

## **Collaborative Fisheries Management in the Tanga Region**

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### **INTRODUCTION**

This case study relates to the collaborative management plans for coral reefs and fisheries facilitated by the Tanga Coastal Zone Conservation and Development Programme (TCZCDP). These plans were formulated by the villagers and local government officers for two villages, Kigombe and Kipumbwi, in two districts to address declining fish yields and income from fishing.

### **THE CONTEXT**

Tanga is the most northern coastal administrative region in Tanzania extending approximately 180 km south of the Kenyan border. The area contains habitats categorised as types 1-9 of marine and coastal wetlands. Located in the tropics the climate is characterized by two main seasons dictated by the behavior of the Inter-Tropical Convergence Zone (ITCZ). The northern eastern monsoon (November-March) is characterized by higher air temperatures, lower wind speeds, calmer seas and reduced velocity (1-2 knots) of the East African Coastal Current (EACC). The southern monsoon (April- October), is typified by cooler air temperatures, higher winds, rougher seas with the velocity of the EACC increasing to a speed of 4 knots.

The area covered by the Kigombe agreement contains 15 coral reefs and that of Kipumbwi 17 reefs. The area primarily used by the villagers of Kigombe is bounded by Ras Mtangata and the southern portion of Karange in the north, and Gongo la Maji Viki to the south (Fig. 1). It includes a poorly developed fringe of mangroves, 14 coral reefs, extensive seagrass beds and sand flats. There are approximately 103 km of reef edge, 35 km of which is coastline, 8.5km coastal reefs and 59 km of patch reef. Five coral reefs are present on the edge of the continental shelf (outer), 5 adjacent to the coast (coastal) and 5 between the coast and continental shelf (mid ) (Table 1). Four reefs were found to be in good condition, four in a moderate state, five in poor condition with one very poor being badly damaged by dynamite. Fish density was low or very low on all reefs excepting south Karange. With the exception of Gongo la Maji Viki (a deep, outer reef) the greatest diversity of fish were caught on outer reefs with coast reefs being the least (Mgaa excepted).

The area primarily used by the villagers of Kipumbwi is bounded by Mwamba Mskitini and Mwamba Dambwe in the north and Mwamba Nyama to the south. It includes a Mangrove Reserve in the estuary of the Mto Msangazi, coral reefs, extensive seagrass beds and sand flats. There are approximately 86 km of reef edge including about 30 km of coastline, 5 km of which form the mangrove reserve. Six coral reefs are present on the edge of the continental shelf (outer), 6 adjacent to the coast (coastal) and 4 between the coast and continental shelf (mid) (Table 2). One reef was found to be in very good condition, four in good condition with the rest being in a moderate to poor state. Fish densities were low with only 3 reefs having relatively high densities. With the exception of Nyamvi (a deep outer reef), outer reefs

invariably produced the highest number of species caught.

These habitats provide a buffer to erosion, centres for productivity and diversity, feeding and resting areas for marine and terrestrial species especially migratory birds. The ecosystem is extremely important for maintaining the high levels of diversity found in the area as well as providing the main protein and income sources for local people. There are many important species utilising this area, many species are also likely to be unknown. The Kigombe area is especially important for the Crab Plover in that it holds at least 1% of the world's population of a species "biogeographical population". Crab Plovers have been estimated to have a total world population of less than 50,000 (Hockey). So at 1%, an area holding more than 500 birds qualifies as a RAMSAR site. The Kigombe area has up to 750 Crab Plovers, over a distance of approximately 20km giving 20-30 birds/km. This figure compares favourably with other important sites (e.g. Mafia Island, Tanzania). All these figures are much higher than any survey results for Kenya, or South Africa.

**Table 1. The position, size, condition, fish density and number of species caught for each reef used by Kigombe villagers**

Name of reef	Position	Size (km)	Condition	Fish Density	Fish species caught
Karange Island (South)	Outer	16	Moderate	Moderate	60
Shenguwe	Mid	2	V. Poor	Very Low	24
Fungu Tongoni	Outer	7	Poor	Low	57
Kange	Outer	6	Moderate	Low	38
Makome	Mid	2.5	Good	Very Low	33
Taa	Mid	4	Poor	Low	19
Chanjale (Kijamba Kai)	Coast	1.75	Moderate	Low	12
Kitanga	Coast	1	Good	Low	14
Upangu (Mwamba Shamba)	Mid	4.25	Poor	Low	32
Maji Viki	Outer	11.5	Poor	Low	50
Gongo la Maji Viki	Outer	6.4	Good	Very Low	20
Chamboni	Coast	1	Good	Low	8
Mgaa	Coast	2.75	Poor	Low	25
Kandacha	Coast	2	Moderate	Low	12
Nyamvi	Outer	1	Not surveyed	Not surveyed	Not surveyed

The main human impact on the environment has been physical degradation represented by the use of dynamite on coral reefs, cutting of mangroves and the use of drag nets over seagrass beds. Over use of areas is a common problem. Reefs in the northern section of the region adjacent to the high population centres are heavily overfished, whereas those in the

south adjacent to low population densities are less overfished. Currently, tourism and recreational use is minimal and does not pose a threat. Local communities also face an increasing problem of beach erosion which causes property loss and may be related to the degradation of reefs. Future threats to the human-environment relationship include increased erosion and the rising need for food and income generated by a higher rate population increase compared to economic development. This is exacerbated by the lack of alternative income sources.

Infrastructure in the area is poorly developed and the potential for future development is limited through lack of funds. Artisanal fishing is by far the most important economic activity for these people with 70-80% of the adult male population being involved in some of the more rural villages. Agriculture and petty trade are the other most important occupations on the coast while a significant number of people are involved in boat building, house building, salt boiling, lime burning, charcoal making, mangrove pole cutting, seaweed farming, bicycle transport, labouring, livestock, tapping palm wine, and traditional medicine. The commercial interests of the coast include trawlers, traders and exporters of fish and other marine products.

**Table 2. The position, size, condition, fish density and number of species caught for each reef used by Kipumbwi villagers**

Name of reef	Position	Size (km)	Condition	Fish Density	Fish caught	species
Kijamba cha Mtoni	Mid	2.5	Moderate	Very Low	24	
Kijamba cha Kati	Mid	1.1	Moderate	Very Low	17	
Kijamba cha Beja	Mid	1	Moderate	Very Low	n/a	
Kijamba cha Msikiti	Mid	1	Moderate	Very Low	22	
Miji Mile Ndogo	Outer	1.5	Moderate	Low	40	
Miji Mile Kubwa	Outer	3.5	Moderate	Low	40	
Dambwe	Outer	11	Good	High	49	
Mwamba Ugungu	Outer	8	Good	Low	28	
Nyama	Outer	1+	Good	Low	35	
Kibweta	Coast	1.5	Poor	Very Low	n/a	
Pagare	Coast	2.5	Poor	Very Low	n/a	
Boyani	Coast	4.5	Good	High	10+	
Viboko Nje	Coast	2.5	Moderate	Very low	29	
Viboko Ndani	Coast	3	Poor	Very Low	29	
Jiwe la Sange	Coast	4.5	Poor	Very Low	n/a	

Chachaani	Outer	4	Moderate	Low	37
Nyamvi	Outer	1	Very Good	High	17+

The relative importance of these uses to communities as a source of income is dependant on; a) the sex of the user, b) the area, and c) the market. Sex of the user is by far the most determinant factor. Traditionally, women were gleaners of the reef flat. Markets and the area in which they lived then determined what they collected, whether it be shells, seacucumbers or octopus. The recent rise in seaweed farming has attracted many women. Initially, men did not take up this activity as it was regarded as farming and as such, the traditional role of women. Latterly, more men have realised that this is a viable source of income and are now starting their own farms. The primary income earner for most men is fishing for fin fish and for women it is farming.

The area is predominantly rural 87 villages (including sub-villages and 31 registered villages), one district town (Pangani) and one municipality (Tanga). Tanga Municipality's population is 222,824 (1988 census plus estimated growth at 2.5% *per annum*) while Pangani township's population is 5,864 and there are estimated to be about 40,000 people living in the coastal villages. Coastal village society is heterogenous and highly mobile. 'Swahili' is the generic term for those communities of the East African coast, which are predominantly Muslim, Swahili speaking and share a common coastal culture. The dominant coastal tribes are Digo, Bondei, Zigua and Segeju and any one village's inhabitants are a mix of these tribes with also Arab, Shirazi and other influences. There is a high degree of contact between the different villages. Young men generally spend a considerable period travelling between different areas. There is also a high rate of divorce and remarriage with women often residing in a number of villages during their marriage career. Migrants into coastal villages can gain acceptance by marrying a local woman. The coastal area had no traditionalised state systems. Traditional societal organisation is based on kinship groups and authority traditionally exercised through the elders of the kinship group.

The majority of coastal inhabitants including fishers can be classified as being poor, subject to insecurity and poor health. There are often large differences in income, health, education and status between the poorer and richer sections of society. The middle class in Tanzania is poorly developed.

Kigombe village is situated in Muheza District approximately 35km south of Tanga and 15 km north of Pangani. The village has a total population of 3,751, 68% women and 32% men (Socio-Economic Study, 1995). The working population is only 26.6% of the total population and is dominated by men (men 64.7%, women 35.3%) (Table 3). The majority of the population is below the age of 17 years (67.5%).

**Table 3. Population structure of Kigombe Village**

Sex	Village pop'n	Working pop'n	Children (1-17)	Unable to work	Students
Men	1200	550	1200	127	173

Women	2551	300	1332	142	222
Total	3751	850	2532	269	395

Main income generating activities are fishing followed by farming and trading. There is a total of about 100 licensed fishers (12% of working population) using about 80 boats. The real total is likely to be much higher because of problems in licensing fishers. Fishing generates approximately Tsh 11 million per year in sales. Thus, the village government earns approximately Tsh 550,000 from fish catches landed at Kigombe.

Villagers use all the reefs from Karange Island in the north to Maziwe in the south (Figure 1) (Coral Reef Survey, 1996). Their main fishing area however, is associated with 14 reefs closer to the village; Karange Island (South), Shenguwe, Fungu Tongoni, Kange, Makome, Taa, Chanjale (Kijamba Kai), Kitanga, Upangu, Maji Viki, Gongo la Maji Viki, Chamboni, Mgaa, and Kandacha (Figure 2). Use of these reefs is shared with the two neighbouring villages of Mwarongo and Tongoni as well as with an increasing number of visiting fishermen (Table 2). Peak fishing periods are associated with north-east monsoon (seasonal) and spring tides (monthly).

**Table 4. Numbers of resident and visiting fishers and vessels for Kigombe, 1990-1994**

Year	Resident Fishers	Resident Boats	Visiting Fishers	Visiting Boats
1990	120	63	37	11
1991	100	67	30	19
1992	80	80	59	33
1993	99	84	68	20
1994	100	86	84	28

Since 1991 there has been a steady decline in the amount of recorded fish landed (Table 3). The catch in 1994 was approximately half of that recorded for 1990. Although a very approximate estimate, the amount of fish per fisher showed an even greater decrease (67%) over the same period. Value of the catch fluctuated around Tsh 11 million. The price per kilo, however, doubled between 1990 and 1994. Increase in the price per kilo could reflect the fall in supply and/or may have also been the result of inflation. Despite the increase in the number of fishers, there has been a decrease in the number of shark nets, handlines and traps. There has been an increase in the number gears classed as others which may reflect the rise in use of spears and spear guns.

**Table 5. Total fish catch, number of fishers, catch per fisher, value of catch and price of fish per kilo in Kigombe, 1990-1994**

Year	Catch (Tonnes)	No. Fishers	Catch/Fisher (Kg)	Value (TSh)	Price (Tsh) per kilo
1990	101	157	643	9,416,801	93

199 1	144	130	1107	11,658,671	81
199 2	74.9	139	538	12,191,340	163
199 3	54.9	152	361	10,526,857	192
199 4	55.7	170	327	11,119,760	200

**Table 6. Number of fishing gears recorded at Kigombe 1990-1994**

Fishing gear	1990	1991	1992	1993	1994
Shark nets	161	191	203	199	167
Handlines	8	86	96	164	136
Traps	48	120	156	126	70
Beach seines	-	1	-	-	1
Other	43	45	36	58	58

Kipumbwi is situated within Pangani District approximately 40km south of Pangani town. It has 4 main suburbs or *vitongoji*: Kipumbwi Mji Mkuu (100 households); Kipumbwi Mtoni (100 households); Kipumbwi Mji Mpya (200 households); and Kipumbwi Serawani (40 Households). There are a total 440 homesteads within the village (Socio-Economic Survey, 1995). Total population is given as 1600 of which 1300 are able to work, 260 are children and 40 are disabled. Main income generating activities are fishing followed by farming and trading. There is a total of 119 licensed fishers (7.4% of population) within the village of which 107 are men and 12 are women. The real total is likely to be much higher because of problems in licensing fishers. Total village government revenue is variable but in 1994 was 627,250 TSh. Income was raised from rates on: fish 581,410 TSh (93%); transportation of fish 29,840 TSh (5%); coconuts 10,500 TSh (1.7%); vessels anchored 5,500 TSh (0.8%).

Despite the low figure for licensed fishers, the socio-economic study showed that the majority of the villagers depend on the ocean for their living. Villagers use all the reefs from Maziwe in the north to Fungu Buyuni in the south (Coral Reef Survey, 1996). Their main fishing area however, is associated with 16 reefs closer to the village. The names of these reefs are: Kijamba cha Mtoni; Kijamba cha Kati; Kijamba cha Beja; Kijamba cha Msikiti; Miji Mile Ndogo; Miji Mile Kubwa; Dambwe; Mwamba Ugungu; Nyama; Kibweta; Pagare; Boyani; Vibokoni (3 small reefs); Jiwe la Sange; Chachani and Nyamvi. Use of these reefs is shared with the three neighbouring villages of Ushongo, Stahabu and Sange as well as with approximately 114 registered visiting fishermen.

Peak fishing periods are associated with spring low tides when reefs are exposed, fish stocks are concentrated and access to octopus and lobster is easiest. Increased yields of finfish in these periods reflects the dependance of the total yield of fish on the juya net (seine net) catches. This gear type is used by a relatively small number of resident fishermen (see

below), but are also used by the majority of visiting fishing groups (Kipumbwi Fish Catch Statistics, 1996).

### ***Fishing Gear***

Juya (Seine net)		6
Jarife (Shark net)	10	
Gill net (Nyavu ndogo)		20
Mishipi (Handline)	24	
Dhulimati (Longline)	10	
Madema (Trap)		25

These recently collected catch statistics show that juya nets can catch anything from 25kg-100kg of fish per net per day. These catches are mostly juvenile fish and so fetch a low price (70-80TSh) per kilo. The catch landed at Kipumbwi over recent years has been around 90,000 kilos per year with a value of approximately 7 million shillings.

The marine areas are all common property and everyone has the right to use them once licenced by the government to do so. In this respect, the government is supposed to play a controllong role. There are considerable interactions between the different marine habitats and the linkages are well known. For example, mangroves and seagrass beds protect reefs from excess sedimentation whilst the reef protects the mangroves and seagrass from heavy wave action. Upland deforestation also impacts marine wetlands through increasing the sediment loads borne by rivers draining the deforested areas.

Before the advent of the Tanga Conservation and Development Programme, the government were the sole decision making body. With the facilitation of the programme, collaborative management systems have just been established for a number of resources in several areas. Problems with the solely government system were that decisions were rarely made and those that were, were hardly implemented. Before independence, in 1962, there were few government regulations on resource exploitation. Local communities were very much left to themselves. A number of studies conducted by the Programme have shown that despite the non interference policies of pre-independence administrations, there was no traditional or indigenous management of resources. The reason given by the communities for this was that there was no need, there being plenty of resources and very few people.

Up until 1991 politics were the sole prerogative of a single socialist party with policies of centralisation and planned economy. Tanzania is currently undergoing a democratisation and decentralisation process. Despite this the former single party is still the strongest political party. In addition, the traditional social system of strong family control is still in existence although it is weakening. Government has stated that its recognises the need for increased autonomy of local communities. There are now an increasing number of examples of resource management that have significant levels of community autonomy. There is however, a lack of policies or laws that specifically state the involvement of communities. One notable exception to this is the Marine Parks and Reserves Act of 1994, which specifically states the rights of communities in marine parks and reserves. In conclusion, overall the government has recognised the need for community involvement, implementation however can be a problem. This problem is not because of the stated government attitude but that of government employees (civil servants) who often resist having their power base eroded.

## INVOLVEMENT OF STAKEHOLDERS

The stakeholders of these areas are the users mentioned above and the government. Resources provide food and income for the stakeholders. Before the management agreements were formulated, only the government had legal jurisdiction over the use of resources, customary use rights are not formally recognised.

The process started with the holding of workshops with villagers and government personnel to identify critical issues; the undertaking of participatory socio-economic and coral reef surveys; and a study on existing traditional management (Scheinman and Mabrook, 1996). Workshops held with the villagers of both Kigombe and Kipumbwi identified the major issue affecting them, its perceived causes and suggested solutions (Table 6).

The villagers then formed a village committees to take actions to deal with fisheries related issues especially the enforcement of regulations, the Kamati ya Doria (Patrol) at Kigombe, the Kamati Ulinzi na Usalama (defence and security) at Kipumbwi. These committees became the focal point for planning and implementation of agreed actions. A study conducted by the Programme has shown that this committee is representative of the stakeholder groups (Gorman et al. 1996). District personnel (Natural Resources Officer, Fisheries Officer and Community Development staff) and Programme staff provided technical assistance to the village committees.

**Table 6. Issue, perceived causes and solutions identified by Kigombe and Kipumbwi villagers**

<b>Issue</b>	<b>Causes</b>	<b>Solutions</b>
Declining fish catch	<ul style="list-style-type: none"> <li>- Illegal fishing techniques</li> <li>- Destruction of coral reefs</li> <li>- Poor gears</li> <li>- Increased number of fishermen, overfishing</li> <li>- Trawlers fishing close to coast</li> <li>- Seine nets, fishing of juveniles</li> </ul>	<ul style="list-style-type: none"> <li>-Restrict illegal fishing techniques</li> <li>-Close areas to fishing</li> <li>-Provision of appropriate gears</li> <li>-Development of alternative incomes</li> <li>-Restrict trawlers to fishing offshore</li> <li>-Alternative gears</li> <li>-Increase mesh size of nets</li> </ul>

Programme staff facilitated a series of meetings in which:

- The Programme reported on the results of the coral reef survey to all users. Information included reef status, fish population status, coral diversity, which villages use the reef, importance of reef for different fisheries, fishing gears and fish species. In this meeting users discussed, modified, and/or agreed the presented information.
- Users defined the area in which management action will be implemented and who needed to be involved.
- The management committees developed the principles of management to be applied;
- Users developed the overall management objective, purpose of the action plan, results and indicators.
- Users identified, analysed and agreed actions to be taken to meet results. Actions

discussed and agreed included: reef closure; special rules to apply to closed area(s); general rules to apply to the larger area; and other actions to support management objectives i.e. trial of fish aggregating devices, trial of exchange of seine nets, and identification of future actions for control of trawlers.

- The village management committees defined how rules will be enforced, who will do what, what are the penalties, and what training is required for effective enforcement.
- The village management committees defined a programme for monitoring and review including who will do what and what training is required.
- The village management committees identified who should be informed and how this will be done. In meetings with the villagers and village governments of other villages with a stake in the area, the village committees presented their management objective, results and actions (particularly the reef closures). Each of these villages approved and supported the closure of these reefs which was confirmed by written agreements.

At the last meeting involving a large number of users, they expressed concern on the time they were spending on developing the plan. Their solution was to give the management committees the mandate to further develop management actions. This was conditional in that the final action plan be approved by a meeting of users.

Minutes of all meetings including attendance were recorded (see Kigombe Management File). In meetings attended by users an average of 91 villagers attended 9% of whom were female and 91% male, representing approximately 91% of resident fishers. Attendance of committee members at the subsequent meetings was fairly consistent averaging 28 people (all members of Kamati ya Doria plus others from other committees). At committee meetings 25% were female and 75% male. District staff attendance averaged 5 persons per meeting. A separate study conducted by the Programme has shown that most villagers are aware of, and support, this action plan (Gorman *et al.*, 1996).

An example of the Kigombe plan is given in Table 7. Both plans address declining income from fisheries which was the major concern of villagers. The overall objective reflects this concern, i.e. increased income from higher fish catches. Each plan also recognised the need to increase reef fish stocks. This is expected to be achieved through conservation measures and reduction of fishing pressure on reef stocks through the diversification of fishing activities and the reduction of the numbers of fishers. Key result areas are:

- 1) the reduction of illegal fishing (enforcement of existing regulations);
- 2) reduction of legal but destructive techniques;
- 3) closure of reef(s);
- 4) trials of fish attracting devices; and
- 5) reduction in fishing pressure through control of the numbers of visiting fishers.

The objective, purpose and all results have objectively verifiable indicators. Roles and responsibilities of villagers and government personnel are defined for each activity as well as the time frame in which they are to be achieved (Table 8). Activities related to several results (1, 2 and 5) are ongoing. Each of the plans will be reviewed every six months. A monitoring and evaluation system has been defined to assist in the review process (Table 9). In both the implementation of activities and the monitoring programme, emphasis is placed on the communities. These management action plans represent the agreed strategy of both Districts

and users. Decisions that are not covered by the plans should be taken by agreement of the village management committees, users and the local government. One party should not take a decision not covered by plan without the consent of the other.

These management plans are supported by village by-laws and by the central Government Fisheries Regulations of 1994. District by laws have not yet been formulated or approved. The Fisheries Regulations of 1994 have been used to gazette the closure of reefs. It is envisaged that these regulations will also be used to enforce bans on currently legal but destructive techniques. It also contains all the necessary legislative measures required to implement actions recommended to produce a sustainable fishery. However, what is lacking is a clearly defined policy and programme of implementation at all levels of government.

Critical factors that promoted the involvement of local and indigenous communities were: clear and secure system of access to resources, exchange visits to and from other communities, direct efforts of the facilitating agency, flexibility of the management process, effective facilitation, funds, legal advice, appropriate technical support, direct stimulus provided by the Programme, participatory surveys and effective attention to gender issues and concerns.

## **RESULTS**

It is too early to comment on how effective this type of management will be in terms of sustainable use of resources. The overall management strategy is one that can be best described as “adaptive management”. With this type of strategy management attempts to address the priority issues, monitors and evaluates the actions taken and adapts future measures to meet the outcome of the evaluation. There has been however progress made in stopping illegal techniques with the incidences of illegal fishing having dropped to about 2% of former levels. Fish catches per fisher have also increased by about 10%. Reef closures have now been gazetted, attracting devices are being deployed, and agreements for net exchanges formulated but their impact is still unknown. The prohibitive costs of active restoration of reefs make implementation of that type of activity unlikely. Participation has enhanced conservation of the area by facilitating the closure of some reefs and effective enforcement of laws, rules and regulations.

This approach has been successful in bringing agreement between government and users as to what should happen and who should do it. There are still problems between parties at the pace it is done. Villagers expectations of government are too high and some government officers outside of the Programme remain cynical about the villagers ability to undertake their allocated activities. Success in enforcement which has largely been due to the villagers’ efforts is making the latter attitude less prevalent amongst those officers directly involved in Programme implementation.

The above difficulties coupled with poor communication has led to problems in the implementation of the plans. In one instance the committees tried to enforce a ban on small mesh nets before it was scheduled which was then overruled by the District Fisheries Officer. This issue has been resolved by clarification of the timeframe for the elimination of these nets and how it should be done. The decision was reversed by the head of the district government after an appeal from the village. Communications will hopefully improved by the use of VHF radios in the village and District headquarters. The fundamental weakness of this approach is that it depends on mutual trust between the government and users. This lack of

trust was a primary cause of resource related issues at the start of the Programme. It is something that can only improve with time and commitment from both parties. To encourage this the decision making and monitoring and evaluation process for the plans has been designed to be transparent and participatory. Moreover, clearly defining roles and responsibilities in written agreements signed by all concerned parties has been shown to be an effective measure in preventing this type of problem.

Another significant outcome of this type of management strategy is the increased accountability of government officers. Despite the problems described above, overall the villagers have stated that the work and usefulness of the government officers has improved.

From the experience gained to date, it is clear that the strengths of this type of management stem from improved communication between parties and that problems arise when it breaks down. Maintaining communication entails a lot of work and associated costs. Costs of management have increased, but only because there was no management before. Replication of this type of model to other villages is feasible in terms of community infrastructure but may start over-stressing the current local government structure. To overcome this potential difficulty the Programme is trying to encourage the Districts to review their roles and responsibilities with a view of supporting collaborative management. This also entails a large commitment to retrain suitable government staff in the skills to support community efforts rather than just direct them.

## **RECOMMENDATIONS**

Although implementation of the management actions is at an early stage, there are clear lessons as to the value of a participatory approach to planning and implementation. Criteria for the employment of a participatory approach to management identified from this case study are when:

- 1) people's livelihood is directly affected (this covers almost all cases nowadays);
- 2) people feel strongly about what should and should not be happening;
- 3) people are required to assist in implementation as in enforcement;
- 4) there is weak government infrastructure and a lack of resources for implementation;

Key areas of support required are:

- 1) Provision of good technical and policy advice.
- 2) Periodic checks are needed to assess the effectiveness of community actions and whether they have the broad support of different interests in the village community.
- 3) Timely technical input is required to assess available and best options.
- 4) Legislation to support community actions. Local level by-laws have a much faster and easier approval process. They are however, weaker in terms of their subservience to national or local government level legislation.

Key process steps include:

- 1) Participatory resource assessments, done jointly with government and village resource users, have been influential in changing attitudes and building better relationships between villagers and government officers. The resource assessments were the start of participatory dialogues.

- 2) It is important to verify resource users' perceptions of resources; independent observations were made for both coral reefs and coastal forests.
- 3) Village resource users have displayed considerable knowledge and awareness of the state of health of their coastal resources, but they often lack suitable alternatives to harmful practices.
- 4) Focussing on a small number of priority issues is very important in gaining the support of the village and in concentrating on the critical actions to address them. Setting clear objectives for village action plans is critical in ensuring that everyone knows what they are trying to achieve and in focussing activities to reach them.
- 5) As women are considered among the poorest people in coastal villages, they must be targeted if poverty is to be reduced. Specific strategies are needed for targeting women and ensuring their participation.
- 6) Ongoing monitoring and regular evaluations (i.e. every six months) are needed to check how well anticipated impacts match reality. Modifications are needed to actions which do not lead to the desired outcomes.
- 7) Regular feedback meetings have proved very useful in participatory monitoring of progress and in sharing ideas and experiences to solve problems.

#### Recommendations on negotiation procedures:

- 1) If meetings are held ensure well defined agendas.
- 2) Be gender sensitive. Some fishing groups are antagonistic to the presence of women and vice versa. In these cases, hold separate meetings for initial negotiations.
- 3) The village committees provided a good starting point for the participation of users in the management process.
- 4) Ensure continuity of activities including the negotiation procedure. If agreement is reached start implementing as soon as possible. This ensures that credibility and confidence is maintained.

Use of written agreements has been essential to the implementation of collaborative management in the Tanga region. If agreements are used they should also contain actions that will be taken if the agreement is not followed. For example, the agreements the village committees have with fishers concerning the use of fish attracting devices, state that if the conditions of the agreement are not met, then the device will be confiscated. These agreements are endorsed by local government which have the legal power to implement a confiscation order. A problematical area is enforcing what government has agreed to. Pressure can be brought on local government from central government, but who pressurises central government? If a donor is involved they can assist, but if they are not, then it can be very difficult. Strengthening the legal base for agreements is another option being considered, but its feasibility and effectiveness has not yet been tested by the Programme.

#### Management institutions should:

- 1) be cost effective;
- 2) have a transparent decision making process;
- 3) be accountable;
- 4) have motivated staff that can provide timely technical input;
- 5) where applicable, represent stakeholder groups;

Monitoring and evaluation should:

- 1) have measurable indicators directly relevant to what management is trying to achieve;
- 2) be simple and quick to conduct;
- 3) be as accurate as 2 above will allow;
- 4) be readily understandable to the target group;
- 5) be low cost, and require minimal time and equipment;
- 6) be reported to communities and management institutions.

**Table 7. Overall objective, purpose, results, indicators, verification and assumptions**

<b>Overall Objective</b>	Resident fishers income increased through increased fish catch.	<b>Indicator:</b> Income and catch of resident fishers increased	<b>Verification:</b> Monitor fish catches for catch per gear per fisher, income earned		
<b>Purpose of Plan</b>	Reef fish stocks increased	Indicator: Increased stocks on all reefs within management area.	Verification: 1) Simple stock assessments of key species from catch statistics which record, type and number of gears, area fished, species caught, number of fish per size class, weight of catch. 2) Visual assessment		
<b>Results</b>	1. Illegal fishing reduced	2. -Reduced number of incidents of legal but destructive fishing. -Management controls in place.	3. One reef closed to extractive use	4. Trial of fish aggregating devices initiated	5. Fishing pressure reduced by decreased numbers of visiting fishers

<b>Indicators</b>	-Reduced number of incidences of illegal fishing e.g. dynamite, seine nets and sticks (kigumi), poison, spears and spear guns. -All vessels and fishers using area licensed.		-No extractive use of closed reef.	-FADs in place -Catch information recorded	-Reduced number of visiting vessels.
<b>Verification</b>	-Patrol logs which record number and type of complaints/reports of illegal fishing and action taken. -District Fisheries Licensing records.	-Patrol logs recording number of reported instances and what action taken. -By-laws, regulations	-Patrol logs recording instances of extractive use & action taken. -Legal gazette of reef closure specifying restrictions and penalties	-Site visit -Catch statistics	-Catch statistics recording fishing effort of residents & visitors
<b>Assumptions</b>	-Sufficient funds to continue patrols	-Exchange of small mesh nets for larger size mesh nets economically feasible (Killer) -Trawlers are a significant problem -Gov't has political will to control activities of trawlers.	-Closure of reef approved by District Government and Director of Fisheries.	-Agreement on areas of use, use rights, maintenance and monitoring of effectiveness reached.	-Management measures approved by District Government (and Director of Fisheries)

**Table 8. Management actions, who does what when, outputs and assumptions**

<b>RESULTS AND ACTIONS</b>	<b>Who</b>	<b>Does What</b>	<b>When</b>	<b>Outputs</b>	<b>Assumptions</b>
<i>1. Illegal fishing reduced</i> 1 Village militia trained 2 Patrols within management area to enforce existing fisheries regulations	-DMT -DFS -VM	Trains militia Legal support required Conduct patrols, detain	2nd qtr 97 2nd qtr	-Trained villagers -Effective	-Approved by District.

<b>RESULTS AND ACTIONS</b>	<b>Who</b>	<b>Does What</b>	<b>When</b>	<b>Outputs</b>	<b>Assumptions</b>
<p>concerning fishing techniques and the fishing of juvenile fish. This activity to include inspection of gears, fish catches.</p> <p>2 Licence all vessels &amp; fishers using area.</p> <p>3 Check that all vessels and fishers have a valid licence.</p>	<p>-MP</p> <p>-DFS</p> <p>-DFS</p>	<p>suspects.</p> <p>Conduct patrols &amp; Arrest suspects</p>	<p>97</p> <p>1st half 97</p> <p>1st half 97</p>	<p>patrols</p> <p>-All fishers &amp; vessels licensed</p>	<p>-Fishers cooperate, sufficient District staff and funds</p>
<p><b>2. Legal but destructive activities reduced</b></p> <p><b>a) Seine Net Trials</b></p> <p>1 Identify information required to assess feasibility of exchanging small mesh nets for larger mesh nets.</p> <p>2) Collect information identified in 2.1.</p> <p>3) Evaluate feasibility of net exchange.</p> <p>4) Initiate trial</p> <p>5) Monitor impact.</p> <p>6) Participatory evaluation of trial using criteria identified in Activity 1 and formulate action plan</p> <p><b>b) Trawlers</b></p> <p>1 Record: numbers, position, activities, e.g. dumping of fish, and impact of trawlers fishing in area.</p> <p>2 Participatory evaluation of monitoring</p>	<p>-PT&amp;FC</p> <p>-DO</p> <p>-PT</p> <p>-DO,Users</p> <p>-PT</p> <p>-Users</p> <p>-Users, VMC,DFS</p> <p>-PT</p> <p>-Users, VMC, DFS</p> <p>-PT</p> <p>-VMC, DFS, -PT</p> <p>-VMC, DFS, -PT</p> <p>-DNRO,DFO</p>	<p>-District officers collect data, -Provide technical advice.</p> <p>-Evaluate information</p> <p>-Advice, facilitation of process</p> <p>-Record, collate &amp; analyse data</p> <p>-Technical support</p> <p>-Evaluate analysis</p> <p>-Technical advice, facilitation</p> <p>-Record &amp; compile information</p> <p>-Technical support</p> <p>-Evaluate analysis</p> <p>-Technical advice,</p>	<p>1st qtr 97</p> <p>2nd qtr 97</p> <p>Phase II</p>	<p>-Report</p> <p>-Data recorded.</p> <p>-</p> <p>Recommendations for implementation</p> <p>-Reduced no. small mesh nets</p> <p>-Data</p> <p>-Analysis produced</p> <p>-Action plan</p> <p>-Information &amp; analysis</p> <p>-</p> <p>Recommendations for</p>	<p>-Sufficient expertise</p> <p>-Funds available</p> <p>-Information collected.</p> <p>-Exchange economically feasible. Funds available to exchange sufficient nets.</p> <p>-Users cooperate</p> <p>-Data collected</p> <p>-Analysis completed</p> <p>-Information collected</p> <p>-Analysis completed</p> <p>-Some form of legislation required</p>

<b>RESULTS AND ACTIONS</b>	<b>Who</b>	<b>Does What</b>	<b>When</b>	<b>Outputs</b>	<b>Assumptions</b>
3 Report information and recommend actions to District Council and Director of Fisheries.		facilitation		management.  -Legislative support.	

<p><b>3. One reef closed to extractive use</b></p> <p>1 User groups and District officers to analyse different options for reef closure i.e short term v long term closure and which reef to close.</p> <p>2 Gain formal agreement of those village governments &amp; users which utilise the reef selected for closure.</p> <p>3 Gain agreement of District Technical Officers, District Finance and Planning Committee and District Council.</p> <p>4 Seek agreement of Director of Fisheries and legal gazettelement of closure under the Fisheries Regulations 1994.</p>	<p>-Users, VMC, DO, -PT -VMC, DFS -DNRO, DFO, D C -DNRO, DFO &amp; Dist. Councils</p>	<p>-Analysis of different options, identify management actions Technical advice &amp; facilitation</p> <p>-Present analysis to other villages</p>	<p>4th qtr 96  4th qtr 96  1st half 97  1st half 97</p>	<p>-Reef to be closed identified, closure period agreed  -Letters of agreement  -Agreement minuted.  -Gazettelement of closed areas,</p>	<p>-Majority of users support reef closure  -Majority of users in other villages support closure.  -District government support for reef closures  -Director of Fisheries supports case for closure</p>
<p><b>4. Trial of fish aggregating devices initiated</b></p> <p>1 Identify appropriate aggregating devices through participatory analysis of different options.</p> <p>2 Users to identify and agree areas of use, use rights, maintenance and monitoring of effectiveness for any devices installed.</p> <p>3 Implement trial</p> <p>4 Monitor impact</p> <p>5 Evaluate trial &amp; identify future management actions.</p>	<p>-Users, VMC, DO, -PT, -FC  -Users, VMC, DO,  -PT, FC -Users -Users, VMC, DFS -Users, VMC, DFS -PT</p>	<p>Analysis of different options Technical advice, facilitation Preliminary analysis, technical advice Analysis of options, identification of rights &amp; management actions Technical advice, facilitation Construct &amp; deploy devices -Collect &amp; analyse data, -Evaluate data, formulate actions Technical advice, facilitation</p>	<p>2nd qtr 97  2nd qtr 97  2nd half 97 2nd half 97 2nd half 98</p>	<p>-Type of device(s) identified  -Report &amp; action plan  -Devices in use -Data &amp; analyses -Plan of proposed actions</p>	<p>-Consultants preliminary analysis favourable to use of aggregating devices.  -Agreement reached between user groups &amp; individuals  -Funds available -Sufficient data collected</p>
<p><b>5. Fishing pressure reduced by decreased numbers of visiting</b></p>					

<p><b>fishers</b></p> <p>1 Record number of visiting vessels using management area, types of gears used, areas fished, catch, value of catch.</p> <p>2 Above information analysed to produce recommendations for management of visiting fishermen i.e number of vessels.</p> <p>3 Report and recommend actions to District Council and Director of Fisheries.</p>	<p>-VMC, DFS</p> <p>-VMC, DFS -PT</p> <p>-DNRO, DFO</p>	<p>-Analysis -Technical support, facilitation</p>	<p>1st qtr 97</p> <p>1st qtr 98</p> <p>Mid 98</p>	<p>Information compiled.</p> <p>Recommendations &amp; action plan</p> <p>Legislative support</p>	<p>-Co-operation of visiting fishers</p> <p>-Sufficient information collected for valid analysis</p> <p>-Legislative support required</p>
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VMC=Village Management Committees; DFS=District Fisheries Staff; DFO=District Fisheries Officer; DNRO=District Natural Resources Officer; DC=District Coordinator; PT=Programme Team; FC=Fisheries Consultants; DMT=District Militia Trainer.

**Table 9. Collaborative monitoring system**

Indicator	Verification	Who	Does What	Interval
1. Income <i>and catch</i> of resident fishers increased	Monitor fish catches for catch per gear per fisher, income earned	Users & VMC VMC& DFS	Deliver catches/record data Compile & analyse data Feedback of information to fishers & District.	Daily Monthly Six months
2. Increased stocks on all reefs within management area.	- Simple stock assessments of key species from catch statistics which record, type and number of gears, area fished, species caught, number of fish per size class, weight of catch. -Underwater census of key species	Users/VMC PT VMC/DFS  As for above	Record data Analyse data Feedback information to fishers and District.  As for above.	Daily Six months Six months  All activities every six months
3. Reduced number of incidences of illegal fishing e.g. dynamite, seine nets and sticks (kigumi), poison, spears and spear guns.	-Patrol logs which record number and type of complaints/reports of illegal fishing and action taken.	VMC & Village militia VMC/DFS	Record complaints, incidences, responses & results Evaluate effectiveness & report to DFO & village government.	Daily  Monthly
4. All vessels and fishers using area licensed.	-District Fisheries Licensing records.	DFO	Compiles licencing records	Yearly
5. Reduced number of incidences of legal but destructive fishing.	-Patrol logs recording number of reported instances and what action taken.	As for 2.	As for 2.	As for 2.
6. Management controls in place.	-By-laws, regulations	VMC/VGov 't D Gov't	Formulates bye laws/regulations Approves bye laws/regulations	As required
7. No extractive use of closed reef.	-Patrol logs recording instances of extractive use & action taken. -Legal gazette of reef closure	As for 2	As for 2	As for 2

	specifying restrictions and penalties			
8. Fish Attracting Devices in place	-Site visit			
9. Catch information recorded	-Catch statistics recording fishing effort & catch from each device	As for 1	As for 1	As for 1
10 Reduced number of visiting vessels.	-Catch statistics recording fishing effort of residents & visitors	As for 1	As for 1	As for 1