoo	<input type="checkbox"/>				
Maduka madogo madogo	<input type="checkbox"/>				
Mahali pa kulia chakula	<input type="checkbox"/>				
Ukusanyaji taka taka	<input type="checkbox"/>				
Doria kwenye hifadhi	<input type="checkbox"/>				
Masanduku ya maoni	<input type="checkbox"/>				
Mengineo (tafadhali fafanua)	<input type="checkbox"/>				

5.5 Ni kiasi gani cha fedha za kitanzania zilipwe na watalii, wageni wenyeji na raia/wenyeji wa Tanzania ili kuchangia maendeleo ya hifadhi (kwa kila safari)

	1	2	3	4	5	6	7	8	9	10	11
Watalii	<input type="checkbox"/>									
Wenyeji	<input type="checkbox"/>									
Wageni wenyeji	<input type="checkbox"/>									

1, 0; 2, 500; 3, 1000; 4, 2000; 5, 3000; 6, 4000; 7, 5000; 8, 6000; 9, 7000; 10, 8000; 11, tofauti(elezea)

5.6 Kama unaona kuwe na viwango tofauti vya malipo ya kuingia kwenye hifadhi kati ya watalii, wageni wenyeji na raia/ wenyeji wa Tanzania tafadhali toa maoni yako kwa nini? (kama HAPANA endelea na swali la 5.7)

5.7 Je unafikiriaje wazo la kuwepo na kiwango kidogo kwa ajili ya shughuli za mashule ya Tanzania ndani ya hifadhi

-
- NDIYO HAPANA sijui
- 5.8 Je kuna umuhimu wa kuwa na kanuni na taratibu za kuhifadhi visiwa hivi?**
- NDIYO HAPANA
- sijui (kama hujui endelea na swali la 5.10)
- 5.9 Eleza sababu za kuwepo au kutokuwepo na kanuni na taratibu za kuhifadhi visiwa hivi**
- 5.10 Je kuna shughuli zozote zinazoendelea ndani ya hifadhi ambazo zinazosababisha kupungua kwa vivutio na uzuri wa hifadhi?**
- NDIYO / HAPANA (kama HAPANA endelea swali la 5.12, kama NDIYO tafadhali fafanua)
- 5.11 Kifanyike nini kupunguza tatizo/matatizo hiyo?**
- 5.12 Je utajisikiaje ikiwa shughuli vitazuiwa katika baadhi ya maeneo ya hifadhi kwa madhumuni ya kuhifadhi mazingira ya maeneo haya?**
- nitapinga sitapinga sijui
- nahitaji ufafanuzi na maelezo zaidi
- 5.13 Unafikiri shughuli zingine zizuiwe ndani ya hifadhi?**
- NDIYO HAPANA sijui
- 5.14 Shughuli zipi unazofikiri zizuiwe?**
- 5.15 Tafadhali eleza kwa nini shughuli hizi zizuiwe?**
- Asante sana kwa kutumia muda wako kujibu maswali haya. Unaweza pia kutumia sehemu ya nyuma ya karatasi kwa maelezo na maoni zaidi kuhusu maeneo tengefu ya bahari katika pwani ya Dar es Salaam. Ukitaka maelezo zaidi kuhusu mradi huu tafadhali wasiliana na Frontier Tanzania, simu 22 2600796, P.O. Box 9473, Dar es Salaam, e-mail: frontier@twiga.com

7.5. APPENDIX 5. FISHERIES QUESTIONNAIRE (ENGLISH)

The waters surrounding the islands of Bongoyo, Mbudya, Pangavini and Fungu Yasini host a rich diversity of marine life and have been granted special status as a Marine Protected Area (MPA). Work is under way to gather information on those who make use of the resources within the reserves, from visitors who enjoy a day relaxing on the beach, to those who depend daily on the productive fishing grounds. We would appreciate the few minutes of your time that it would take to fill out this questionnaire, the results from which will contribute directly towards the formulation of a long-term management plan.

- 1 **What is your name?**
- 2 **How old are you?**
- 3 **Which village are you from?**
- 4 **What sort of boat do you have?**
- 5 **Where is your boat registered?**
- 6 **What sort of gear do you use?**
- 7 **How many years IN TOTAL have you been fishing for?**
- 8 **How long have you fished around the islands for?**
- 9 **(IF DIFFERENT ANSWERS TO 7 and 8) Where did you fish before?**
- 10 **(IF DIFFERENT ANSWERS TO 7 and 8) Why did you prefer to fish around the islands now?**
- 11 **How often do you fish around the islands?**
 - daily every few days weekly
 - other (please specify)
- 12 **Which island do you fish around most?**
 - Bongoyo Mbudya Pangavini Fungu Yasini
- 13 **Why?**
- 14 **Since you began fishing around the islands have catches:**
 - increased decreased stayed the same don't know
- 15 **(If DECREASED) How concerned are you about catches getting smaller?**
 - not concerned a little very don't know
- 16 **(If CONCERNED) Why are you concerned?**
- 17 **(If DECREASED) Why do you think catches have got smaller?**
- 18 **Is this your only source of income?**
YES / NO
- 19 **How many people in your family depend on your livelihood?**

-
- 20 **Do you think you'll carry on fishing to earn a living?**
YES / NO (If NO why not?)
- 21 **Do you think your children will?**
YES / NO (if NO why not?)
- 22 **Do you know that the islands are a marine protected area?**
YES / NO
- 23 **(If YES) How did you find this information?**
- 24 **Do you agree with these regulations?**
YES / NO (Please explain why)
- 25 **If fishing were restricted in areas where fish breed what do you think would happen to fish catches all around the island?**
 increase decrease stay the same don't know
- 26 **If you thought that not fishing in certain areas of the reserve or at certain times of year resulted in better catches would you be happy to do this?**
 yes no don't know need more information
- 27 **Do you think any of these fishing techniques below should be stopped around the islands?**
 seine net drag net gill net fish traps
 line spear dynamite poison
 fence trap don't know
- 28 **Why?**
- 29 **Are you happy to pay a licence fee to be able to fish?**
YES / NO
- 30 **(If YES) What do you think the money should be used for?**
- 31 **(If NO) Why not?**
- 32 **Would you like to see any of the following introduced?**
 community based management fishing regulations
 government based management patrol boats
 regular meetings other (please specify)

Thank you for taking your time to fill in this questionnaire. Please feel free to use the space below to voice any further suggestions that you may have concerning the Marine Protected Area. If you would like to know more about the project or have any other points you believe are important for this discussion, please contact Frontier-Tanzania on: (22) 2600796, or write to: P.O. Box 9473, Dar es Salaam, or e-mail: frontier@twiga.com.

7.6. APPENDIX 6. FISHERIES QUESTIONNAIRE (KISWAHILI)

Maji kuzunguka visiwa vya Bongoyo, Mbudya, Pangavini na Fungu Yasini yana viumbe wengi wa baharini na maeneo hayo yamepewa hadhi ya kuwa maeneo tengefu ya bahari. Kazi inayofanyika sasa ni kukusanya habari ya hifadhi ya bahari, kutoka kwa wageni wanaofurahia kupumzika katika fukwe tulivu, na pia kutoka kwa watu wanaopata ridhiki zao kutokana na uvuvi katika maeneo hayo. Tunatoa shukurani zetu kwa kutumia muda wako kujaza maswali yafuatayo. Maoni yako yatasaidia moja kwa moja katika uandaaji wa mipango ya muda mrefu ya uendeshaji wa visiwa hivi.

- 1 **Jina lako?**
- 2 **Una umri gani?**
- 3 **Unaishi kijiji gani?**
- 4 **Una chombo cha aina gani?**
- 5 **Chombo chako kimesajiliwa wapi?**
- 6 **Unatumia uvuvi wa aina gani ?**
- 7 **Mpaka sasa umevua kwa muda gani?**
- 8 **Kwa muda gani umevua kuzunguka visiwa Bongoyo, Mbudya, Pangavini, au Fungu Yasini?**
- 9 **Kabla hujaanza kuvua karibu na visiwa, ulikuwa unavua wapi?**
- 10 **Kwanini unapenda kuvua karibu na visiwa hivi.**
- 11 **Unavua mara kwa mara karibu na visiwa hivi?**
 kila siku kila siku mbili kila wiki moja
 Mengineo (tafadhali fafania)
- 12 **Kisiwa gani unapendelea kuvua?**
 Bongoyo Mbudya Pangavini Fungu Yasini
- 13 **Kwanini?**
- 14 **Tangu umeanza kuvua karibu na visiwa hivi unaonaje hali ya uvuvi:**
 inaongezeka inapungua iko vilevile sijui
- 15 **Kama samaki wanapungua inakuhusu?**
 hapana kidogo sana
- 16 **Kwanini inakuhusu?**
- 17 **Kama samaki wamepungua unafikiri ni kwanini?**
- 18 **Je una chanzo kingine cha kukuingizia kipato?**
NDIYO / HAPANA (Kama NDIYO ni kipi?)
- 19 **Una watu wangapi wanaokutegemea?**
- 20 **Unafikiri utaendelea na kazi ya uvuvi?**
NDIYO / HAPANA / SIJUI (Kwanini?)

-
- 21 Unafikiri watoto wako watarithi kazi ya uvuvi?**
NDIYO / HAPANA (Kwanini?)
- 22 Unajua kuwa visiwa hivi ni hifadhi ya baharini?**
NDIYO /HAPANA
- 23 Kama jibu ni NDIYO, ulijuaje?**
- 24 Je unakubaliana na sheria hizi?**
NDIYO /HAPANA
- 25 Kama ingezuiliwa kuvua kwenye mazalia ya samaki, unafikiri hali ya uvuvi itakuaje?**
 itaongezeka itapungua itakua vilevile sijui
- 26 Katika hifadhi hizi, utajisikiaje ikiwa baadhi sehemu zitazuiliwa kuvua kwa muda?**
 sawa siyo sawa sijui nahitaji taarifa zaidi
- 27 Ni aina gani za uvuvi katika hizi zinafaa kuzuiliwa katika hifadhi?**
 nyavu kokoro jarife madema mshipi
 mkuki baruti sumu uzio sijui
- 28 Kwanini?**
- 29 Unafikiri ni sawa kulipia leseni?**
NDIYO / HAPANA
- 30 Kama NDIYO, unafikiri pesa za leseni zitumiweje?**
- 31 Kama HAPANA, kwanini?**
- 32 Elezea. Ungependa vitu gani vifanyike?**
 Ushirikishwaji wa wanakijiji katika kufanya maamuzi ya kutawala visiwa hivi.
 liachiwe serikali moja kwa moja.
 boti ya doria
 mikutano ya mara kwa mara.
 vinginevyo (fafanua)

Asante sana kwa kutumia muda wako kujibu maswali haya. Unaweza pia kutumia sehemu ya nyuma ya karatasi kwa maelezo na maoni zaidi kuhusu maeneo tengefu ya bahari katika pwani ya Dar es Salaam. Ukitaka maelezo zaidi kuhusu mradi huu tafadhali wasiliana na Frontier Tanzania, simu 22 2600796, P.O. Box 9473, Dar es Salaam, e-mail: frontier@twiga.com

7.7. APPENDIX 7. DIVERS QUESTIONNAIRE (ENGLISH)

The waters surrounding the islands of Bongoyo, Mbudya, Pangavini and Fungu Yasini host a rich diversity of marine life and have been granted special status as a Marine Protected Area (MPA). Work is under way to gather information on those who make use of the resources within the reserves, from visitors who enjoy a peaceful day relaxing on the beach, to those who depend daily on the productive fishing grounds. We would appreciate a few minutes of your time to fill in this questionnaire, the results from which will contribute directly towards the formulation of a long-term management plan.

Day of the week: Date: / / 2000

Nationality:

Gender: M F Age:

Please indicate your status at the present time.

- Tanzanian citizen Kenya/Uganda citizen
- non-Tanzanian resident other African citizen
- other (please specify)

DIVERS

1.0 By entering your total number of dives to date in the box indicate the qualification (or equivalent) you hold.

- PADI open water PADI rescue diver PADI instructor
- PADI advanced PADI dive master Other

1.1 Please estimate the number of coral reef dives that you had carried out BEFORE diving the reserve area for the first time.

- none 1–5 6–10 11–20 21–30 30 or more

1.2 Please specify the number of dives you have carried out in the reserve area and the approximate month and year of your first dive there.

number of dives.....month.....year.....

1.3 What proportion of your dives are within the waters around the following island reserves?

	0%	1–19%	20–39%	40–59%	60–79%	80–100%
Bongoyo	<input type="checkbox"/>					
Mbudya	<input type="checkbox"/>					
Pangavini	<input type="checkbox"/>					
Fungu yasini	<input type="checkbox"/>					

IMPRESSIONS

If your first dive in reserves was less than 6 months ago please go to question 2.2.

.....

2.0 Please indicate whether you think the following characteristics of the reserve waters have improved, degraded, or not changed since you first dived there.

	Improved	degraded	not changed	don't know
Fish abundance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fish diversity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Coral health	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Marine animal abundance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Water quality	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2.1 Please indicate whether you think incidences of the following have increased, decreased, or not changed in the reserves since you first dived there.

	1	2	3	4
Abandoned fishing gear	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Coral bleaching	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Broken coral	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Rubbish in the water	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Oil in the water	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Crown-of-thorns starfish	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dynamite fishing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

1, increased; 2, decreased; 3, not changed; 4, don't know

2.2 Please specify what you think are the most pressing concerns in the reserve?

2.3 Do you feel boat traffic levels are acceptable?

YES / NO (If NO please specify)

2.4 Have you ever heard any dynamite blasts whilst diving?

YES / NO (If NO please proceed to question 2.10)

2.5 When did you last hear dynamite fishing in the reserves?

2.6 Please rank the islands from 1–4 in terms of how often you hear dynamite blasts around them. (use 1 for most and 4 for least)

Bongoyo Mbudya Pangavini Fungu Yasini

2.7 Have any incidences been reported to the police?

YES / NO Don't know

2.8 Do you think policing is effective?

YES / NO Don't know

2.9 If NO, what solutions / changes would you recommend?

2.10 Please give the three features of the reserve that attract you to dive there.

MANAGEMENT

3.0 Are you aware that the islands and surrounding water are a Marine Protected Area?

YES / NO

3.1 If YES, how did you find out this information?

3.2 Are you aware of any regulations that protect the area?

YES / NO (If YES please specify)

3.3 Do you agree with the principle of paying an entry fee for use and upkeep of the reserve?

YES / NO don't know

3.4 Please indicate the amount in Tsh you think tourists, nationals and residents should contribute towards the upkeep of the reserve per visit.

	a	b	c	d	e	f	g	h	i	j	k
Tourists	<input type="checkbox"/>									
Nationals	<input type="checkbox"/>									
Residents	<input type="checkbox"/>									

a,0; b, 500; c, 1000; d, 2000; e, 3000; f, 4000; g, 5000; h, 6000; i, 7000; j, 8000; k; Other.

3.5 If you have suggested different entry fee prices comment on the reasons why.

3.6 Please indicate your feeling toward the provision of the following in the reserve areas.

	1	2	3	4	5
Marked snorkelling points	<input type="checkbox"/>				
Marked walking trails	<input type="checkbox"/>				
Providing ecological info	<input type="checkbox"/>				
Providing historical info	<input type="checkbox"/>				
Guides	<input type="checkbox"/>				
Toilet facilities	<input type="checkbox"/>				
Small shops	<input type="checkbox"/>				
Places to eat	<input type="checkbox"/>				
Litter collection	<input type="checkbox"/>				
Suggestion boxes	<input type="checkbox"/>				
Other (please specify)	<input type="checkbox"/>				

1, strongly disagree; 2, disagree; 3, don't mind; 4, agree; 5, totally agree

3.7 Do you think a management plan is necessary for the reserves?

YES / NO (If NO proceed to question 3.9)

.....

3.8 Please indicate which of the following practices you feel should be included in a management plan for the Marine Protected Area.

	YES	NO	don't know	need more information
Diving exclusion zones	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fishing exclusion zones	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Park patrols	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Scientific research	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stakeholder meetings	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Private boat registry	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tour boat operator fee	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (please specify below)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3.9 If you believe stakeholders in the reserve should be invited to workshops how often would you suggest they meet?

- weekly fortnightly monthly annually
 other (please specify)

3.10 How would you feel about your access to some parts of the reserve being restricted for conservation purposes?

- opposed approve don't mind don't know
 need more info

3.11 Do you think you will return to the Marine Protected Areas?

- YES / NO don't know

Thank you for taking the time to fill in this questionnaire. Please feel free to use the space provided below to voice any further suggestions you may have concerning the Marine Protected Area. If you would like to know more about the project or have any other points you believe are important for this discussion, please contact Frontier-Tanzania on: (22) 2600796, or write to: P.O. Box 9473, Dar es Salaam, or e-mail: frontier@twiga.com.

7.8. APPENDIX 8. DIVE CENTRE QUESTIONNAIRE (ENGLISH)

The waters surrounding the islands of Bongoyo, Mbudya, Pangavini and Fungu Yasini host a rich diversity of marine life and have been granted special status as a Marine Protected Area (MPA). Work is under way to gather information on those who make use of the resources within the reserves, from visitors who enjoy a peaceful day relaxing on the beach, to those who depend daily on the productive fishing grounds. Please take your time in filling out this questionnaire, the results from which will contribute directly towards the formulation of a long-term management plan.

Day of the week: **Date:** / / **2000**

1.1 Your name:

1.2 Nationality:

Gender M F Age:

1.3 What is the name of the organisation you own / work for?

1.4 What is your position:

1.5 Status:

- Tanzania Kenya/Uganda Other African
- Non-African resident Other (please specify)

1.6 In what year did YOU first dive in the reserves?

ORGANISATION

2.0 Please indicate the type of organisation you own / work for.

- dive shop dive club hotel other (please specify)

2.1 Please indicate how long the organisation has been running (years).

- 0-1 1-2 2-3 4-5 more than 5

2.2 Please indicate how long the organisation has been running dive trips.

- 0-1 1-2 2-3 4-5 more than 5

OTHER ACTIVITIES

3.0 Besides diving, please indicate any other activities that you offer which take place within the reserve areas.

- snorkelling game-fishing water-sports
- day-visitors other (please specify).....

3.1 Where applicable, please estimate approximately how many people you have arranged the following activities for over the last year, i.e. June 1999 – June 2000.

- Snorkelling Game-fishing
- Water-sports Day visitors
- Other (please specify)

3.2 Please specify which island reserve these activities take place on/ around.

	Bongoyo	Mbudya	Pangavini	Fungu Yasini
Snorkelling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Game-fishing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Water-sports	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Day visitors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
*Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

*Please specify.....

3.3 Do you hire out boats?

YES / NO (If YES please specify type)

3.4 How much does this cost?

3.5 Where in the reserve do the customers take them?

3.6 Do they need a licence/qualification in order to hire a boat? (If YES please specify).

EQUIPMENT & CREW

4.0 How many boats do you have?

4.1 Please describe what sort of boat(s) you have

4.2 Please specify the length of the boat(s) metres

4.3 How many have inboard engines?

4.4 How many have outboard engines?

4.5 Are they registered?

YES / NO

4.6 Do you employ your own skipper(s)?

YES / NO

4.7 Please indicate their status?

- Tanzania Kenya/Uganda Other African
 Non-African resident Other (please specify)

4.8 Please specify what experience / qualifications your skipper(s) have?

.....

4.9 How many other crew working on the boat(s)?

4.10 Please indicate their status?

- Tanzania Kenya/Uganda Other African
 Non-African resident Other (please specify)

4.11 Do you employ anyone else who is directly involved in the provision of diving services? (e.g. dive instructors)

YES / NO (If NO please proceed to question 5.0)

4.12 What are their roles and training level?

4.13 Please indicate their status.

- Tanzania Kenya/Uganda Other African
 Non-African resident Other (please specify)

DIVERS

5.0 Please indicate what proportion of your divers over the last year, i.e. June 1999 – June 2000, hold the qualifications (OR EQUIVALENT) listed below?

	0%	1–19%	20–39%	40–59%	60–79%	80–100%
PADI open water	<input type="checkbox"/>					
PADI advanced	<input type="checkbox"/>					
PADI rescue	<input type="checkbox"/>					
PADI dive master	<input type="checkbox"/>					
PADI instructor	<input type="checkbox"/>					

5.2 What proportion of your divers have dived on coral reefs before visiting you.....%

5.3 Please indicate what proportion of your divers fall in the following age categories (in years).

- 0–9.....% 10–19.....% 20–29.....%
 30–39.....% 40–49.....% 50–59.....%
 60–69.....% 70+.....%

5.4 Please indicate approximately what proportion of your divers fall in the following status categories.

- Tanzania % Kenya/Uganda %
 Other African % Non-African resident %
 Other (please specify) %

COSTS

6.0 How much do dives cost at the present moment?

- Single dive \$ Two dives \$
 Multiple dives (please specify) \$

6.1 What does this cost cover?

6.2 Are there any other costs payable to the organisation, e.g. membership fee?

YES / NO (If YES please specify) \$

6.3 Please indicate approximately what proportion of your divers over the last year, i.e. June 1999 – June 2000, carried out the following number of dives per visit?

- 1.....% 2.....% 3.....% 4.....%
 more than 4 (please specify number and %)......dives.....%

RESERVES

7.0 *Do you organise dives in areas other than around the reserves? YES / NO (If YES please specify).*

7.1 *How long have you been taking divers to the following reserve islands for (years)?*

	<1	1-2	2-3	3-4	4-5	>5	(please specify)
Bongoyo	<input type="checkbox"/>					
Mbudya	<input type="checkbox"/>					
Pangavini	<input type="checkbox"/>					
Fungu Yasini	<input type="checkbox"/>					

DIVE ACTIVITIES

8.0 *Of all dives you organised in the reserves over the last year, i.e. June 1999 – June 2000, please estimate what proportions fall in the following activity categories?*

	1	2	3	4	5	6
Recreational	<input type="checkbox"/>					
Dive training	<input type="checkbox"/>					
Research	<input type="checkbox"/>					
Other (specify)	<input type="checkbox"/>					

1, 0%; 2, 1–19%; 3, 20–39%; 4, 40–59% 5, 60–79%; 6, 80–100%

8.1 *Please indicate if you brief divers on any of the following before entering the water?*

- Dive route Buoyancy Biological features
- Maximum depths Restrictions* Other**
- *Please specify type of restrictions

.....
 **Please specify other

SITE DETAILS

9.0 *We would appreciate your help on this section in providing as much detail as possible on the dive sites you have visited in the reserves:*

- Your name for the site (dive club adopted or similar)
- Local Kiswahili name for the site
- Total number of divers visiting site over the last year, i.e. June 1999 – June 2000.
- GPS co-ordinates if available

Your name for the site	Local name for the site if known	Number of divers over last year (approx.)	GPSCo-ordinates	
			South	East
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				

9.1 *Have you changed preference for dive sites? YES / NO (If NO please proceed to 9.5)*

9.2 *Why have you changed preference?*

9.3 *Which areas don't you dive anymore?*

9.4 *Why have you stopped going there?*

9.5 *Do you frequently see other dive boats at the same sites as those you visit?*

9.6 *If known please list YOUR names for the three sites that appear to be most popular amongst other dive organisers?*

IMPRESSIONS

10.0 *Again we would greatly appreciate your help with this section on the characteristics of your dive sites. With the dive site numbers from the previous table, please indicate for each how strongly the following influence your choice of dive destination (where 1 is not at all and 5 is very strongly).*

- A. Underwater topography (e.g. cliffs, drop offs)
- B. Fish abundance
- C. Fish diversity
- D. Coral health
- E. Suitability for diver experience level
- F. Marine animals
- G. Water quality
- H. Travel distance
- I. Other (please specify)

Site no.	A	B	C	D	E	F	G	H	I
1									
2									
3									
4									
5									
6									
7									
8									

9									
10									
11									
12									
13									
14									
15									

10.1 Please indicate whether you feel the following characteristics of the reserve waters have improved, degraded, or not changed since you first dived there.

	improved	degraded	not changed	don't know
Fish abundance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fish diversity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Coral health	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Marine animal abundance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Water quality	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

10.2 Please indicate whether you think incidences of the following have increased, decreased, or not changed in the reserves since you first dived there.

	1	2	3	4
Abandoned fishing gear	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Coral bleaching	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Broken coral	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Rubbish in the water	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Oil in the water	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Crown-of-thorns starfish	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dynamite fishing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

1, increased; 2, decreased; 3, not changed; 4, don't know

10.3 Please specify what you think are the most pressing environmental concerns in the reserve?

10.4 How long ago did you last hear dynamite blasts in the reserves?

..... wks mnths yrs

10.5 Please rank the islands from 1—4 in terms of how often you hear dynamite blasts around them? (use 1 for most and 4 for least)

Bongoyo Mbudya Pangavini Fungu Yasini

10.6 Have any incidences been reported to the police?

YES / NO Don't know

10.7 Do you think policing is effective?

YES / NO Don't know

10.8 If you answered NO to question 10.7 what solutions / changes would you recommend?

.....
10.9 Do you feel boat traffic levels are acceptable?

YES / NO (If NO please specify what type of traffic)

10.10 If possible please give the three features of the reserve that are most attractive to your business/club (land or sea).

ANCHORING / MOORING BUOYS

11.1 Do you anchor at any of the dive sites? YES / NO (if NO, please proceed to question 11.5)

11.2 Please give YOUR name(s) for the site(s) at which you anchor?

11.3 What depth do you usually anchor in? metres

11.4 What sort of anchor do you use?

11.5 Are there any mooring buoys in the reserves at present? YES / NO (if NO go to question 11.8)

11.6 Please specify YOUR name(s) for the site(s) that have buoys and give number?

11.7 Over the past year, i.e. June 1999 – June 2000, how often have you made use of the buoys? (after answering please go to question 11.12)

not at all some trips every trip

11.8 Have buoys ever been used in the reserve before? YES / NO

11.9 What happened to them?

11.10 Please specify any suggestions you may have as to how to overcome this problem?

11.11 How often would you use them if they were made available at these sites?

not at all some trips every trip

11.12 Do you ever see recreational boats anchoring in the reserves? YES / NO (If NO please proceed to question 12.0)

11.13 Please give YOUR names for the site(s) where they anchor most frequently?

MANAGEMENT

12.0 Are you aware that the reserves hold marine protected area status?

YES / NO

12.1 How did you find out this information?

12.2 Are you aware of any regulations that protect the area?

YES / NO (If YES please specify)

12.3 Do you agree with the principle of paying an entry fee for use and upkeep of the reserve?

YES / NO don't know (If NO proceed to question 12.5)

12.4 Please comment on your answer.

12.5 Please indicate the amount in Tsh you think tourists, nationals and residents should contribute per visit towards the upkeep of the reserve.

	0	500	1000	2000	3000	4000	5000	6000	7000	8000	other (specify)
Tourists	<input type="checkbox"/>									
Nationals	<input type="checkbox"/>									
Residents	<input type="checkbox"/>									

12.6 If you have suggested differing entry fee prices please comment on the reasons why?

12.7 Please indicate your feeling toward the provision of the following amenities and uses of the reserve areas.

Please indicate your feeling toward the provision of the following in the reserve areas.

	1	2	3	4	5
Marked snorkelling points	<input type="checkbox"/>				
Marked walking trails	<input type="checkbox"/>				
Providing ecological info	<input type="checkbox"/>				
Providing historical info	<input type="checkbox"/>				
Guides	<input type="checkbox"/>				
Toilet facilities	<input type="checkbox"/>				
Small shops	<input type="checkbox"/>				
Places to eat	<input type="checkbox"/>				
Litter collection	<input type="checkbox"/>				
Suggestion boxes	<input type="checkbox"/>				
Other (please specify)	<input type="checkbox"/>				

1, strongly disagree; 2, disagree; 3, don't mind; 4, agree
5, totally agree

12.8 Do you think a management plan is necessary for the reserves?

YES / NO (If NO proceed to end of questionnaire)

12.9 Please indicate which of the following practices you feel should be included in a management plan for the MPA.

	YES	NO	don't know	need more information
Diving exclusion zones	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fishing exclusion zones	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Park patrols	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Scientific research	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stakeholder meetings	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

-
- Private boat registry
 - Tour boat operator fee
 - Other (please specify)

12.10 If you believe stakeholders in the reserve should be invited to workshops how often would you suggest they meet?

- weekly fortnightly monthly annually
- other (please specify)

12.11 How would you feel about your access to some parts of the reserve being restricted for conservation purposes?

- opposed approve don't mind don't know
- need more information

12.12 Please list any aspects of a management plan that you anticipate may be detrimental to your clubs/business's activities?

Thank you for taking the time to fill in this questionnaire. Please feel free to use the space provided below to voice any further suggestions you may have concerning the Marine Protected Area. If you would like to know more about the project or have any other points you believe are important for this discussion, please contact Frontier-Tanzania on: (051) 600796, or write to: P.O. Box 9473, Dar es Salaam, or e-mail: frontier@twiga.com.