FMSP Project R8196: Understanding Fisheries Associated Livelihoods and the Constraints to their Development in Kenya and Tanzania

Annex 4: Comparative Analysis

COMPARATIVE ANALYSIS

Table of contents:

List of Tables and Figures:

1. Introduction

1.1 Project rationale and purpose

It is believed that limitations or weaknesses in fisheries management, including a lack of understanding or awareness of fisheries-dependent livelihoods, and weak linkages between stakeholders in the fisheries sector, particularly between national institutions and primary stakeholders, have contributed to constrain the livelihood development of poor groups dependent on fisheries in East Africa.

A number of East African regional organisations and initiatives, including IUCN, WWF and CORDIO (Coral Reef Degradation in the Indian Ocean project), have identified the need for a greater understanding of the livelihoods of people dependent on coastal and marine resources, reflected in their participation of a regional socio-economic monitoring pilot project and spelt out in organisation reports. For example, the Draft Programme Framework for the IUCN *Development of a Partnership Programme for implementing the Jakarta Mandate in the Western Indian Ocean region* programme identifies the need for 'a better understanding of biological and socio-economic fisheries in the region'.

The findings of the FMSP Programme Development visit to Kenya and Tanzania in February 2002, where a range of stakeholders, including Fisheries Departments, National marine research institutes, NGOs and independent researchers were consulted, confirmed the above and identified the following needs:
1. Understanding of the contribution of fisheries to livelihoods
2. Alternative/improved livelihood opportunities for artisanal fishers
3. Socio-economic valuation of aquatic resources
4. Improved data collection methods

The inadequacy of current information and data on the fisheries resources, and on the use of these resources were highlighted during the visit by Fisheries Departments in both Kenya and Tanzania. The extent of dependence on fishing was considered to be severely underestimated in both countries. An example of this is the official government statistics for the Rufiji district in southern Tanzania, which indicate 400 fishers in the district. However, the Rufiji Environmental Management Project has found that approximately 61% of households fish, indicating that the actual number of people involved in fishing in the district is approximately 3,000.

The purpose of this project was thus to increase the understanding of the importance of marine fisheries for the livelihood of the poor, and identify the constraints to their livelihood development; in order to contribute to improving in their livelihood choices.

1.2 Overall aims and objectives of the project

The aim of the project was to contribute to the sustainable improvement of livelihoods of fisheries dependent communities in Kenya and Tanzania by improving understanding of fisheries-dependent livelihoods, identifying constraints to livelihood development and suggesting appropriate technologies to alleviate these constraints. The major objectives were to:
- Increase the capacity to understand fisheries-dependent livelihoods;
- Identify the constraints to sustainable fisheries-dependent livelihood development, particularly of poor groups, and suggest strategies to improve fisheries-dependent livelihood development;

- Strengthen the linkages between stakeholder groups through using a participatory research process and carrying out a multi-stakeholder problem census/learning workshops.

The project was carried out from September 2002 to April 2003 by three teams: MKK Ltd in Kenya and FANRM Research Consultants in Tanzania, with project management support from MRAG in UK.

After introducing the research components of this project (aims and methods- section 2), this report presents the major findings of the project through tables (sections 3 and 4), and draws out conclusions emphasising new knowledge and implications on the livelihood of the poor (section 5). Section 6 concentrates on the opportunities identified and the constraints. Overall conclusions are provided in section 7.

2. Research components

To achieve its objectives, the project had three main components. Firstly, country reviews of the available information were undertaken in Kenya and Tanzania.   These were supplemented by livelihood appraisals and multi-stakeholder participatory learning and problem census workshops at selected study sites in each country.

2.1 The review

The role of the review was to compile existing socio-economic and biophysical information in order to increase understanding on the structure of the fisheries, their importance, their socio-economic contexts and determine gaps in information.

2.1.1 Review objectives

The objectives of the review were to:
- Identify and collate existing information using both literature and interviews.
- Categorise and quantify stakeholders and their dependency on fisheries resources.
- Categorise and quantify status, trends and threats of fisheries resources.
- Describe the assets and access to capital of fisheries-dependent stakeholders.
- Conduct an institutional analysis of the fisheries sector.
- Identify information gaps.

One of the objectives of the review was also to describe and select representative coastal sites in Kenya and Tanzania where the fieldwork would be carried out. The sites had to be representative, as far as possible, of communities of the Kenyan and Tanzanian coast.

2.1.2 Methodology

Methods used to compile the review included literature review, internet and interviews. Visits were made to different relevant Departments which including Department/Division of Fisheries, Research Institutes, and other organisations such as the Tanzanian National Environment Management Council, the Tanzania Coastal Management Partnership, the Department of Zoology and Marine Sciences of the University of Dar es Salaam and Mbegani Fisheries Training Institute, the Coral Reef Degradation in the Indian Ocean (CORDIO) for Kenya.

In Kenya, semi-structured interviews in all Kenyan coastal Districts (except Lamu due to budget constraints and inaccessibility) were carried out to complement and update the information gathered through literature. Interview guides were used to gather information on numbers of fishers, fisheries related resource use patterns, organisation, management, and dependence. This data was collected in 13 sub-locations. Informants were from the Fisheries Department mainly but fishers and fishers' leaders were interviewed when possible.

In Tanzania, the review was conducted through visits to the above-listed institutions and departments, and discussions with relevant contributors.

2.1.3 Village selection

Six villages were selected for the livelihoods appraisals and multi-stakeholder learning and problem census workshops on the basis of the review findings and according to criteria defined at the beginning of the project:

- Poverty: the studied communities should be poor as the project aims at targeting the poor
- Representative biophysical environment and resource use patterns
- Manageable and representative demographic size (no urban areas)
- Accessibility: This relates to logistics for research and workshop – cost, availability of transport, availability of facilities for the workshop
- Information should be available about the area but previous work at site should be minimal (no previous extensive studies, no on-going research work at sites)
- There should be no on-going project or established Marine Protected Area at the site.

The potentially most suitable villages were then visited to confirm whether they responded to the research needs and authorisation was sought to carry out research from the village leaders.

Table 1: Characteristics of the selected communities

Country	Village	Approx. Size (house holds)	Location	Dependence	Access	Ecosystem	Gear used
Kenya	Chumani	150	Kilifi District (North Coast)	High	Very Easy	Barrier reef, lagoon	Spear guns, gill nets, hand lines
	Kidundu	104		Very High	Medium	Creek, estuary	Cast nets, hand line
	Mtondia	214		Medium	Very Easy	Barrier reef, lagoon	Spear guns, seine nets, hand lines
Tanzania	Kondo	222	Bagamoyo District (South Coast)	Very high	Easy	Coral reef, lagoon, mangrove	Beach seines, spear, hand lines, gill nets, cast nets/ring nets

	Mlingotini	540		Very High	Easy	Coral reef, lagoon mangrove	Beach seines, spear, hand lines, gill nets, cast nets/ring nets
	Dunda*	2415	Bagamoyo District (Central Coast)	High	Easy	Coral reefs	Beach seine, Spear, gill nets, hand lines, cast nets, fish traps.

* Note that Dunda was used as a study site in the multi-stakeholder learning problem census workshops, but not in the livelihoods appraisals.

2.2 Livelihood Appraisals

By increasing knowledge of fisheries socio-economic and institutional context at representative sites, the livelihood appraisal aimed to contribute to improving the understanding of constraints on development of fisheries dependent livelihood through providing more detailed and quantitative knowledge at the study sites.

2.2.1 Aims and objectives

The livelihood appraisal aimed at providing more detailed socio-economic information, in order to determine the dependence on fisheries resources, increase the knowledge on use patterns and investigate links between livelihood activities and household wealth. The livelihood appraisal also had a training component to increase local capacity to carry out socio-economic studies.

The objectives of the livelihood appraisal were to:
- Describe the relationship between fishers and their resources;
- Describe links between livelihood strategies and relative socio-economic status, and identify the most vulnerable groups to loss or mismanagement of fisheries resources;
- Identify site-specific formal and informal management systems and institutions; and
- Determine the opportunities and constraints to improved fisheries-based livelihood strategies.

2.2.2 Methodologies

Participatory methods as well as a questionnaire were used. Community members and personnel of local institutions were trained and involved in the research at all stages as well as a leading socio-economist.

2.2.2.1 Participatory approach

Participatory methods included semi-structured interviews, informal interviews and focus groups (see Bunce et al., 2000, Chambers, 1992, 1994, 1997, Slocum et al. 1995).

Semi-structured and informal interviews were used to study communities' dependence on fisheries resources. Key informants helped determine the communities' occupational structure (for each of the communities' households, the informants listed all their activities

whether for income or for subsistence- Berkes *et al.*, 2001). The percentage of fisheries dependent households could be determined for the community. Key informants were middle aged to old men and women who knew their community well (3 to 6 in each village)

User-based focus groups (fishers grouped according fishing gear/type, fish fryers, sea weed farmers) and semi-structured interviews (fresh fish traders, boat makers, ice sellers) were used to investigate:
- The relationship between fishers and their resources and fisheries-dependent livelihoods (fisheries resource use patterns).
- Site-specific formal and informal management systems and institutions;
- The constraints to sustainable fisheries-dependent livelihood development as perceived by users.

Focus groups were composed of 6 to 8 participants of different ages. In total 23 focus groups were interviewed (10 in the Tanzanian sites and 13 in the Kenyan sites). Participants were randomly selected within their user groups using the occupational structure households' list as a sampling frame.

Tables and basic statistics were used to analyse the data.

2.2.2.2   *Households survey*

A questionnaire was used to identify the poorer user groups, and investigate the links between livelihood activities and relative socio-economic status. Results of the household survey also provided more detailed insights on dependence on fisheries resources.

Wealth was investigated through food security (food coping and food surplus accumulation strategies- see Malleret-King, 2000, Maxwell, 1996) and material style of life indicators (see Berkes et al., 2001, Pollnac and Crawford, 2000). Food security indices reflected the households' situation in the short term and material style of life, based on assets ownership, the longer term situation.

Key informants identified and ranked local specific wealth/poverty criteria. Material Style of Life (MSL) items included housing material (roofing, walls), livestock and transport ownership. Each item was given a score reflecting its rank. Food coping strategies included changes in diet, skipping meals, borrowing food or money. A frequency scale was determined. Frequency of use of each food related strategy was weighed by its severity rank. Cumulative score were then calculated (MSL score, food security scores). The higher the scores, the wealthier the household.

On the basis of the wealth/poverty criteria identified a questionnaire was designed. The first part of related to household's characteristics and MSL data. The second part concentrated on fisheries dependent households (fishing systems, other activities).

40 to 60 households were randomly sampled in each village using the occupational structure list as the sampling frame.

ANOVA, T-test and Pearson correlations were used to investigate factors that could influence MSL and food security scores. Factors considered were location, main source of income, main source of food, type of fisheries related activity. For fishing households boat use, boat ownership and gear used were considered.

2.3 The multi-stakeholder participatory learning and problem census workshops

The purpose of the workshops was to identify, from the stakeholders' point of view, the constraints to fisheries-related livelihoods, and the influence of external factors (policies, institutions and processes). This was achieved by conducting a workshop with community representatives and traders, as well as representatives of institutions.

2.3.1 Aims and objectives

The aim of the multi-stakeholder participatory learning and problem census workshops was to facilitate the participating artisanal fishers and service providers in:
- Understanding the ecology and status of marine capture fisheries in the selected site,
- Understanding the meaning and importance of the multi-stakeholder participatory learning approach to empower communities to realise and plan development of their livelihood activities to ensure sustainable utilization of the available natural resources,
- Understanding the importance of fisheries within complex livelihood strategies of the poor,
- Ranking the factors influencing livelihood choices,
- Identifying the constraints to fisheries dependent livelihoods
- Identifying the changes and actions to realise future visions and
- Formation of Multi-sector Fisheries Reference Groups.

2.3.2 Methodologies

2.3.2.1 Sensitisation of District Officials and Training of resource persons

District officials were introduced to the Multi-stakeholder Learning Approach in the early stages of the project. They identified three Fisheries and Assistant Fisheries officers in each district who were trained to act as resource persons in the workshop.

2.3.2.2 Pre-workshop Visioning

This involved village members of various age groups (young, middle age and old) sitting together to prepare two vision maps (sketches) of their own village, one depicting the situation as it was some 30 years ago and the other to show the present situation. On the maps they would show important natural resources and infrastructure that are utilized for their livelihoods. Important areas for the fish resource and the habitats that support the resource had to be shown. Changes would be noted by comparing the two maps. Other important resources to be shown were settlement areas, utilities, community centres (religious sites), schools, roads, hotels, etc. This process was necessary to shorten the workshop time. Using these maps at the workshop, the participants from each village then developed future vision maps showing their perception on how they want the situation changed to improve their livelihoods, and what resources they would need to achieve their future vision plans.

2.3.2.3 Workshop

Each three-day workshop was fully participatory and sharing of experiences, involving plenary and group discussions. Participants drew their own expectations at the beginning of the workshop, which were matched with the workshop objectives and formed the reference points at each stage for successful workshop outcomes. Facilitators gave detailed

instructions before each session and allowed the participants maximum time to discuss and present their findings and suggestions. Learning by doing was a key feature of the workshop. The formation of Reference (Participatory Learning) Groups was stressed at the end of the workshop so that the learning process would continue within the communities when they went back, which is expected to stimulate empowerment and planning for development right from the grassroots level.

3. Project findings on the context of fisheries

The project's main findings are summarised in tables according to the themes studied. Results are presented according to the source of the information (the three research components). For the review, regionally applicable findings are given, and national differences highlighted. For the workshops and livelihood appraisals, findings refer to the selected sites in Kenya and Tanzania. Conclusions from the findings are drawn together in Section 5.

3.1   Fisheries and stakeholders

Table 2 presents the main findings of the three research components related to fisheries resources exploited, the trends and the threats to these resources. Some of the workshop participants included other resources as fisheries resources – these are given in italics in the table below.

Table 2: **Fisheries resources, trends and threats**

Theme	Review	Workshops	Livelihood appraisal
Resource exploited	**_Region_**: • Demersal species (parrot fish, lethrinids, rock cod etc), • Pelagics (jacks, king fish, tuna, sardines/Anchovy) • Crustaceans (prawns and lobster) • Other: octopus, squids, sea cucumber, shells. • Rays and sharks • Fossil coral? **_Tanzania_**: Seaweed Live coral?	**_Kenya and Tanzania:_** • Finfish (rabbit fish scavengers and cavilla fouks), • Crustaceae (prawns, crabs, shrimps and lobsters), • Sardines, • Molluscs (oysters, octopus, and squids). • _Limestone Rock (fossil corals),_ • _Mangroves and coconut trees,_ • _Land,_ • _Food crops (preparation of food for fishers)._ • _Livestock species._ **_Tanzania_**: • Seaweed • Live coral?	**_Tanzania and Kenya sites:_** • Demersal species (parrot fish, lethrinids, rock cod etc), • Pelagics (jacks, king fish, tuna, sardines/Anchovy) • Crustaceans (prawns and lobster) • Other: octopus, squids, sea cucumber, shells. • Rays and sharks. • Fossil coral **_Tanzania_** (1 site): Seaweed
Trends	**_Kenya and Tanzania_**: • Depletion of main exploited resources (catch decline) • Information gap: reliable fish catch statistics, trends.	**_Kenya and Tanzania:_** • Decline of fish catch • Decrease of size of fish caught • Depletion of some of	**_Kenya and Tanzania_**: • Decline in fish catch (quantity and size of fish), in crab, octopus, sea

---

		the fish species, • *Decline of soil fertility,* • *Decline of mangrove and coastal forests.*	cucumber catches.
Threats	***Kenya and Tanzania:*** • Increased demand linked to tourism and population growth • Poverty (fishing as last resort activity) • Increased number of fishers • Land based and marine based pollution (including bad farming practices causing siltation) • Human and natural caused habitat destruction (mangrove, coral reefs) • Non selective gear use (e.g. trawling) • Destructive gear use.	***Kenya and Tanzania:*** • Illegal fishing (misuse of small sized nets and spear guns), • Coral mining, • Habitat degradation & Pollution • Poverty, • Inadequate skills • Increase of fishers/ farmers on same resource. ***Tanzania:*** • Destruction of seaweed farms by beach seine fishers. • Illegal gear use (dynamite)	***Kenya and Tanzania***: • Increase number of fishers • Increase use of destructive gear (beach seines, poison) • Destruction of habitat (mangrove for crab) • El Nino rains

The three research components provided relatively similar results. Both Kenya and Tanzania exploit the same type of resources. Seaweed farming and live coral extraction are specific to Tanzania and do not occur in Kenya. Findings of the three components on trends and threats to the resources were similar and complementary. The review provided more extensive information on causes for resource and habitat degradation at a broader level. More detailed insights on the local situation provided by the workshop and livelihood appraisals confirmed the review findings. Results were also similar in both countries, except for the occurrence of dynamite fishing, which is particular to Tanzania.

Table 3 gives the summary findings related to fisheries community stakeholders and their socio-economic status.

Table 3: Findings related to fisheries community stakeholders and their socio-economic status

	Review	Workshop	Livelihood Appraisal
Stakeholders	***Kenya and Tanzania***: Main fisheries stakeholders are the fishers and fish traders. Boat builders, ice sellers, trap makers, net repairers are also stakeholders. Kenya: • Kenya Marine Fisheries Research Institute • Fisheries Department • Universities ***Tanzania:*** • Seaweed farmers in	***Kenya and Tanzania***: Main stakeholders - • Artisanal fishers, • District/Divisional/ Village Fisheries Officers. • Fish traders, boat builders/repairers, net menders. • Community-based Organisations, Department of Agriculture. ***Tanzania:*** • Mbegani Fisheries Training Institute	***Kenya and Tanzania sites***: • Mainly fishers (more than 75% of fisheries dependent households), fish fryers (10 to 25% of households at the sites). • Fresh fish traders and boat builders and net repairers. ***Tanzania***: Seaweed farmers, ice seller.

	Bagamoyo, Tanga and Pangani. • Faculty of Marine and Aquatic Sciences – Kunduchi (University of Dar es Salaam), • Vocational Training Centre Pangani • Young Fishermen's Centre Kijichi, • Tanzania Coastal Management Partnership, • The National Environment Management Council	• Tanzania Fisheries Research Institute ***Kenya:*** • Kenya Marine Fisheries Research Institute, • KDDP, CBNP, NEMA, Green Com, Marine Conservation Department, Plan International, Action Aid, Plan Kenya, Forestry Department.	
Gender	***Kenya and Tanzania***: • Fisheries activities are male oriented. Women are mainly involved through fried/dried fish trading and shell collection. ***Kenya***: Women are sometimes involved in octopus fishing (e.g. shimoni), prawn fishing (Kilifi), net fishing (Takaungu).	***Kenya and Tanzania***: • Fisheries activities are pre-dominantly male oriented. • Women are mainly involved in fried/dried fish trading, shoreline small fish species catching using bed nets and 'kangas' and shell collection. ***Tanzania***: Women do most seaweed farming.	***Kenya and Tanzania*** • Women involved in fried fish trading, shell collecting, fresh fish trading is a male activity. ***Kenya***: Women mainly involved in prawn and crab fishing (Kilifi Creek).
Socio-economic status	***Tanzania and Kenya***: • Gaps of information on stakeholders socio-economic status. • National surveys (GK, 2000; Nat.Bur.Stats, 2002) show that Coastal Districts are poor. • Tanzania: Between 7 and 33 % of households in the coastal regions live below the food poverty line (19% nationally), • Kenya: 59.5% people live in food poverty in the Coastal Province (50.6% nationally). ***Tanzania***: Fishing households are wealthier than farming groups in term of income (FAO, 2001). ***Kenya***: Fishing dependent households are one of the poorer groups (Shimoni area, Malleret-King, 2000), fishers	***Tanzania and Kenya***: • Artisanal fishers regard themselves as being poor.	***Tanzania and Kenya***: • Fishing dependent households poorer in Kenya than in Tanzania in the short and long term (food security and assets). • Gear can affect relative wealth (beach seines seem to increase food security in villages) • Access to boats affect positively wealth in the long term (MSL) • The type of boat used affect wealth (the more capital intensive boat used, the more wealthy the household).

---

	are found to have very low income (south Coast: McClanahan and Mangi, 2001)		

Findings of the three research components complement each other in relation to stakeholders, their socio-economic status and on the gender division of activities. A broader picture is provided by the review and the workshop, whereas the livelihood appraisal provided more detailed quantitative information. The livelihood appraisal also enabled more in depth analysis of the factors affecting wealth at the local level. Although at different levels of detail, findings converged. In both countries fisheries dependent people are considered and consider themselves poor. The main difference found between countries related to activities in which women are involved. Women are involved in some fishing activities in Kenya (prawn and crab fishing), whilst this did not seem to be the case in Tanzania. Fishing households are poorer in Kenya than in Tanzania.

Table 4 : Findings of the three research components relating to fishing systems

Theme	Review	Workshops	Livelihood Appraisal
Ecosystem	***Region***: • Fisheries activities are conditioned by the ecosystem. Fisheries are affected by the monsoon regime, current patterns, oceanographic characteristics, productivity of waters and continental shelf width. • Creek, barrier and patchy reefs with channels to deeper waters, large estuaries, mangroves, sandy beaches are all characteristics of Kenyan and Tanzanian coastline.	***Region***: • Fisheries activities depend on climatic conditions (Kusi, Kaskazi and Matlahi winds) monsoon wind regimes.	
Gear	***Region***: • Main gears used include basket traps, fence traps, gill nets, shark nets, sardine nets, cast nets, beach seines, spear, spearguns, handlines, longlines ***Kenya***: • Suggests high percentage of beach seining and spearguns in Diani (McClanahan et al., 1996, Wanyonyi *et al*., 2003)	***Region***: • Main gears used include basket traps, fence traps, gill nets, shark nets, sardine nets, cast nets, beach seines, spears, handlines.	(see Figure 1 for quantitative information). ***Region***: • Gill nets, shark nets, cast nets, beach seines, handlines, sticks. • High percentage of beach seine use (25% on average- see Figure 1) • Very few traps. ***Kenya***: • Spear guns
Boats	***Kenya and Tanzania***: Mainly small, unpowered canoes, dug out canoes, out	***Kenya and Tanzania***: Dug out canoes, out rigger canoes and	***Kenya and Tanzania***: • Dug out and outrigger canoes, dhows (very

	rigger canoes. Larger boats are used in more productive areas (e.g in North Kenya). Ugwana Bay in Kenya and offshore areas in Tanzania, trawlers operate.	dhows. Powered large boats (outboard or inbuilt engines). **Tanzania:** Few planked canoes owned by the richer fishers.	few). **Kenya:** • A significantly higher percentage of fishing households did not use boats than in Tanzania. • 69% of the fishing households did not use boats even when net fishing. **Tanzania:** • 51% of fishing households did not use boats.
Seasonality and location	**Kenya and Tanzania:** • Seasonality affects fishing. The low fishing season , which refers to low access to better fishing grounds, is during the South East Monsoon (SEM), when winds are strong and sea is rough. (March/April to September/October). Downwelling conditions in Kenya reduce further water productivity. • During the SEM, fishing activities are carried out inshore mainly. • During the North East monsoon, deeper, offshore fishing grounds for the more productive fishing of northern Kenya and around Dar es Salaam can be accessed. • Catch is lower in the low season.	**Kenya and Tanzania:** Maximum catch realised during Kaskazi, while low catches obtained during the Kusi. Most fishers are scared to go fishing during Kusi when the sea is usually very rough.	**Kenya and Tanzania sites:** • Fishing activities mainly carried out inshore. • Catch is lower during the South East Monsoon (often estimated to be halved by fishers). • Offshore, deeper fishing grounds accessible if fishers are using boats during the North East Monsoon. **Tanzania:** The seaweed farming high season is during the North East Monsoon.
Gear and boat ownership	**Kenya and Tanzania:** • Boats and gear are often shared or rented out by an individual. • A share of the catch is given for boat and gear.	**Kenya and Tanzania:** • Boats and gears are shared, rented or individually owned.	**Kenya and Tanzania:** • Boats are owned in partnership, shared or rented. • Gear, particularly nets, are owned in partnership or owned by an individual and rented out. Gear can also be given by traders (fins and masks for example). • A share of the catch is given for the maintenance and owner of the gear or boat.

| Gear choice | **Kenya:**
• Preferred gear would be nets.
• Gear choice reflect skills, age but mainly economic constraints

Tanzania:
• no information | **Kenya and Tanzania:**
Gear choice is dependent on the economic status of the fishers, although they would prefer to catch the larger fish using powered boats and large mesh nets. | **Kenya and Tanzania:**
• Gear choice and boat use are highly conditioned by fishers' economic situation.
• Beach seines are considered the easiest with which to enter the fishery
• Preference would be for nets, which are considered to give the best catch. |

As for other themes studied, the picture of the fisheries provided by the three research components were complementary. The review provided more detailed information on the ecosystems. On gear and boats, similar results were found by the three components but the livelihood appraisal provided new insights and more detailed information on the distribution of gear and boats at the local level for Tanzania and for representative sites in Kenya. One of the gears identified as common in the review (traps) was not found to be common at the study sites chosen.

In terms of seasonality, location of activities and gear and boat ownership, the livelihood appraisal and workshop results confirm the review findings. The level of detail is lower in the workshops for these themes. Finally all three components provide similar results and level of information on the criteria for gear choices.

3.2   Relative dependence on fisheries

Table 4 presents results relating to coastal people's dependence on fisheries.

Table 4: **Results relative to the dependence on fisheries**

Review	Workshops	Livelihood appraisal*
Kenya: • 9 % of the Kenyan population live on the Coast • Gaps of information on dependence **Tanzania:** • 13.3% of the population of Tanzania lives on the coast • Coast population (Tz) depends on marine products for 60% of protein intake **Kenya and Tanzania:** • Fishing and fisheries associated activities important for the livelihood of coastal communities • Other livelihood activities	**Kenya:** See Table 5a: Livelihood dependence: (a) On fishing • **Priority No. 1** – Two villages • **Priority No**. 2 – One village (b) On fish trading • **Priority No**. 2 – One villages and the women group **Tanzania:** See Table 5b: Livelihood	**Kenya:** • 42% of households on average in coastal Kenya depend at least partly on fisheries associated activities, • 33% of households on average depend on fishing at least partly • For 8% of the fishing households, fishing is the only income source. **Tanzania:** • 68% of households depend on fisheries associated livelihoods • 55% households depend on fishing • For 56% of Tanzanian fishing households, fishing is the only source of income **Kenya and Tanzania:** • 100% of the households depend also on another activity for food or income

| | dependence:
(a) On fishing
• **Priority No. 1** – Two villages
• **Priority No**. 2 – One village

 (b) On fish trading
• **Priority No**. 2 -Women group
• **Priority No**. 4 -One village | • For more than 60% on average (Kenya and Tanzania) of fishing households fishing is the main source of income
• Fishing is the main food provider for more than 30% of households on coastal Kenya and Tanzania
• More than 70% of fisheries dependent households eat fish at least once a week
• More than 50% of non-fisheries households eat fish at least once a week. |

include farming, small businesses, wood cutting etc
• Lack of quantitative information

* Reference to Kenyan and Tanzanian coast relates to the study of the representative sites.

Table 5: **Dependence on fisheries and other activities for livelihoods; Source: Kilifi workshop, Kenya**

Village/Priority	1	2	3	4
Mtondia	Stone quarrying	Fishing	Farming	Small businesses
Kidundu	Fishing	Fish trading	Farming/Livestock keeping	Mangrove harvesting
Chumani	Fishing	Farming	Stone quarrying	Coconut by-products **
Women **	Farming	Fish frying & selling	Cooking & selling food	Weaving using coconut leaves

** All villages combined.   ** Mats, furniture, palm wine.

Table 6: **Dependence on fisheries and other activities for livelihoods; Source: Bagamoyo workshop, Tanzania**

Village/Priority	1	2	3	4	5
Dunda	Fishing	Farming	Small businesses	Boat building	Food supply (Mama lishe)*
Kondo	Farming	Fishing	Small businesses	Charcoal making	Livestock keeping
Mlingotini	Fishing	Farming	Small businesses	Fish selling	Food supply (Mama lishe)*
Women **	Farming	• Food supply (Mama lishe) • Fish frying & trading	• Dress making • Baking and selling burns/donuts		

** All villages combined.   * Covering for women activities

Information on the dependence of coastal communities on the marine and coastal resources was scarce in the literature. This was one of the information gaps identified in the review. Findings of the workshop and of the livelihood appraisals reinforce each other and confirm the suggestions made in the review on the importance of the fisheries resources for the income and subsistence of the coastal communities. The workshop and livelihood appraisals provided more detailed information. The livelihood appraisal enabled to determine the level of dependence on resources at the local level. New insights were brought on the relative dependence of fisheries dependent livelihoods on fisheries resources whether for income and for food. Furthermore the livelihood appraisal showed differences between Kenya and Tanzania.

3.3 Fisheries governance

Table 7 and Table 8 summarise the national perspectives of fisheries governance, mechanisms, laws, policies and different institutions impacting fisheries resources (review findings). Table 9 summarises current governance at the local level, as perceived by local communities (workshop and livelihood appraisal findings).

Table 7: Review findings on fisheries management from the national perspective (Tanzania)

Authorities and institutions involved in fisheries governance	Role	Overall policies and laws under which institutions operate
Decision-making, planning and implementing bodies: Central Government	Policy making	**National Environnant Policy (1997)** **National Fisheries Policy and Strategy Statement (1998)**: to promote conservation development and sustainable management of the fisheries resources for the benefit of the present and future generations. **The Fisheries Master Plan 2002 to:** operationalise the National Fisheries Sector Policy and Strategy Statement (1998) to develop a feasible integrated development strategy that will stimulate sustainable economic growth of the sector. 15 programmes proposed to: § Increase protein supply and employment opportunities, § Increase export of fish products § Development of fisheries industry by sustainable use of fisheries resources and § Increase fish production and income of artisanal fishers. **The Fisheries Act No. 10 of 1994:** Presents fisheries law and regulation and other related acts such as the "Territorial and EEZ Acts of (1989)" and the "Marine Parks and Reserves Act 1994". Being reviewed applying National FAO standards and the new international Act established in 1996. **Management Plan for Mangrove Ecosystem of Mainland Tanzania**
Fisheries Division	Implementation and enforcement of fisheries management. Mandate to: • Use and conserve fisheries resource (fresh and marine waters). • Oversee policy-making process and legal functions. • Research and training • Set up regulations and procedures for licensing of large fisher companies • Establish resource co-management principles to safeguard the interests of all stakeholders, especially artisanal fishers.	
Village Environment Management Committees level (VEMC-Local Government)	Fisheries and conservation management activities- *Not effective due to lack of resources*	
Beach Management Units (BMUs)	Complement activities of the VEMC. *Need legal status to be empowered. Are being developed along the coast.*	
Research bodies: • Tanzania Fisheries Research Institute (TFRI) • University of Dar es Salaam	Research and training	
National Environment Management Council (NEMC)	Developed EIA guidelines to regulate use of various resources including marine fisheries resources. Collaborate with the fisheries sector to monitor, conserve and control use of fisheries resources.	
NGOs: • The Tanzania Coastal Management Partnership • Care International (Tanzania) • World Wide Fund for Nature (WWF)	Support activities related to conservation and management of marine resources and work with coastal villages	
Private sector: (Processors and exporters)	Provides services/support to fisher communities through provision of inputs (e.g. sea weed farmers being provided with inputs and in return selling seaweed to the investors.)	

Inter-governmental bodies:	Collaboration with the fisheries sector to assess, manage or conserve fisheries resources.	
• The Southern African Development Cooperation (SADC)		
• Indian Ocean Tuna Commission (IOTC)	Support fisheries related activities at the local level.	
• Food and Agriculture Organisation (FAO) of the United Nations		
• International Union for the Conservation of Nature (IUCN)		

Table 8: Review findings on fisheries management from the national perspective (Kenya)

Authorities and institutions involved in fisheries governance	Role	Overall policies and laws under which institutions operate
Decision-making, planning and implementing bodies:		National Biodiversity Strategy and Action Plan
Central Government	Policy making	National Environmental Action Plan
Fisheries Department	Mandated to: develop, manage, exploit, utilize and conserve the Kenyan fishery resources.	**Maritime Zone Act, 1989,** provides law relating to territorial waters, for the exploration, exploitation, conservation and management of resources in the maritime zones. Provides for the delimitation of economic zones.
Beach Management Committees (BMCs)	Devolve power to fishers themselves to manage their resources at the local level through: • Implementation of fisheries legislation; • Assisting in data collection where insufficient Fisheries staff • Adopting modern environmental management practices in consultation with the Fisheries Department and other relevant organisations • Fish marketing • Mediation. • Ultimately to serve as a link between the Fisheries Department and artisanal fishers. Regular communications with the Fisheries Department to ensure harmonized coexistence of all stakeholders in the fishing industry.- *legislative support in process.*	**The Environmental Management and Coordination Act, 2000,** promotes an integrated approach towards environmental management- *not yet implemented?* **Fisheries Act Cap 378 (Rev. 1991, p**resents fisheries law and regulations. Now being reviewed. **Fish Industry Act**, manages fishing activities at both artisanal and commercial levels
Research bodies: • Kenya Marine Fisheries Institute (KMFRI) • Nairobi and Moi Universities	Research and training	**The Government Fisheries Protection Act** provides for control on gathering particular species such as pearls, pearl shells, oysters, cowries, crustaceans and corals.
Kenya Wildlife Service (KWS)	Enforcement of conservation legislation especially within marine protected areas (MPAs) and adjacent areas. Surveys	**Forest Act Cap. 385** for

The Coast Development Authority (CDA)	Coordinate development activities in the coast region that aim to improve the food security of coastal people, increase employment opportunities and diversify the rural economy. Consult Fisheries Department on fisheries development matters.-*lacks supporting legislation to carry out its cross sectoral role.*	establishment, control and regulation of forest resources. (including mangroves)

MoUs (KMFRI and Fisheries Department, KWS/Fisheries Department)- *not ratified or operationalised. Collaboration depends on specific activities.* I.e through ICAM Secretariat. |
Cross sectoral initiatives: ICAM Secretariat hosted by the CDA, involving KMFRI, Fisheries Department, KWS, Kwale and Mombasa County Councils)	Initiate a integrated approach to coastal management.	
NGOs and projects: • CORDIO • CRCP • World Wide Fund for Nature (WWF)	Support research and activities related to conservation and management of marine resources and work with coastal villages	
Private sector : Tourism industry and others	Support marine resources conservation initiatives.	
Inter-governmental bodies: • Food and Agriculture Organisation (FAO) of the United Nations • World Conservation Union (IUCN)	Collaboration with the fisheries sector to assess, manage or conserve fisheries resources.

Support marine and coastal resource related activities at the local level. | |

Table 9: Institutions perceived as important by local stakeholders for fisheries resource management (workshop and livelihood appraisal).

Workshops	Livelihood appraisal
Fisheries Division/Department: *Tanzania*: Fisheries Division/District Fisheries Section (a) Patrol (b) Extension services (c) Advice on small-scale businesses/Fish marketing (d) Life saving at sea (e) Institutionalisation of fisheries legislation *Kenya*: Fisheries Department/District Fisheries Office (a) Training and extension to fishers (b) Issuance of fishing licences (c) Inspectorate services (d) Conservation activities (e) Law enforcement (f) Technical support to BMCs (g) Collaboration with NGOs and others (h) Link to credit facilities **Local based management:** *Kenya*: Beach Management Committees perceived to prevent illegal/ destructive gear use and planned exploitation but not working yet due to conflict between members, mistrust between district extension staff and BMC managers, and lack of resources. *Tanzania*: The main local authority mentioned was the Village Environment Management Committee (VEMC) which is perceived as responsible for management of all aspects of the environment including village hygiene, safe water, soil erosion, preventing/ controlling illegal gear use as well as controlling other coastal resources use, particularly mangroves. BMUs are similar to BMCs of Kenya are yet to be formed on the Tanzania coast. When formed they will need to be integrated within the VEMCs to avoid role conflicts. **Community based groups:** Tanzania and Kenya: community based groups are scarce.	**Fisheries Division/Department:** *Tanzania*: Fisheries division is perceived as important, and whose role is mainly to authorise fishing and fish trading and produce statistics. *Kenya*: the Fisheries Department is perceived by the stakeholders as authorising fishing and fish trading and prevent the use of illegal gear. **Local based management:** *Kenya*: BMCs are perceived as responsible for preventing illegal gear use- but not working yet due to conflict between members, lack of resources *Tanzania*: the main local authority mentioned was the VEMC which is perceived as for preventing/controlling illegal gear use as well as controlling other coastal resource use, particularly mangroves. **Community based groups:** *Tanzania and Kenya*: community based groups are scarce or non operational (one is starting in one of the Kenyan sites).

The review provided a much more comprehensive overview of the institutional make up for fisheries resource governance than the workshops or the livelihood appraisal, both of which concentrated on the local level. The workshops provided a detailed insight on the stakeholders' perceptions of the role of different institutions in the management of the resources.

4. Project findings on livelihood constraints

Constraints to the livelihood development of fisheries dependent people were identified on the basis of the review findings and investigated in more detailed with the stakeholders during the workshop process. The livelihood appraisal analysis reinforced the knowledge acquired by the two other components by investigating constraints directly through the perception of the different user groups and indirectly on the basis of the quantitative investigations.

The table below presents the major constraints on fisheries dependent livelihood development identified during the three research components.

Table 10: Major livelihood constraints identified through the three research components

Review	Workshop	Livelihood appraisal
• Lack of access to credit. • Poor and inefficient fishing gear and vessels • Lack of access to offshore resources. • Poor handling facilities and services, high post harvest losses • Habitat destruction • Few community based groups / initiatives • Poor involvement at the local level even if some efforts are made by the national level towards devolving power at the local level in both Kenya and Tanzania.	• Lack of access to credit. • Poor and inefficient fishing gear and vessels, lack of capital, access to better markets • Poor handling facilities and services • Habitat destruction impacting the resource regeneration • Poverty	• Lack of access to credit. • Lack of boats and inefficient gear • Destructive gear use • Destruction of habitats • Poor law enforcement and poor management • Poor handling facilities and services • Decline of the resources • Difficult for community members to work together • Poverty • Price fluctuations

The three research components had similar results when investigating the constraints on livelihood development of fisheries dependent people. More in depth investigation could be carried out through the workshops and livelihood appraisal.

Constraints were found to be relatively similar in both countries, although some national differences were identified. For example, poverty was found to be relatively higher in Kenya than in Tanzania. Destructive or illegal fishing methods were found to be widely used in both countries, however dynamite fishing occurred only in Tanzania, whereas spear guns are used in both, but more widely used in Kenya. Community participation was found to be further advanced in Kenya, with the establishment of the Beach Management Committees, whereas the Beach Management Units in Tanzania are still in the process if being formed for the marine environment. Also, in Kenya, processors are more involved in facilitating fishing groups, in order to ensure access to markets and reduce post-harvest losses, than they are in Tanzania.

Figure 2 of the next section pulls the constraints together and shows how they interact and maintain create a poverty cycle.

5. Conclusions on findings

Findings of the three research components generally were convergent and complementary (see tables 2 to 8). Higher level of details were provided by the workshops and the livelihood appraisals for most of the themes investigated except for resource governance and ecosystems, for which more comprehensive analysis came out of the review. Most in depth analysis and quantitative information was provided by the livelihood appraisal. Besides identifying constraints to livelihood development of fisheries dependent people, this research has provided new knowledge on the level of dependence on fisheries resources of coastal communities, on the distribution of gear and boat use, on factors affecting wealth at the local level, on fisheries related differences between Tanzania and Kenya, and on changes perceived by the communities in the last 30 years. This research also has contributed to increased knowledge on the causes for the lack of resource management at the local level.

5.1 Findings on fisheries context, stakeholders status and related constraints on livelihood development

The Kenyan and Tanzanian coasts are characterised by a variety of ecosystems including mangroves, sea grass beds, rocky outcrops, sandy beaches, coral reefs, estuaries. These ecosystems, the ecological characteristics of the coast and a dual climatic pattern are determinant for fisheries. They affect fisheries resources diversity, productivity, density and uses.

For example the narrow continental shelf is believed to limit sufficient productivity for the development of large-scale fisheries (UNEP, 1998) in Kenya. The richest waters are found in the northern coast of Kenya where upwelling influences are still felt. Estuaries and associated bays are particularly productive, and support commercial fisheries (e.g. the Rufiji Delta in Tanzania and the Tana River Delta in Kenya). Oceanographic parameters such as current flows accentuate the difference in richness of the waters, decreasing richness during the SE monsoon due to increased downwelling conditions in Kenya, and increasing richness in some parts of the coast during the NE monsoon through the southerly flow of upwelled waters. Access to the resources is also limited during the SE monsoon when conditions are rough in both countries.

The impact of seasonality on fishing activities was reflected in all the research components both in terms of the catch and the intensity of activities. Fishers fish less intensely in the South East monsoon and get a lower catch with similar methods than in the North East Monsoon. Fishing is a inshore activity most of the year. Depending on boats available, offshore, deeper, more productive fishing grounds are reached during the North East Monsoon (see Table 2).

The most commonly caught demersal species are parrotfish (Scaridae), scavengers (including Lethrinidae, Lutjanidae and Haemulidae), rabbit fish (Siganidae), and goatfish (Mullidae) (UNEP, 1998). As found in the review, the workshops and livelihoods appraisals found that fisheries resources mostly exploited are inshore demersal species (see Table 2).

Fishing is, mostly, an artisanal activity in both countries (see Table 4). The type of boats used (small, non engine powered canoes), mainly allow fishing inshore. Thus most of the fishing pressure is located in lagoons. Furthermore, more detailed results of the livelihood appraisal showed that a relatively high percentage of fishing households did not use boats in Kenya (69%), a significantly higher percentage than in Tanzania (51 %).

Findings of the livelihood appraisal and workshops showed that handlines, gill nets, beach seines, spear, spear guns were the most common gear used. Although traditional/basket traps were mentioned to be one of the main fishing method in the review, this was not confirmed in Kilifi or Bagamoyo areas. It is suggested that this might be a reflection of the sites rather than an overall trend. However it is important to note that traps are not the main gear used all along the coast.

Figure 1: **Proportion of fishing households using each gear identified at sites**
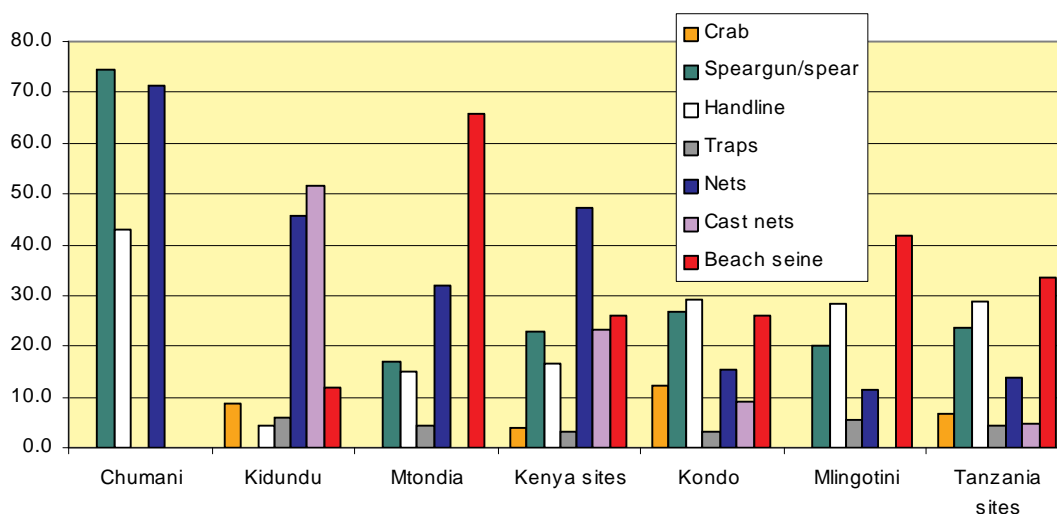
As for other themes investigated, the livelihood appraisal enabled some quantitative information to be gathered and provided an overview of the importance of the different gears (see Fig. 1) in representative sites. One of the major findings of the livelihood appraisal relates to the importance of beach seines. Beach seine is one of the most widely spread gears, despite being illegal. On average, more than 25% of fishing households were found to use beach seines in Kenyan sites and more than 30% in Tanzania (Figure 1). Findings for Kenya compare to recent findings for the Diani-Chale area (Wanyonyi and Malleret-King, 2003 and previous findings for Diani, McClanahan *et a*l., 1996).

Due to the high price of nets (preferred method of fishing) and of boats, fishers usually share boats and nets between three to six fishers or rent them.

Fisheries activities are male dominated except for fish frying which is women's domain. In Kenya, women were found to have started getting involved in fishing in Takaungu due to extreme poverty (Tunje, pers.com) and were involved in other fishing activities such as octopus and crab collecting in some sites, which did not appear to be the case in Tanzania. The main stakeholders at the local level are fishers and fish traders/fish fryers (see Table 3). Seaweed farmers were only found in Tanzania. The livelihood appraisal enabled the importance of different user groups to be quantified. Fishing households was found to represent 23% to 65% of the households in the study sites (75% of the fisheries dependent households) and fish traders (mainly fried fish traders) represented between 10% and 25% of the households in the sites.

Fisheries stakeholders' socio-economic status was identified as an important information gap by the review. However a few studies in Kenya suggest that fishers are one of the poorer groups (Malleret-King 2000, McClanahan and Mangi, 2001). In Tanzania, a national survey concludes that fishers are wealthier than farming groups (FAO, 2001). It was found, through the workshop process, that fisheries dependent people perceive themselves as poor. The livelihood appraisal investigated fisheries' stakeholders' socio-economic status but could not find significant differences in wealth according to household's activities.

However, the livelihood appraisal shows that fishing dependent households are poorer in Kenya than in Tanzania. This could be due to the fact that deeper, more productive fishing grounds are more accessible around Bagamoyo than in most of the coast in Kenya, where

the presence of the barrier reef makes access to deeper waters dangerous most of the year. The significant difference in socio-economic status of fishing dependent households was also found to be linked to the fact that less fishers had access to boats in Kenyan than in Tanzanian sites. Fishers who did not use boats were found to be poorer than those who did. The lack of access to deeper waters and to boats is considered as a major constraint to livelihood development by the stakeholders. This was found through the three research components (see Table 10). The livelihood appraisal confirmed this by showing that the type of boat used affected fishing households' wealth, as the larger and more sea worthy the boat, the more wealthy the households (see Table 3). The high fishing pressure in the lagoon resulting partly from this lack of more sea worthy boats is already taking its toll on the resources.

Indeed, fisheries resources are threatened (see Table 2). Although there is a lack of reliable catch statistics in both countries, several studies suggest that the resource is threatened (Mc Clanahan and Mangi 2001; Malleret-King 2000). This was confirmed at the local level both in the workshop and in the livelihood appraisal. The perception of fishers and fish traders was that both the quantity and size of fish available has declined in the recent years including sea cucumber and octopus catches.

Review findings show that the resource decline is mainly due to an increase in the number of fishers, to the demand increase (due to population pressure and tourism), the use of destructive gear (beach seines, trawling, poison) but also to habitat destruction through man made causes (coral reef destruction through lime production, siltation due to bad farming practices, mangrove cutting etc), or natural causes (sea level rise, storms, etc.).

From the stakeholders' point of view (workshop and the livelihood appraisal), the decline in fisheries resources is due to the increase in number of fishers, the destruction of habitat and the use of destructive gears. Decrease in fish catches has contributed to reduced income and opportunities for the fisheries dependent people. Resource decline is considered by them as one of the most important constraints on livelihood development. The lack of fish prevents some fish traders to carry out their activities (see Table 10 and Figure 2).

Poverty and lack of access to credit which constrains opportunities for fishers and other associated activities is considered as the root of most of the constraints identified. It prevents access to and maintenance of boats, and of gear, it also prevents good handling facilities/infrastructure for the fish to be developed, which in turn results in high post harvest losses, which were identified as a constraint (see Table 10 and Figure 2).

Furthermore, the difficulty in accessing credit affects gear choices, which in turn affects the resource. Indeed, the choice of gear often reflects the economic status of fishers, as was found in the review for Kenya and the two field research components. Gears such as handlines and spearguns, which are both widely used in Kenya, and beach seines, which are used in both countries, are the cheaper methods to use. A minimum investment is required. In the case of beach seines, one rich individual (*tajiri*) owns gear and boats which incite fishers to participate in this destructive fishery (see Table 10 and Figure 2).

5.1.1 Dependence on fisheries and related constraints

The three research components suggest that dependence on fisheries resources is high in coastal areas both for food and income (see Table 4 to Table 6). Whereas the information was scarce in the literature and identified as a knowledge gap, the livelihood appraisal and workshop reports provide more detailed quantitative information. The ranking process carried out in the workshops shows that fishing was considered as the most important activity in four of the six villages, and the second most important activity in two of the villages studied (see Table 5 and Table 6). These results were taken a step further and confirmed by

the quantitative analysis carried out in the livelihood appraisal which showed that fisheries resources are essential for income and for food at the local level, particularly in three of the five sites studied. In the livelihood appraisal, dependence was studied at different levels, at the community level which showed that on average, in coastal Kenya, at least a third of the households depend on fisheries associated activities for their livelihood and the proportion reaches more than 60% in coastal Tanzanian households (see Table 4).

New insights were provided by the livelihood appraisal on the importance of fish as a food source. Although no households depended exclusively on fisheries for their livelihood, fishing represented the main source of income for most of the fishing dependent households (more than 60%). Fish also appeared as one of the most important source of protein for more than a third of fishing households in both countries. More than 70% of fisheries dependent households were found to eat fish more than once a week, as did more than 50% of non fisheries dependent households.

Findings of the livelihood appraisals suggest that the dependence on fisheries resources might be higher on the Tanzanian coast than on the Kenyan coast. 8% of fishing households were found to depend only on fishing for income in Kenya whereas it was the case of 56% of fishing households in Tanzania.

The high dependence on fisheries resources reflects the lack of alternative employment opportunities on the coast. The lack of employment alternatives was mentioned by the stakeholders as a cause for resource decline, and thus a constraint on livelihood development both during the workshops and the livelihood appraisal (see Table 10), which confirmed the review suggestions.

The implication of this dependence is the high vulnerability of the coastal communities to the loss or mismanagement of marine fisheries resources, particular of fishing households depending solely on fishing for income (i.e: 56% of the fishing households in the Tanzanian sites). The loss or mismanagement of fisheries resources would also strongly affect the wider community who depend on fish for cheap protein supply. This is a critical issue as the lack of management was identified as a trait in both countries (see next section and Table 10).

5.1.2 Resource governance and related constraints on livelihood development

The review provided more comprehensive information than the workshops or the livelihood appraisals in terms of resource governance. There are a diversity of institutions responsible for fisheries management, but the Fisheries Division (Tanzania) and Fisheries Department (Kenya) are the most directly involved as they are the ones mandated to enforce the Law. In both countries the most important legislations for fisheries resources management covers both marine and fresh water fisheries. In Kenya, the Lake fishery has been considered as much more important than the marine fishery, and this has led to reduced interest during recent decades, which has contributed to the lack of management.

Both in Kenya and Tanzania, fisheries management is very much a top down approach, and this has been rather ineffective due to the impossibility for the Fisheries Department / Division so carry out their task. Efforts towards cross sectoral and more holistic approaches to management have been made, however due to the lack of communication and the common interest of institutions involved in fisheries management, this has relatively small impact. The legislative framework is not yet sufficient to provide management tools for cross-sectoral efforts such as the Coastal Development Authority in Kenya.

In response to the realization that marine fisheries are an important source of food and employment and that the resource was declining, both governments are making efforts to improve management, particularly through devolving more power to the local communities. In Tanzania, increasing power at the grass roots level is occurring through the current decentralization process which is increasing the power of local government, and establishing village committees, including Village Environment Management Committees who have a legal mandate and responsibility to carry out conservation activities. Setting up Beach Management Units (BMU) along the coast, using the experience gathered around the Lake Victoria, to be expressly devoted to marine issues is also a step in this direction (see Table 7 and Table 8).

Similarly, in Kenya, a review of the Fisheries Act has been carried out in the last two years, in consultation with the local stakeholders, in order for the act to be more adapted to the country's needs. The establishment of Beach Management Committees (BMC), based on traditional institutions, which will act as an intermediary between the Fisheries Department and the fishing communities and carry out some fisheries management tasks, are a similar step towards more community involvement (see Table 7 and Table 8).

However the progress is slow. So far the local based units are not yet effective often due to the lack of resources. From the review it was also apparent that there are very few community based groups.

The findings of the workshops and the livelihood appraisal with respect to local institutional arrangements were similar to the review findings. Both the livelihood appraisal and the workshops found that VEMCs in Tanzania and BMCs in Kenya were perceived as important, particularly in preventing illegal gear use. The VEMCs have a wider scope than the BMCs, as they are also responsible for overseeing environmental protection on farmland and settlement areas. Both types of committee were considered ineffective as yet due to the lack of resources. Fisheries Division/Department were also perceived as the main institutions to manage fisheries resources (see Table 9) but considered as not able to carry out their mandate. Stakeholders, particularly in Kenya, complained during the livelihood appraisal of the lack of law enforcement by the Fisheries Department.

When investigated during the livelihood appraisal, no traditional or informal management was found to be likely to contribute to resource management, which confirmed the findings of several studies in Kenya mentioned in the review (Glaesel, 1997).

The lack of fisheries management, particularly the lack of law enforcement relating to illegal gear use, was identified as one of the major constraints to livelihood development by the stakeholders through the workshops and the livelihood appraisal. For stakeholders, and also according to review findings, destructive gear use is one of the main causes of resource depletion. Thus, for the stakeholders, fisheries management authorities contribute to maintaining poverty. Interestingly, although the stakeholders complain about the lack of management, the three research components suggested that there are very few community based initiatives arising to fill this management gap. There are very few self help groups, or working committees to improve both the management of the resources and the livelihood of the stakeholders. The lack of community based groups is also one of the constraints to accessing credit, for example.

This lack of community based groups was attributed to the fact that there is little trust amongst community members. This was suggested in the review and confirmed in the workshops and in the livelihood appraisal. This is one of the very important findings of this research as it prevents development from happening. Some stakeholders consider that the lack of loyalty and trust between community members is a result of poverty, as fishers have to be opportunistic.

Figure 2 below summarises the constraints on livelihood development of fisheries dependent people and the way they interact with each other, perpetuating poverty.

Figure 2: Fisheries associated livelihood. Poverty cycle
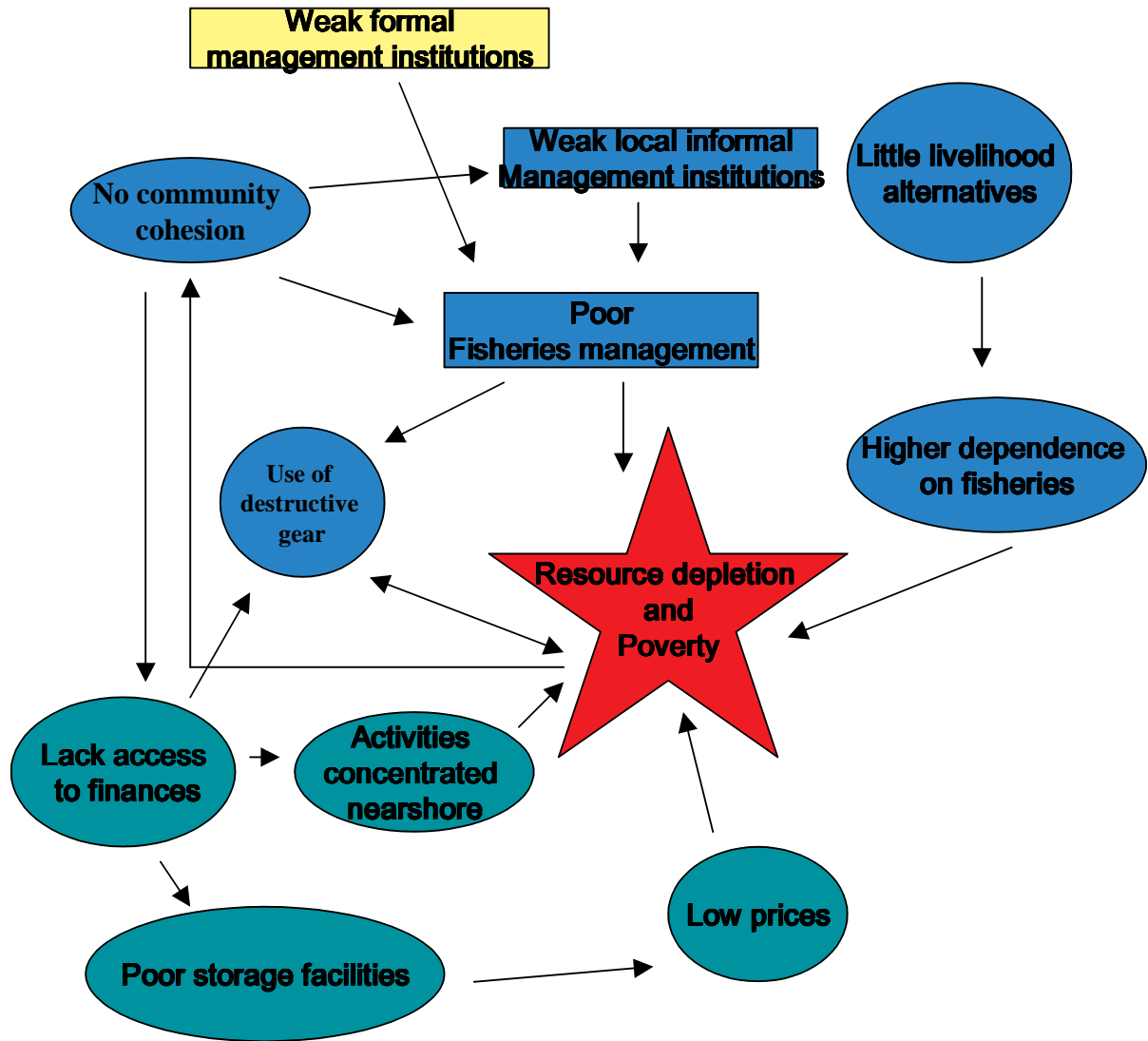
6.   Analysis of opportunities and constraints

From the results presented above, the most important fisheries livelihood problems facing the poor are the decline of the resource base, poor resource management and lack of access to credit. The lack of access to credit to acquire improved gear and fishing vessels is the main constraint on livelihood development identified by stakeholders. . In view of the perceived and documented overexploitation of the resources and the identified causes for this overexploitation (mainly poverty and lack of management), opportunities discussed will relate to these main causes. In order for fisheries exploitation to be sustainable and livelihood improved, pressure on resources has to be reduced and management has to improve.

6.1   Reducing pressure on resources

The number of fishers has been increasing over the last 10 years while production is declining (as found in the reviews, livelihood appraisals and workshops). The high pressure on inshore fisheries resources has led to decline of the resource base as a result of overexploitation, and fishers resorting to using destructive fishing methods.

6.1.1   Fishing offshore: opportunities and constraints

Because of the environmental, technical and financial constraints, fishing activities are mainly carried out inshore, inside the lagoons and around coral reefs in shallow water areas. This puts a high pressure on the reef ecosystems and depleted resources, thereby increasing poverty.

Thus the most obvious and common answer would be to increase access to capital and enable fishers to obtain more sea worthy and powerful boats and appropriate fishing gear, in order to release pressure on the inshore areas and increase access to offshore fishing grounds. However, there are reservations and this suggestion is confronted with three major constraints.

(i) There is a lack of knowledge about offshore resources. Offshore resources might not be able to sustain a significant increase in effort in the long term as there is no evidence from single operators that currently exist that significant resources exist offshore except in isolated locations along the coast (e.g. North Kenya Banks), and these locations are already exploited by commercial and small scale fishers. Most information available is therefore based on research in the inshore waters.

(ii) The use of more powerful but more expensive gear (to maintain as well as to obtain) has been experienced in other locations and has often been a failure. A cost benefit analysis on the use of outboard engines for small-scale fishermen done in Dar es Salaam showed that the cost outweighed the benefits (King, pers. comm.). Fishermen interviewed in Mtwara mentioned one of the three engine powered sardine fishing boats was grounded because the fishers could not afford to maintain all of them. Engines are expensive to maintain and run, particularly in remote areas where spare parts, repair facilities and technical expertise are difficult to find and are expensive. Powered boats are capital intensive; they have to match increased costs with increased catch. During the workshop in Bagamoyo, participants were concerned with the deterioration of life-saving services (patrol boats and equipment), and requested the Fisheries Division to update and strengthen their capacity to react to emergencies at sea. Such services would be even more expensive for offshore fishing.

Around the Kisite Marine National park however, Malleret-King (2000) found in one of the communities studied that fishermen using engine-powered boats (two boats) were more food secure than others. Donors had given boats to three communities in compensation for the loss of fishing grounds to the Marine Park. They were run by a community-initiated association. This functioned in only one of the fishing communities out of the three. The Mikingamo Fishing Group operating in Mafia Island mentioned in the review was able to raise contributions and obtain a loan to purchase fishing equipment and a second hand powered boat. Subsequently, incomes and welfare benefits for the members increased considerably.

(iii) There is no guarantee that the improved gear will be used to fish offshore and there is the risk that it would be used to fish inshore, worsening the situation of the inshore fishery and increasing poverty.

Trying to alleviate pressure on inshore resources by increasing access to offshore resources could provide benefits but must be considered very cautiously, looking at appropriate technology. The use of plywood stitch and glue boats, which were tested in Asia (King, *pers. comm.*) could be an example of the type of appropriate technology. However a study would be needed on the cost of using such materials in areas considered.

A way to enhance the fisheries, and test offshore resource potential would be to try and establish Fish Aggregating Devices (FADs). Communities could set up FADs made of local materials (e.g. palm fronds) in strategic offshore places accessible for fishers with their current boats. The potential for FAD programmes to contribute to the livelihoods of poor coastal fishers in East Africa has been investigated in a recently-completed FMSP project (R8249). This found that, whilst FADs may benefit livelihoods, appropriate policy and legislative frameworks, and market networks need to be in place, as well as training and support to fishers. Investigations on the effectiveness of FADs were also carried out in the South Pacific in a previous FMSP project (R4777). Using the results of this project on best location and socio-economic benefits of FADs would be useful. Accessibility to boats would still remain a condition to the use of FADs.

Further strategies could be to enhance fish/prawn stocks. For example, experiences on enhancing prawn stocks, through research carried in the context of a previous FMSP project (R6267) in Asia, suggest that stock enhancement could improve the socio-economic status and food security of fisheries dependent people. Further research would be needed to investigate the feasibility of such interventions in the East African context.

6.1.1.1   *Promoting alternative livelihood activities*

The high pressure on resources is due not only to the lack of access to offshore resources but also to the increase in fishing, contributing to poverty. This is partly due to the lack of alternative opportunities.

Alternative activities are already carried out to complement fisheries dependent households' income. Increasing the productivity of activities, such as farming could reduce dependence on fisheries resources and release pressure on the resources. This could be by exploring more effective farming techniques in fishing villages or explore higher value crops including livestock keeping. The loss of soil fertility has been mentioned as a constraint in the workshops.

Seaweed farming is being encouraged in some of the coastal districts like Tanga, Pangani and Bagamoyo in Tanzania. Although seaweed farming is often suggested as an alternative

livelihood activity, it was found at the sites that the market is restricted and prices are kept low. If setting up seaweed farming, careful market studies have to be carried out and the income, which can be derived from such activity, investigated.

Aquaculture development is an attractive alternative but is less developed in both Kenya and Tanzania. Aquaculture requires capital and training. Again, feasibility studies would be needed and learning lessons from experiences in South East Asia on the drawbacks and advantages of aquaculture would be necessary and on the best way to manage culture fisheries.

However, investigating alternative livelihood opportunities was not a focus of this study. In the light of the findings of this study, it is recommended that a detailed examination of alternative livelihood opportunities, and mechanisms for enabling fishers to engage in them is conducted.

6.1.1.2 *Reducing post harvest losses*

One of the constraints identified by the stakeholders was their vulnerability to price fluctuations, particularly when catches are good. Traders as well as fishers are obliged to sell at low prices due to the lack of storage facilities. Other fishers are located in remote areas, and access to larger markets is difficult.

Improving marketing and storage facilities could be a way of contributing to improving the socio-economic status of fisheries dependent households. Improving storage conditions would help stakeholders regulate their supply and improve the quality of the fish, which could reach higher prices. Similarly, value added fish products would contribute to post-harvest benefits. Finally, improving communication networks to the remote landing sites will enable the catch to reach more competitive markets.

However, experiences from past attempts at improving marketing and storage in Kenya have failed due to the collapse of the community-based organisations needed to maintain the facilities (IFAD project in the late 1980s, see King, 2000). Private initiatives, such as the octopus storage and marketing chain, whereby octopus dealers providing fishers with cold storage have enabled products to be kept for a while, are successful. However the prices are determined and kept low by the dealer. Finally, improving communication networks requires improving road networks to the fishing villages. This is a long term process and requires District and Central Government support as well as community involvement.

Prior to suggesting ways of developing value added products, more knowledge is required on the marketing potential of such products.

6.1.2 Improving fisheries management: opportunities and constraints

Fisheries resources are common pool resources and are extensive. Their management requires resources, planning and coordination of the multiple stakeholders involved in their use. Uncoordinated management attempts and lack of law enforcement has been identified as a main constraint to livelihood development, by allowing destructive gear to be used and thus the resources to be depleted (see figure 2 and Table 8). Formal institutions are responsible for the management of the resources, but do not have the means to carry out their mandate. In Tanzania, attempts to manage the marine fisheries resource by different institutions are in progress; Fisheries Division/Department, Tanzania Coastal Management Partnership, Marine Parks, Institute of Marine Science/University of Dar es Salaam, World Wide Fund, and others are involved, but there needs more collaboration as these efforts

tend to be isolated. In Kenya, a number of institutions is also involved in fisheries management, however coordination is lacking.

Fisheries Department/Division in both countries are trying to change their approach from top down to a more inclusive community-based approach. This is the aim of the Beach Management Committees (Kenya) and Beach Management Units (Tanzania). However, these are not yet functioning effectively. These activities could be supported with further guidance and input from experiences from outside the region, tied in with giving groups greater skills and capacity to carry out their new roles. Community based initiatives with real devolution of power could provide an effective means of breaking the current resource mismanagement. For any of the suggestions to alleviate constraints on fisheries management it would be essential to promote and enable community-based actions. Participatory catch monitoring promoted through CORDIO and IUCN Tanga Coastal Zone Conservation and Development Programme is a step further towards more involvement of communities in fisheries management (Obura *et al.*, 2002).

Solutions to resource threats need to come from the fisheries stakeholders and implemented by the stakeholders with the communities taking the lead (co-management). Furthermore, in Kenya and Tanzania, more efforts could be done to attract the private sector to participate in fisheries management of the marine fisheries resource e.g. large fishing/trawling companies, fish processors, the beach hotel owners, tourist operators, etc.

Involving the private sector could contribute of improving marine resource management however more needs to be known on how to attract the private sector in ways that would also benefit local stakeholders.

Other initiatives, such as community selected and managed closed fishing areas could be explored. Closed areas created by communities in Tanga in northern Tanzania for example under the IUCN Tanga Coastal Zone Conservation and Development Programme, are paying off and the community based catch monitoring is now showing an increase in catch and size of fish (Horrill *et al.*, 2001).

Improving management could mean real devolution of power, although steps are being made in this direction by Kenyan and Tanzanian governments, this might take time. The main constraint is also the distrust among community members, which prevents micro interventions/initiatives to be developed. Community unity has to be promoted and trust built for effective management of the marine fisheries resource.

6.1.3 Promoting and enabling community based initiatives ventures

For any of the suggestions made above to alleviate constraints on livelihood development of the poorer fisheries dependent groups, it would be essential to promote and enable community-based actions. However, from the results of the three research components it is clear that due to the lack of trust amongst stakeholders, cooperative and other community based initiatives have failed. This prevents stakeholders acquiring equipment and vessels or improved vessels, storage facilities but also prevents them from taking up non fisheries related activities. As a group they are more likely to raise the finances needed through their own contributions, credit systems and support from donors and government. This lack of cooperation at the community level is believed also to be one of the main constraints to improved management.

Thus the first step towards finding solutions to constraints to livelihood development would be to facilitate the process and enable the establishment of community groups to be formed and function on a trust basis, thus promoting an enabling environment for local people to

work more effectively together. Training on organisational skills, group functioning etc could be needed.

6.1.4 Increase in knowledge

The unreliability and lack of fisheries data has been cited as a serious information gap. Planners and decision makers need reliable data to be able to project the needs and support to the artisanal fishers so as to improve their livelihoods. Such data is also important to plan for conservation and sustainable management of the fisheries resource.

The major information gaps identified by this study relate to fisheries statistics (reliable catch data), data on the socio-economic status of fishers, and their dependence on fisheries for livelihoods. Fisheries statistics are frequently lacking, or considered to be unreliable, with data available from different sources being inconsistent. The status of the marine resources cannot therefore be reliably determined.

In the case of Tanzania the Fisheries Master Plan has proposed a fisheries information improvement programme to strengthen the Statistics Section of the Fisheries Division. It is envisaged that this will form the fisheries information centre linking all the other institutions. An effort at the regional level is being made through Coral Reef Degradation in the Indian Ocean (CORDIO) project to promote the monitoring of socio-economic information on marine resource dependent people to decision makers. The DFID/SADC Regional Fisheries Information System is also an attempt to make information available to managers. However more efforts and coordination are needed.

7. Conclusions

Coastal people represent 13.3% and 9% of the populations of Tanzania and Kenya respectively. The coastal populations are highly dependent on fisheries resources for food and income. The research findings suggest that on average 68% of coastal households in Tanzania and 43% in Kenya depend on fisheries related activities for their livelihood.

However, fisheries dependent people are poor, and fishing households are particularly vulnerable to loss or mismanagement of the resources. Opportunities to move out of fishing are often very scarce in both countries, whereas a wider choice of activities is provided in urban areas or inland.

Fisheries management has failed so far due to the lack of enforcement capacity, poor resources, and also to a lack of coordination between institutions involved. Fisheries Department/Division are making efforts in order to give more power to the local level to improve management capacity but these are not fruitful yet. The lack of local based initiatives and non-existent informal management systems, coupled with the lack of formal management, has contributed to overexploitation of the resources, particularly inshore.

The major constraints to improved fisheries livelihoods are perceived as:
- Lack of / weak management;
- Resource depletion, due to poor management, population growth, environmental factors, lack of alternative livelihood opportunities;
- Lack access to credit.

One of the underlying causes to the constraints mentioned above was found to be the distrust amongst community members preventing community based groups or initiatives to function successfully.

Livelihood opportunities are few in coastal Kenya and Tanzania. Farming and small businesses including the production and trading of ready foods, wood, charcoal, palm wine making, thatch. Stone quarrying, lime production, salt production were also identified as other livelihood activities undertaken by coastal communities. At the household level, these activities already often complement fisheries associated activities. Some of these activities are associated with conservation issues such as lime making in Tanzania where live coral is used, wood trading and charcoal making which are contributing to the destruction of habitats. Employment is scarce unless large urban areas or tourism development are in close proximity. Farming could be diversified, value added products could be promoted but more research would be necessary to identify how other livelihoods could provide an alternative to or increase their contribution to the income/subsistence of fisheries associated activities.

However livelihood diversification is a long term objective. In the shorter term, fisheries related suggestions to improve the livelihoods of the poor would be:

- Potentially increase yield by enabling access to offshore resources (looking for ways of increasing access to more seaworthy boats). However this option needs to be considered with great caution and a lot of aspects need to be considered further (eg, the potential of offshore resources, cost benefits of more expensive gear- note that this does not refer to high capital investment necessarily or mechanisation but simply access to boats, or to gill nets rather than spear guns for example, and the actual use of the gear offshore rather than inshore etc);

- Enhancing fisheries through the establishment of Fishing Aggregating Devices or stock enhancement. Again, more research would be needed before pursuing this;

- Reducing post harvest losses by improving fish storage and handling facilities, and promoting value added products. Again, more knowledge would be needed;

- Improving fisheries management by supporting and promoting co-management and community management initiatives;

- Crucial to all of the above suggestions would be to promote an enabling environment for community based management and self help groups to develop.

More specifically, actions and further research needed to implement or investigate the potential of the above suggestions would be:

- To investigate the potential of offshore resources for example through surveying commercial fishing companies operating offshore, deep sea fishing operators, Research Institutes etc.;

- To investigate the potential and feasibility including a cost benefit analysis of setting up low cost FADs in appropriate offshore locations (not far offshore) to be easily accessed by currently used boats. The findings of FMSP project R8249 would be relevant here;

- To investigate the potential markets for higher value fish products in the region, the requirement and feasibility of developing valued added products in order to increase post-harvest benefits.

- For Governments to invest more in co-management approaches. Examples already exist, for example the IUCN initiative in Tanga, Tanzania (Horrill *et al.*, 2001), and efforts are made through the establishment of Beach Management Committees (Kenya) and Beach Management Units (Tanzania). However these need to be supported and constraints to their functioning investigated. Actions to increase the involvement of the private sector should also be carried out. For this, further investigations are needed in order to understand how to attract the private sector into management.

- To support and promote self-help groups and community based management initiatives. This will serve two purposes; to increase access to credit and thus access to better fishing and storing equipment, and to improve management. The causes for the lack of community unity and lack of trust among community members in coastal areas needs to be investigated further. At the same time, training interventions/workshops at the village level on organisational skills are required. A support unit providing help and advice for community groups development could also be set up.

8. References

Bakun, A., Roy, C. and Lluch-Cota, S. (1998). Coastal upwelling and other processes regulating ecosystem productivity and fish production in the Western Indian Ocean. In *Large Marine Ecosystems of the Indian Ocean: Assessment, Sustainability and Management*. Edited by Shermann, K., Okemwa, E. and Ntiba. M. Oxford: Blackwell Press.

Berkes, F., Mahon, R., McConney, P., Pollnac, R. and Pomeroy, R. (2001). Managing small-scale fisheries: alternative directions and methods. International Development Research Centre, Ottawa, Canada. 309p.

Bunce, L., Townsley, P., Pomeroy, R., and Pollnac, R. (2000). Socioeconomic manual for coral reef management. Australian Institute of Marine Science, Townsville, Queensland, Australia. 251p.

Chambers, R. (1992). Rural appraisal: rapid, relaxed and participatory. *IDS Discussion Paper* **311**.

Chambers, R. (1994). Participatory Rural Appraisal (PRA): analysis of experience. *World Development* **22**(9), 1253-1268.

Chambers, R. (1997). *Whose Reality counts? Putting the first last*. London: Intermediate Technology Publications.

FAO, 2001. Population Change in Fishing Communities: Implications for fisheries resources and the coastal environment. http://www.fao.org/sd/2001/PE0101a_en.htm

Government of Kenya (GK), (2000). Economic survey 2000. Central Bureau of statistics Ministry of Finance and Planning.

Glaesel, H. (1997). Fishers, Parks and Power: The socio-environmental dimensions of marine resource decline and protection on the Kenyan coast. PhD Thesis. University of Wisconsin-Madison.

Horrill, C., Kalombo, H., and Makoloweka, S. 2001. Collaborative reef and reef fisheries management in Tanga, Tanzania. IUCN East Africa Programme and SEACAM.

King, A. (2000). Managing without institutions: the role of communication networks in governing resource access and control. PhD Thesis. University of Warwick, UK.

Malleret-King D. (2000). A Food Security Approach to Marine Protected Area Impacts on Surrounding Fishing Communities. PhD Thesis. University of Warwick, UK.

Maxwell, D.G. (1996). Measuring food insecurity: the frequency and severity of "coping strategies". *Food Policy* **21**(3): 291-303.

McClanahan, T.R. and Mangi, S. (2001). The effect of closed a closed area and beach seine exclusion on coral reef fish catches. Fisheries Management and Ecology, 8. 107-121.

National Bureau of Statistics Tanzania, (2002). Household Budget Survey 2000/01, Dar es Salaam, July 2002.

Obura, D., Wells, S., Church, J. and Horrill. C. 2002. Monitoring of fish and fish catches by local fishermen in Kenya and Tanzania. Marine and Freshwater Resources **53**: 215-222.

Pollnac, R. and Crawford, B. (2000). Assessing behavioural aspects of coastal resource use. Coastal Research Centre Coastal Management Report 2226. Coastal Research Centre, University of Rhode Island, Narragansett, Rhode Island.

Slocum, R., Wichhart, L., Rocheleau, D. and Thomas-Slayter, B., (eds.). (1995). Tools for environmental and social change. In *Power, Process and Participation - Tools for Change -*, 1st edn, pp51-228. London: Intermediate Technology.

UNEP. 1998. Eastern Africa atlas of coastal resources: Kenya. United National Environment Programme, Nairobi. 119pp.

Wanyyonyi, I., Obura. D. and Malleret-King, D. Linking socio-economic monitoring to reef fisheries management. (2003). Poster presented at the International Tropical Marine Ecosystems Management Symposium, Manilla, March 2003.