

IUCN Eastern Africa Programme

Tanga Coastal Zone Conservation & Development Programme

Building Capacity for the Use of Monitoring and Assessment in Adaptive Management: *Review of Existing Systems and Practices in Tanga*

Mine Pabari, Violet Matiru, Helinah Muniu and George Thande



February 2005



**BUILDING CAPACITY FOR THE USE OF
MONITORING AND ASSESSMENT IN
ADAPTIVE MANAGEMENT:
Review of existing systems and practices in Tanga**

Mine Pabari, Violet Matiru, Helinah Muniu and George Thande

February 2005

Tanga Coastal Zone Conservation & Development Programme

Table of Contents

Table of Contents.....	ii
1 Introduction.....	1
1.1 Background.....	1
1.2 Methodology.....	2
1.3 Limitations of the Review.....	3
2 Findings.....	3
2.1 Strengths & Weaknesses of Existing Systems.....	3
2.1.1 Enhanced appreciation of M&A principles.....	3
2.1.2 Identification of Data & Information Needs.....	4
2.1.3 Data Collection.....	4
2.1.4 Data analysis and feedback.....	5
2.1.5 Use of Data for Coastal Management.....	5
2.2 Existing Data Collection and Management Systems.....	6
2.2.1 Reef Health.....	6
2.2.2 Mangroves.....	7
2.2.3 Fisheries.....	8
2.2.4 Enforcement.....	8
2.2.5 Socio-economic.....	9
2.2.6 Gender & Environmental Education.....	9
3 Recommended Information Management System.....	10
3.1 Users of the System.....	10
3.2 Structure & Contents.....	11
3.3 Co-ordination.....	10
3.3.1 Data & Information Related to Mangroves.....	13
3.3.2 Data & Information related to Reefs.....	15
3.3.3 Data & information related to Fisheries.....	17
3.4 Managing & Processing Data.....	19
3.4.1 Data Collection Tools.....	19
3.4.2 Data Collection & Storage Procedures.....	19
3.5 Data Analysis & Feedback mechanisms.....	20
3.6 Capacity Building Requirements.....	21
3.6.1 Training & skill development.....	21
3.6.2 Equipment Needs.....	21

LIST OF ABBREVIATIONS

CCC	Central Co-ordinating Committee
CMA	Collaborative Management Area
CMAp	Collaborative Management Area Plan
CORDIO	Coral Reef Degradation in the Indian Ocean
DCI	Development Corporation Ireland
DED	District Executive Director
DNRO	District Natural Resource Officer
DoFi	Director of Fisheries
DoFo	Director of Forestry
DTT	District Technical Team
EE	Environmental Education
ICM	Integrated Coastal Management
IMS	Institute of Marine Sciences – Zanzibar
IUCN EARO	The World Conservation Union – East African Regional Office
IUCN	The World Conservation Union
M & E	Monitoring and Evaluation
MD	Municipal Director
MDDP	Muheza District Development Programme
MMP	Mangrove Management Project
MPA	Marine Protected Area
SEMP	Social Economic Monitoring Programme
SU	Support Unit
TCZCDP	Tanga Coastal Zone Conservation and Development Project
UDSM	University of Dar es Salaam
VeMC	Village environmental Management Committee

1 Introduction

1.1 Background

The Tanga Coastal Zone Conservation and Development Programme (TCZCDP) started in 1994 and aims to enhance the well-being of coastal communities in the Tanga Region by improving the health of the coastal and marine environment that they depend on, and by diversifying options for the use of marine resources. The Programme is working with coastal fishing villages to manage the coral reefs, mangroves and other marine resources that the villagers depend upon for their livelihoods. Districts and village level institutions are being strengthened so that they can undertake integrated management in a sustainable way.

The Programme is implemented by the three districts of the Tanga region - Muheza and Pangani Districts and Tanga Municipality, in collaboration with the Regional Administrative Secretariat (RAS), The Ministry of Natural Resources, and the Vice-President's Office (Environment). The Eastern African Regional Office of The World Conservation Union (IUCN), based in Nairobi, provides technical and managerial support to the Programme, with funding being provided by Development Corporation Ireland (DCI), formerly known as Ireland Aid.¹

The Programme is now in its fourth Phase (the "Exit Phase"), which aims to mainstream the Programme's processes, actions and methods as normal practice. This requires that the local institutions have sufficient capacity to adopt these processes, actions and methods. The Programme Exit Strategy recognizes that genuine institutional sustainability is long-term capacity to effectively and efficiently respond to and manage dynamic environmental circumstances within the programme, and the Strategic Plan incorporates a number of capacity building activities at different levels.

One of the key elements of this is to ensure that there is a sound environmental and socio-economic knowledge base supporting decision-making and adaptive management (Result One of the Programme strategic plan). In doing so, the Programme aims to:

- Establish effective and sustainable environmental and socio-economic monitoring and assessment mechanisms;
- Enhance capacity for monitoring and assessment at the District and village level;
- Ensure that environmental and socio-economic information are effectively supporting decision making for coastal and marine resource management; and
- Use environmental and socio-economic information to promote the sustainable use of marine and coastal resources.

During the different Phases, the Programme established a number of monitoring and assessment (M&A) mechanisms to measure changes in impact (changes in environmental and socio-economic conditions) and outcome (changes in behavior and performance). Various types of data have been collected, data collection protocols reviewed and adapted over time, and databases established. However, many of the M&A systems were developed at different time periods and tend to operate in isolation, making it difficult to generate a holistic picture of the status and links between marine resources

¹ Strategic Plan for the Fourth Phase of the Tanga Coastal Zone Conservation and Development Programme (TCZCDP) 2004-2007.

and social and economic health and/or the cause-effect relationship between impact and outcomes.

In order to leave a lasting management system for improving and maintaining the integrity of the Tanga Region's coastal zone, there is a need to establish a simple yet comprehensive knowledge base by building on and strengthening existing M&A systems, ensuring that it is sustainable in the long run and fully integrated with Government systems and can be used to inform decisions for the management and sustainable use of marine and coastal resources.

This consultancy was commissioned by TCZCDP, through IUCN, to:

- i) Identify and review existing data & information collection and management practices, vis a vis information requirements at the village and district level for monitoring and assessment of management and sustainable use of marine resources;
- ii) Develop a sustainable and user friendly data and information management system (building on and strengthening existing systems); and
- iii) Train villagers and district staff in the use of the data and information management system for adaptive management

This report describes the findings of the review on existing data and information management systems undertaken between the 24th and 28th of February, which includes: an overview of the types of data collected; mechanisms for data analysis, storage and use; strengths and weaknesses of the existing processes; and recommendations for a sustainable and user friendly data and information management system.

1.2 Methodology

Information for the review was gathered through a literature review and interviews with the Regional and district staff involved in Programme activities, and members of the Central Coordinating Committees (CCCs), Village Government (V/Govt) and Village Environmental Committee (VeMC) from 9 villages across the three Districts. A full list of documents reviewed and stakeholder consulted is included as Annexes One and Two to this report.

Interviews were conducted in groups, using open ended interview questions. Key issues explored by the review team were:

- What data are currently being collected, by whom and how is it managed?
- What kind of information is required at village and district levels?
- How is data collected being used? To what extent is it perceived as being necessary and useful to the different stakeholders?
- To what extent are existing information needs being met?
- What is required to strengthen data collection and management systems and integrate them into the existing Government systems?

1.3 Limitations of the Review

The purpose of this review was to understand and define the overall conceptual framework within which data and information can be utilized for the sustainable management of marine and coastal resources in Tanga Coastal Zone. The review did not intend to carry out an in-depth assessment of the indicators, nor data collection and analysis methods. In the case of the reef health and fisheries monitoring programmes – this had already been carried out by the Programme in 2004, and the findings referred to here.

TCZCDP is a complex programme – one that involves a number of different types of stakeholders, with varied needs, resources and levels of capacity. Consequently, unraveling the various layers within the Programme, and clearly identifying the information needs of each of the different stakeholders is no simple task. Given that this review was undertaken in 5 days, there are bound to be a number of gaps in the findings with regards to information needs, and capacity requirements to ensure that these needs can be fully met - now and in the future. Furthermore, information requirements are by no means static, and certain to change over time.

We therefore highly recommend that the TCZCDP views this activity as a “work in progress”, and revisits the key issues explored by this review from time to time – using their findings to strengthen the data and information management system initiated through this exercise.

2 Findings

The TCZCDP has developed a range of data collection tools, which are used to collect data on mangroves, reef health, fisheries and socio-economic aspects. This data is collected from the field and stored and analysed at different levels, including village, CCC, district and regional levels. The following strengths and weaknesses were identified within the current system.

2.1 Strengths & Weaknesses of Existing Systems

2.1.1 Enhanced appreciation of M&A principles

The Programme has had a tangible positive impact on the level of understanding and the benefits of monitoring and assessment. The majority of respondents interviewed recognized the importance of regular monitoring, which was also evident by the number of monitoring activities taking place at both Village and District levels. Data collection forms have been developed and are in use; the Programme has successfully introduced incentives for village participation in monitoring activities; and data are systematically entered into the databases established at the Support Unit.

Box 1: Using information as a tool for compliance?

In Ndaoya Village, the Mangrove Monitoring team has copied the Mangrove data collection forms developed by the Programme and reports generated are being used by the V/Govt to make management decisions, and to lobby the Districts for additional support for mangrove planting activities.

2.1.2 Identification of Data & Information Needs

While District staff are involved in all of the monitoring programmes, the extent to which they actually participated in the design phase of these programmes is questionable. With the exception of a few key staff, the majority of the respondents interviewed did not fully understand the purpose of data and found it difficult to relate the analysis with their daily responsibilities in coastal management. The review team found that often management decisions (such as issuing mangrove harvesting permits) are made on the basis of an individual's knowledge and familiarity with a topic, rather than interpretation of data being gathered and analyzed.

At the Village level, the review team identified a number of cases where there appeared to be no understanding at all of why data was being collected (notably fisheries and reef health data), implying that they had not been involved in identifying which data are to be collected and how. This has made it particularly difficult for the fisheries monitoring programme, as fishermen are highly suspicious of data collectors and therefore reluctant to part with information regarding their catch (Box 2).

From the findings described above, the review team concluded that a number of monitoring programmes were driven externally with very little effort on the part of the Districts to clearly define their own information needs, and that of the Villages. It is therefore difficult for Districts to intervene and direct the design of the programmes to suit these needs. Consequently, today there appears to be a greater emphasis on data collection, as opposed to data analysis and use.

Box 2: De-motivating data providers?

"Why should we tell them about the fish we catch? What are they doing – witchcraft?"
(Fisherman, Kwale village)

2.1.3 Data Collection

Data collection forms have been developed for a number of relevant types of data, and, in the case of fisheries, mangroves, reef health, and enforcement data, are being used systematically at Village and District levels. A gender monitoring system was also established by the Programme and is being used at the district level. However, data from this system is not entered into the databases at the Support Unit.

The introduction of the Mangrove ecological monitoring programme in 2004, appears to have resulted in some confusion. Although the review team was informed that the data collection forms developed by TCZCDP are to continue to be used, Pangani District have replaced the "old forms" with the "new forms" – indicating that there is need to cross check that the ecological monitoring programme is fully understood by everybody.

In the case of the fisheries monitoring, it was felt that having two systems – that of the Fisheries Division and the Programme was highly beneficial as one serves as a cross checking mechanism for the other. On the other hand, it would also appear that there are instances where the TCZCDP fisheries monitoring programme undermines that of the Fisheries Division. TCZCDP collects its data at the landing sites, while the Fisheries Division data is collected from the market place. In some cases, it was reported that once fishers have provided the information on their catch to the TCZCDP data collector, they do not wish to do so again at the market place. After discussing these findings with the District office, it was suggested that a study is undertaken in order to explore the possibilities of merging the two systems, or finding ways in which to ensure that the Programme fisheries monitoring system can be continued in the long run.

2.1.4 Data analysis and feedback

The Programme has made a number of efforts to ensure that data are analyzed and feedback is provided to the villages for use in the review of Collaborative Management Area Plans (CMAPs) twice a year, and the development of annual work plans.

However, while representatives of the CCC receive feedback on (for example) the status of reef health – this information is not necessarily relayed back to the V/Govts or other individuals within the village. This could have an effect of creating little “power houses” within the village, and resentment and suspicion amongst others who are simply requested to provide information, but do not receive any feedback.

Furthermore, members of the CCC who had seen the reports on reef health did not understand what the different graphs actually meant in relation to the management decisions they were required to take as a village. Much of the data are analyzed using a CMA as the unit of analysis, which may not always be appropriate – given that most decisions are taken at the village level, by the village government.

Box 3: The “dangers” of sharing information?

“I used to tell the other villagers what I found in the closed reef during monitoring but it made them go and poach there so I stopped”

(Village Monitoring Team
(VMT) member)

2.1.5 Use of Data for Coastal Management

Information can have a significant positive impact on the ability of participating institutions to implement their programmes. However, the necessary “ingredients” must be in place to enable the use of this information – such as authority and willingness to act.

The Local Government Reform Programme of Tanzania has made it possible for local communities to actively engage in the management of their local resources (by, for example, enabling Villages to pass By-laws). Furthermore, the Programme has made significant efforts to increase the capacity of local institutions to enable them to effectively participate in the Programme and manage their marine and coastal resources. However, there are a number of issues which must be addressed if data & information are to be effective tools for adaptive management. These include:

- **The CCCs inability to make biding decisions:** While the CCCs play a significant role by providing a forum for a number of villages to plan and share their experiences, they do not have a legal mandate and are consequently unable to act as a decision making body. The Programme has recognized this limitation, and is making efforts to address the problem (through exploring possibilities of linking them to Beach Management Units, which are legally recognized).
- **Institutional willingness:** In some of the Districts and Villages, there is a sense of lethargy and limited investment of time and resources to enforce management decisions – which may be a result of low priority given to natural resource management. Given that donor funding will end in two years, it is crucial that the Programme identifies the root of these problems now and finds way to address them. If funding is the only motivating force behind marine & coastal management – the sustainability of the Programme in the long run is highly doubtful.

- Political Interference:** It is almost impossible for any intervention to separate itself from the daily lives of its stakeholders and beneficiaries. In this part of the world, politics often plays a significant role and cannot be disregarded. The review team encountered a couple of incidences where it was evident that local politics featured greatly in the workings of the V/Govt and VeMC. In one village, for example, after the recent election – members of the opposite political party felt it was “their turn” to be on the VMT and were highly resentful of the Programme for continuously selecting particular individuals. The Programme has invested many years in training members of the VMT and could not possibly choose to switch individuals around periodically – nor should they! However, the processes used do need to be made extremely clear to V/Govts (especially now that many of the members are new due to the elections), to minimize jealousy and potential conflict within the V/Govt.
- Enforcement:** While some effort is put into measures such as awareness creation and education, there is a significant emphasis on enforcement (conducting patrols, arresting offenders etc). Enforcement activities are by no means readily affordable and therefore most likely unsustainable in the absence of donor funding. Additionally, the apparent “enforcement culture” that seems have developed limits abilities to explore other more positive incentives that are likely to be more effective and sustainable in the long run.
- Institutional Capacities:** While the TCZCDP has developed the capacity of district and village level staff in different management aspects of the Programme, there are concerns that this capacity will be lost following the retirement of a significant number of district staff. The review team was informed that many of the district staff, especially in Muheza, are about to retire. Further, the government has put a freeze on new recruitments, as part of its civil service reform programme. Therefore it is likely the existing staff will be promoted to fill the positions that will fall vacant. As part of the programme's exit strategy, efforts should be made to develop the capacity of the officers who are likely to take over following the retirement of key staff.

Box 4: Creatively encouraging compliance?

“After we spoke to his father, he told him that if he ever went dynamite fishing again, he would no longer be his son. He had not used dynamite since.

District Officer, TCZCDP

2.2 Overview of Existing Data Collection and Management Systems

During the four phases of the Programme, data and information needs were identified at different times and through different types of activities. This section provides a brief description of the data collected and an overview of the data management and analysis mechanisms for each of the different types of data.

2.2.1 Reef Health

Monitoring of reef health was initiated by the Programme in 1998 and since then data has been collected for a selected number of closed and open reefs in six Collaborative Management Areas (CMAs). Parameters monitored include fish population densities, reef benthos and selected mobile invertebrates (Horril, et. al., 2001., Othina, in prep.).

Monitoring is conducted twice a year (March/April and September/October) by the Village Monitoring Team (VMT). The VMT consists of a team of 8-10 members, who are primarily fishermen that have been trained by the Programme in reef monitoring.

The VMT is coordinated and supervised by a District monitoring coordinator, responsible for surveys in the management areas within his District. The overall monitoring programme is coordinated by the Fisheries officer from Muheza, Hassan Kalombo, who is seconded to the Regional Office as the Monitoring Coordinator.

The data is sent to the Programme Support Unit office, based in Tanga where it entered into an access database. The data are analyzed by the Monitoring Coordinator and reports on reef health are generated on an annual basis. Reef health reports are used to report on Programme progress to: the donor (from the District Natural Resources Office (DNRO)); the District Executive Director (DeD); and to Central Coordinating Committee (CCC) meetings for the review of Collaborative Management Area Plans (CMAPs).

A detailed review of the reef health monitoring programme was conducted by Dr. Samoilys, the Marine & Coastal Technical Coordinator of IUCN EARO. The purpose of the review was to ensure methods meet international standards, field time is minimized for efficiency and that suitable indicators of reef health are being obtained (Samoilys, 2004). The Programme also commissioned a statistical analysis of Reef Health Data (carried out by Othina in 2004), in order to assess the impacts of reef management through analysis of monitoring data over time.

2.2.2 Mangroves

The Programme has been actively involved in supporting communities and Districts to rehabilitate mangroves, and undertake activities to stimulate natural regeneration. Consequently, the Programme initiated a Mangrove monitoring programme, involving communities to regularly monitor replanting and survival rates, harvesting and natural regeneration.

In villages participating in replanting efforts, monitoring is carried out every six months by the VeMC Mangrove Committee, and copies of the filled data sheets sent to the District office. At the village level, the data are compiled and a report is presented to the V/Govt.

The V/Govt is responsible for approving requests for harvesting and forwarding approved requests to the District Office, who issue permits. In some villages, the reports are used as a basis for approvals for harvesting, to plan enforcement activities (patrols) and encourage villages to participate in replanting efforts and patrols (Box 1).

Box 5: Positive Incentives for Mangrove Management?

In Chongoleani, the V/Govt requires villagers to participate in enforcement patrols and planting efforts if they wish to harvest mangroves – *"if you don't plant, you don't use"*

(Member of the V/Govt)

In 2004, the National Coastal Monitoring Programme introduced an Ecological monitoring programme that involves monitoring of health of the mangrove ecosystem. Parameters monitored include maturity of different species within selected plots, and soil macrofauna. Data collected is entered into and analyzed using Excel at the Programme Support Unit.

At the District level, data from the replanting and the ecological monitoring programme is used to report on progress to the donor and the DeD. Although the District is responsible for issuing harvesting permits, the review was not able to

ascertain whether the data collected was actually used to make decisions regarding harvesting permits.

2.2.3 Fisheries

In 1995 the Programme sought to improve on the existing monitoring system operated by the Fisheries Division and established a fisheries monitoring programme that ran parallel to that of the Fisheries Division. Initially, the Programme used a slightly modified version of the Fisheries Division data collection form, and a similar sampling protocol. However, this was modified over the years as the Programme gained experience and developed a better understanding of their information needs. This process is described in detail in the final report of the Fisheries Data Analysis Consultancy (Anderson, 2004), which also provides a review of all historical protocols, a full analysis of the fisheries data and recommendations on the data collection protocol and data management.

The current fisheries monitoring programme was specifically designed to report on monthly catches/revenues by district and vessel/gear combination, in preparation for a district-based fisheries permit system (Anderson, 2004). Data is collected from selected villages by a District Extension Officer on certain pre-defined dates in a month (usually 5 or 6 days in a month). The data is then sent to the Programme Support Unit, where it is entered into a Fisheries Access Database and analyzed periodically for progress reports to the donor and the DeD. From interviews conducted by the review, it would appear that no feedback is provided to the villages.

2.2.4 Enforcement

The Programme places a considerable amount of emphasis on enforcement practices and the Districts work with villages, the police and the navy² to conduct both land and sea patrols.

Currently, it would appear that patrols take place according to a fixed schedule, as well as on a need to basis, based on reports of destructive practices from various stakeholder groups. After each patrol, a patrol monitoring form is filled by team leader of the patrol, recording details of the patrol, offenders caught and actions taken. If the patrol was conducted by the village, a copy of the form remains with the VeMC and the original is sent to the District where the data is entered in the Enforcement data base at the Support Unit.

At the district level, the data are compiled into a report which is then used in progress reports to the donor and to the DeD. District teams also meet once a month to discuss and plan enforcement measures. These meetings are often attended by the Programme Monitoring Coordinator, who provides feedback on the effectiveness of enforcement measures to date.

² The involvement of the navy has currently been suspended as the agreement between the Programme and the navy expired at the end of Phase III. However, the Programme is lobbying through the Regional Commissioners office for continued support (TCZDP End of Phase Report, 2004)

2.2.5 Socio-economic

In response to the identified lack of socio-economic data on the status of the coastal population before the TCZCDP programme was initiated, a study was carried out by Gorman in 1995 and supplemented by work undertaken as part of the rapid assessment of coral reefs. These studies provided baseline information on the relationship between local communities and the natural resources of the area and included stakeholder analysis, resource use patterns, indigenous management and tenure systems, indigenous knowledge, attitudes and practices relating to natural resources (Horril, et al, 2001). However, there is little evidence that efforts have been made to build upon this existing socio-economic data.

In May 2003, CORDIO initiated a pilot programme for TCZCDP to collect socio-economic data. To date, District Co-ordinators and data collected have been trained in collecting and analyzing data, which is entered into the socio-economic database. Under this programme, data on occupational structure is to be collected every 3 years, while that on resource use patterns will be collected on a semi-annual basis, during the two seasons of *Kusi* and *Kasikazi*. By the time of the review, data on the occupational structures and resource use patterns of 6 villages (2 in each district) had been collected three times.

District staff interviewed felt that socio-economic data are extremely necessary to enable them establish whether or not TCZCDP had made a positive impact on the livelihoods of communities. However, the review team felt that they lacked the capacity to identify which socio-economic data they need and how they can use it to improve their management decision-making. Since the CORDIO study is still at the pilot stage, it is envisaged that the capacity of district staff to collect, analyse and use socio-economic data will continue to be enhanced by being involved in this programme.

The review team visited the Smallholder Empowerment and Economic Growth Through Agribusiness and Association Development (SEEGAD) project staff. SEEGAD is promoting the cultivation of seaweed, under a USAID funded project with villages along the Tanzanian coastline, including 10 villages in Muheza, 3 in Pangani and 4 in Tanga. One of the SEEGAD officers was involved in the CORDIO socio-economic survey. SEEGAD has also approached USAID for financial resources to conduct a household survey of villages along the coast. The TCZCDP, CORDIO and SEEGAD should collaborate in conducting these socio-economic studies to promote their compatibility and reduce duplication.

2.2.6 Gender & Environmental Education

According to the Exit Strategy (2004), gender monitoring of the TCZCDP and project related activities is an ongoing activity. Further, the gender balance in activities, committees and meetings has met set targets. In each district, data is collected on the participation of men and women in training activities, management positions in CCCs, VeMCs, and in environmental activities. The report notes that the contribution of women in management and environmental activities has increased support for the area management plans and reduced the number of illegal activities due to their objective views on illegal activities, which are often dominated by men. Currently, data on gender is not entered into the main databases at the Programme Support Unit (PSU) but is maintained at the district level.

The TCZCDP has contributed to increased awareness of the importance of the management of coastal and marine resources through environmental education. Specifically, TCZCDP has introduced environmental education as an extra-curricular programme in primary schools, and trained 40 teachers on implementing the programme. Pupils have also been facilitated to participate in awareness raising activities, especially during the World Environment Day and the Marine Environment Day celebrations. New youth clubs have been established, with members being provided training in coastal ecology, planning, monitoring and gender. The programme is currently reviewing the training materials for pupils and teachers.

3 Recommended Information Management System

3.1 Users of the System

The data and information management system is intended primarily to support the management of the coastal and marine resources of the Tanga Region. Consequently, targeted clients of the system include:

Relevant institutions at the Village level, including:

- Village Governments – To enable them to make informed decisions regarding the development and implementation of CMAPs – such as writing approval letters for mangrove harvesting permits, proposing By-laws, developing action plans for replanting & patrols, assessing impacts of reef closures and fishing impacts, identifying reefs to be closed and candidates for the VMT.
- Village Environmental Management Committees – To assist them fulfil their role as an advisory body to the V/Govts
- Central Coordinating Committees: Responsible for reviewing progress and developing and harmonising CMAPs and Village By-laws

District level staff: These include (but are not limited to) the DeD who is responsible for making policy decisions and providing progress reports to the Central Government; the District Natural Resources Officer (DNRO) and District Coordinator who oversee the implementation of the Programme; District Technical Officers who provide technical support in particular areas to the Programme; and Extension workers who are responsible for gathering data from the villages.

Regional level staff: Provide technical advice to the Districts

Others: Such as researchers, non governmental/international institutions and/or projects (e.g. IUCN, TCMP, SEEGAD, the University of Dar es salaam, CORDIO and IMS) with an interest in the Programme and its activities

3.2 Co-ordination

The focus of the Exit Phase is mainstreaming of the Programme's processes and activities (TCZCDP Exit Strategy Report, 2004). Therefore, it is important to ensure that the responsibilities for data collection, entry, storage and analysis are mainstreamed into existing institutions. In addition, the units of analysis and mode of presentation should bear in mind the legal mandates and responsibilities of the different institutions.

The Tanga Municipality staff recommended that the responsible officer for managing the database at the District level be the Municipal Statistician, while Pangani recommended that the District Natural Resource Officer (DNRO) play that role. The rationale given by Tanga staff was that the data and information management system should be mainstreamed into the government's structure of collecting, storing and analyzing data, which is the official role of the Municipal/District Statistician. It is recommended that further discussions be held with district staff in order to assign duties for the system to the most appropriate official, bearing in mind the need to mainstream the system into the government structure.

Below are the officers, suggested by district staff, for managing the system for Pangani District and Tanga Municipality.

Role/Position	Tanga	Pangani	Muheza
Village Level			
Data Collection Clerks	?	DF ^s O	?
Data Administrator	Extension worker	Forestry Field Officer	?
District Level			
Data Administrator	Fisheries officer	DNRO	Enforcement Officer
Data Entry Clerk	Municipal Statistician	Agricultural Field Officer	Mangrove technical officer
Regional Level			
Data Administrator	?	Officer in charge of NR	?
Data Entry Clerk	?	To be appointed by RAS	?

3.3 Structure & Contents

In order for the data & information management system to be useful, the structure and contents must relate directly to areas in which the TCZCDP plays a key role, and management decisions are made. We therefore recommend that the system is structured to support the overall goal of the TCZCDP, and contains information relating to the health, uses and threats to the key ecosystems and natural resources of interest. These include i) Reefs, ii) Mangroves, and iii) Fisheries.

Overall Goal: *"Integrity of the Tanga coastal zone ecosystem improved, and its resources supporting sustainable development"*

Additionally, data from the CORDIO's SEMP programme will contribute to enhanced awareness about changes in the socio-economic status of the coastal populations and the impacts of management decisions on community behaviour and economic opportunities. Data on occupational structure indicates the level of reliance on the coastal and marine resources and could prompt management decisions to promote alternative sources of livelihoods, such as agriculture, to reduce pressure on the resource base. Data on resource use patterns among those who rely on coastal and marine resources can zero in on specific resources that are under pressure, thereby facilitating management decisions to reduce such pressures, e.g. reducing the number of permits. Conflicts among the different resource users can highlight the impacts of destructive practices and/or the need for enhanced collaboration among resource users to develop mechanisms for sharing the resources.

Overall, the data and information management system should be based on existing systems, contain all data collected to date, and be sufficiently flexible to accommodate new data and information as needs arise. The system should also enable processing of data by the clients themselves to generate information that is useful and necessary for decision-making and adaptive management.

The following sub-sections provide an overview of the types of information contained in the proposed data & information management system, examples of how the information may be used and examples of the types of reports generated by the system.

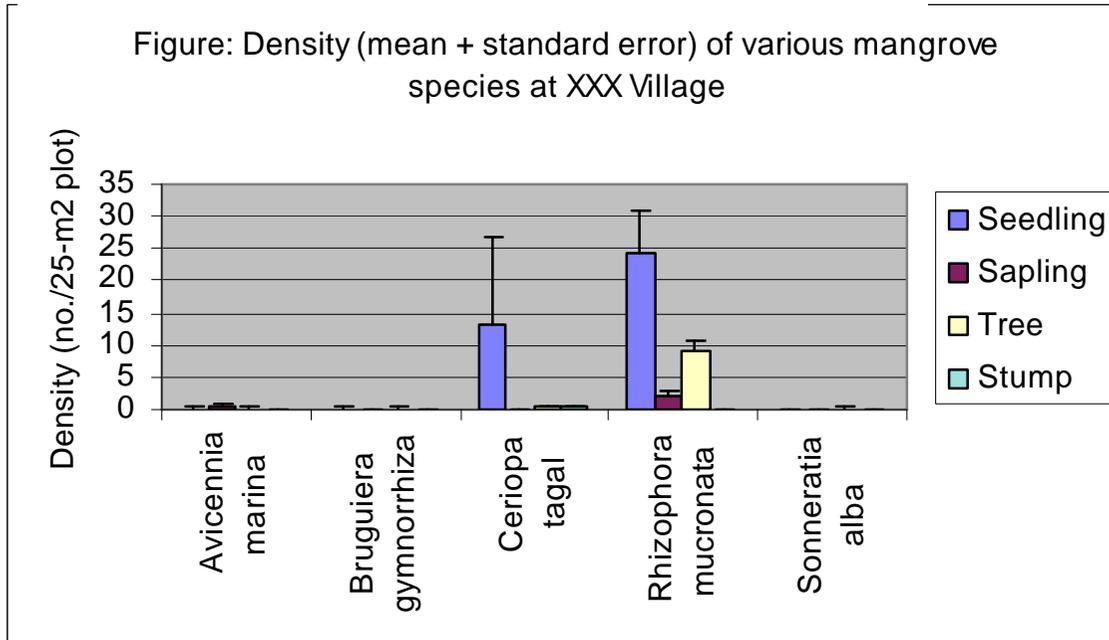
3.3.1 Data & Information Related to Mangroves

i) Information Requirements

Information Types	Relevant data & reports	Purpose of Information (Examples of use for adaptive management)		
		Village Level (Unit of analysis = Village)	District Level (Unit of analysis – Village & CMA)	CCC (Unit of analysis = CMA)
Status of Mangroves	<ul style="list-style-type: none"> ✘ Species/Levels of Maturity/Basal area by plot & sites ✘ Total area 	<ul style="list-style-type: none"> ✘ Guide approval of requests for permits to harvest (how much, where, which species) 	<ul style="list-style-type: none"> ✘ Guide approval of requests for permits to harvest (how much, where, which species) ✘ Guide & lobby national policy makers in decision making 	<ul style="list-style-type: none"> ✘ Input to development of annual action plans; review of CMAPs
Mangrove Harvesting - Use	<ul style="list-style-type: none"> ✘ Permit Data: Nos/area/species ✘ Harvesting levels: Nos/area/species 			
Effectiveness of land patrols	<ul style="list-style-type: none"> ✘ Patrol Data: Nos of patrols/time/area; contribution by village/district ✘ Offences: No of poles illegally harvested/species in the village ✘ Actions: Actions taken and status of cases 	<ul style="list-style-type: none"> ✘ Guide enforcement efforts (identify repeat offenders; increase/decrease patrols) 	<ul style="list-style-type: none"> ✘ Guide enforcement efforts (identify repeat offenders; increase/decrease patrols) 	<ul style="list-style-type: none"> ✘ Input to action plans & CMAPs ✘ Identify villages that are not participating/contributing; reasons why and ways to address the problem
Effectiveness of planting efforts	<ul style="list-style-type: none"> ✘ Replanting v/s Survival per species/area 	<ul style="list-style-type: none"> ✘ Guide planning for mangrove planting (how much; where (medium); which species) ✘ Promote and encourage village participation 	<ul style="list-style-type: none"> ✘ Guide planning for mangrove planting (how much; where (medium); which species) ✘ Promote and encourage village participation 	<ul style="list-style-type: none"> ✘ Input to development of action plans & CMAPs

ii) Example of a product of the data & information system

Quarterly Report to Villages on the status of their mangroves



Comments from District Mangrove Technical Officer:

- Trend:** Ceriopa Tagal and Rhizophora Mucronata are doing better than the other species.
- Possible reasons for trend:** The other species do not do well at all within this village, most likely due to the salinity levels
- Management options:** We suggest that you plant mainly Ceriopa and Rhizophora. You should discuss the uses of all species within your village with the villagers. If the village requires the species that are not doing well, please notify us and we will send a Mangrove expert to help you find a solution.

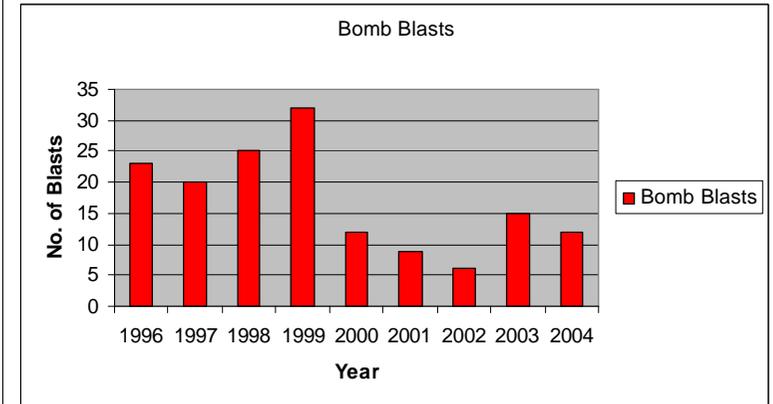
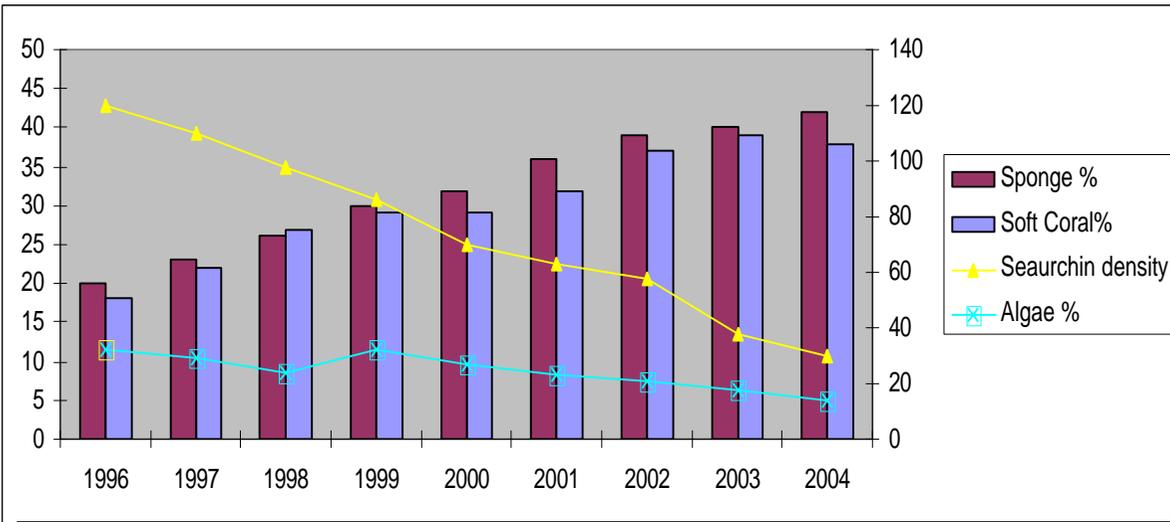
3.3.2 Data & Information related to Reefs

i) Information Requirements

Information Types	Relevant data & reports	Purpose of Information (Examples of use for adaptive management)		
		Village Level (Unit of analysis = Individual reefs)	District Level (Unit of analysis – Individual reefs)	CCC (Unit of analysis = Combined reef data within a CMA)
Status of reefs	<ul style="list-style-type: none"> ✘ Reef health (live coral; butterfly & angel fish; sponges, soft corals & molluscs; sea urchins) 	<ul style="list-style-type: none"> ✘ Identify needs for management interventions (eg increase enforcement efforts, close new reefs etc) 	<ul style="list-style-type: none"> ✘ Identify needs for management interventions (increase enforcement efforts, promote awareness) ✘ Guide budgetary allocations 	<ul style="list-style-type: none"> ✘ Encourage participation of villages in management efforts ✘ Guide action plans and review of CMAPs ✘ Encourage increased budgetary allocations of villages to management efforts
Effectiveness of management efforts	<ul style="list-style-type: none"> ✘ Trends in CPUE for 3 selected gears within specific range of closed reefs in relation to the health of the reef ✘ Comparison of open & closed reefs ✘ Destructive practices vis a vis enforcement efforts (Nos of patrols/participants/time/area; contribution by village/district) ✘ Destructive practices vis a vis reef health 	<ul style="list-style-type: none"> ✘ Demonstrate benefits of closing reefs ✘ Assist with motivating villagers to participate in management efforts 	<ul style="list-style-type: none"> ✘ Assist with motivating villagers to participate management efforts ✘ Guide action planning and review of CMAPs 	

ii) Example of a product of the data & information system

District Report on open and closed reefs within CMA XXX



Comments from the Technical Officer:

- a) **Trend:** Reef health has improved significantly
- b) **Possible reasons for trend:** This may be due to our management efforts – such as enforcement, and closing of reefs. If you refer to the report on bomb blasts, it is apparent that dynamite fishing has gone down and therefore very likely that our efforts have been successful. However, we will also need to do a comparison of open and closed reefs to obtain further information
- c) **Management options:** We should use this information to encourage villages to continue to participate in our management efforts. We would have more success in convincing them if we are able to show that the improved status of reef health in this CMA has improved the status of the fisheries as well. I suggest we do a comprehensive report on reefs, assessing all related factors (including external factors) and present this in a manner that is easily understood during the forthcoming review of the CMAP

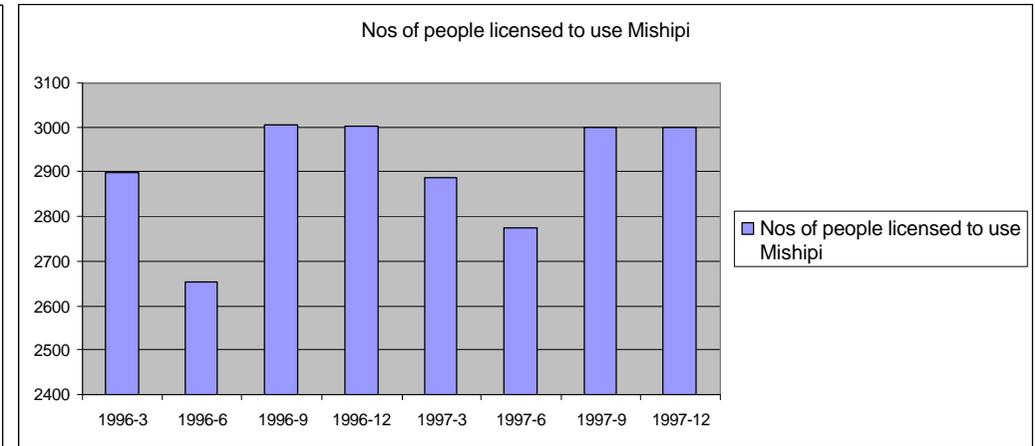
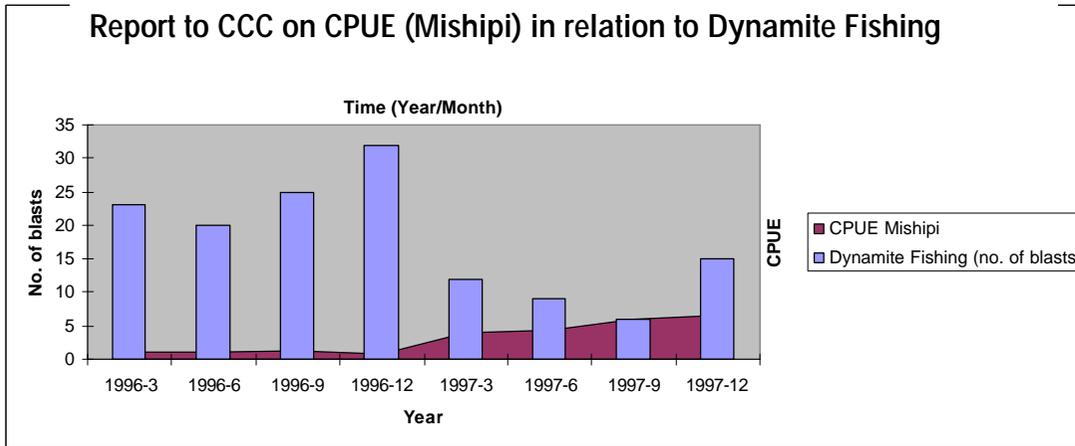
3.3.3 Data & information related to Fisheries

i) Information Requirements

Information Types	Relevant data & reports	Purpose of Information (Examples of use for adaptive management)		
		Village Level (Unit of analysis = Village)	District Level (Unit of analysis – Village & CMA)	CCC (Unit of analysis = CMA)
Status of the Fishery	<ul style="list-style-type: none"> ✘ Trends in CPUE for 3 selected gears ✘ Trends in CPUE v/s key target species ✘ Species diversity of catch ✘ Abundance of Target Species (VMT data) 	<ul style="list-style-type: none"> ✘ Promote and encourage use of appropriate gear in appropriate places ✘ Encourage alternative livelihood practices (eg farming) ✘ Guide decisions regarding enforcement activities to promote compliance with reef closure & destructive practices (eg dynamite fishing) ✘ Guide budgetary allocations for fisheries management 	<ul style="list-style-type: none"> ✘ Guide decisions regarding licensing (how many fishers, vessels; types of gears) ✘ Guide decisions regarding licensing (how many fishers, vessels; types of gears) ✘ Strengthen revenue collection systems ✘ Guide budgetary allocations for fisheries management ✘ Identify management requirements (eg. closure of new reefs; strengthen enforcement measures; increase awareness creation efforts) 	<ul style="list-style-type: none"> ✘ Input to action plans & CMAPs ✘ Identify villages that are not participating/contributing to enforcement measures reasons why and ways to address the problem
Levels of use of the resource base	<ul style="list-style-type: none"> ✘ Trends in fishing practice (nos of licensed vessels & fishermen; gear types) ✘ Trends in occupational structure 			
Financial returns from the fisheries	<ul style="list-style-type: none"> ✘ Trends in revenue (revenue/district) ✘ Distribution and use of income generated from the fisheries 			
Effectiveness of management efforts	<ul style="list-style-type: none"> ✘ CPUE v/s levels of destructive practices (dynamite fishing, beach seines, poisoning) ✘ CPUE v/s reef health (live coral cover & indicator species) ✘ Trends CPUE v/s Populations of target species in closed reefs ✘ Destructive practices vis a vis enforcement efforts (Nos of patrols/participants/time/area; contribution by village/district) 			

ii) Example of a product of the data & information system

Report to CCC on CPUE (Mishipi) in relation to Dynamite Fishing



Comments from the District Fisheries Technical Officer:

- a) **Trend:** CPUE has gone up as dynamite fishing goes down
- b) **Possible reasons for trend:** There are two possible reasons for this; i) Enforcement efforts have been successful; or ii) there has been reduced effort – less people are using Mishipi. However, if you look at the report on nos of people licensed to use Mishipi, you will see that it is very likely that reduced dynamite fishing results in more increased fish catch!
- c) **Management options:** We should continue to carry out patrols, and raise awareness about the negative effects of dynamite fishing. When you go back to your villages – discuss these reports, and encourage more people to assist with the management efforts

3.4 Managing & Processing Data

3.4.1 Data Collection Tools

Data collection forms developed by the Programme to date should continue to be used, with minor changes as suggested by the District Technical Officers based on their experiences to date. Samples of all relevant forms have been included as Annex Three to this report.

3.4.2 Data Collection & Storage Procedures

As far as possible, it is important that the procedures for data collection and storage are standardized for all types of data. This will entail clearly defining responsibilities for data collection and entry and allocating these responsibilities to the appropriate individuals at village and district level. These will include:

- i) **Village Data Collection Clerks (VDCCs)**, responsible for filling out the data collection forms and handing them into the Village Data Administrator once completed
- ii) **Village Data Administrators (VDAs)**, responsible for daily collection of completed forms, and delivery to the District office one day after collection. The VDA should also be in charge of collecting new forms as they are developed, distributing them to the VDCCs, and ensuring they know how to use them.
- iii) **District Data Administrator (DDA)**, responsible receiving completed forms from the VDA and distributing new forms to them, and providing them training on their use
- iv) **District Data Entry Clerk (DDEC)**, responsible for inputting data into the database, performing backups and producing the required reports. The DDEC should also be responsible for regularly communicating to the Regional Database Administrator, and ensuring that they are aware of any computer requirements/problems that the District might have
- v) **Village Data Collection Clerks (VDCC)**, responsible for filling out the data collection forms and handing them in once completed
- vi) **Regional Data Administrator (RDA)**, responsible for receiving all backups from the Districts; storage of data in a safe place; providing authorized³ reports to external institutions/individuals and/or other Districts; disseminating necessary information and coordinating computer issues for district and villages

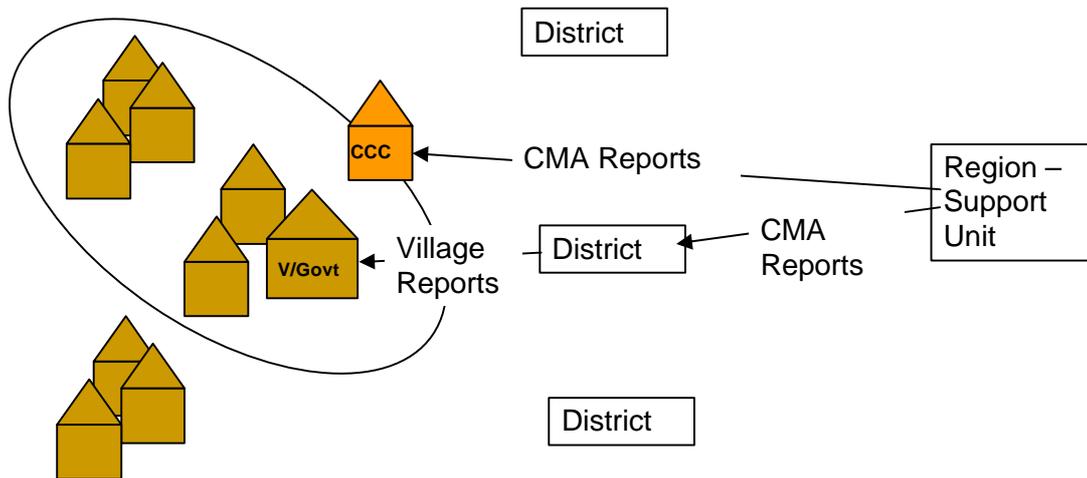
³ All reports should be authorized by the District office from which the data originates

3.5 Data Analysis & Feedback mechanisms

It suggested that two types of analysis and feedback reports are developed initially (see Figure Two below):

- i) Quarterly/Semi-annual Village level reports from the Districts to V/Govts. In order to ensure that the information contained in the reports is distributed to all villages, it is recommended that reports are printed on laminated A3 sheets and posted in a central location in the village (such as outside the office of the V/Govt)
- ii) Semi-annual CMA reports from the Regional Support Unit to the Districts & CCCs

Figure Two: Data Analysis & Feedback



3.6 Capacity Building Requirements

3.6.1 Training & skill development

To ensure that the data & information management system established can actually be utilized, it is important that training is provided to as many of the intended users of the system as possible.

A training workshop has been scheduled for the 20th – 26th of March, during which key district staff will be trained in:

- i) Data analysis & interpretation;
- ii) Data and information management (using the IMS system); and
- iii) Using data for adaptive management (including planning, and communicating results)

Participants of the training workshop should include individuals designated by the District and Regional offices to act as:

- Village Data Collection Clerks (VDCCs);
- Village Data Administrators (VDAs);
- District Data Administrator (DDA);
- District Data Entry Clerk (DDEC Village Data Collection Clerks (VDCC); and
- Regional Data Administrator (RDA)

After the training, participants should be required to conduct similar training workshops at the village level for members of the V/Govt, VeMCs and VMTs. A training manual will be provided to the trainees to guide and assist them with the village level training workshops.

3.6.2 Equipment Needs

i) Data Entry & Storage at the District Level

Each District office will need to have a dedicated computer for data entry and storage, with the following specifications:

Hardware

- Pentium Intel 64RAM
- Hard disk (40GB +)
- Compact Disk reader
- Floppy drive
- Universal Serial Bus (USB)
- Monitor
- Keyboard
- Printer

Software

- **MICROSOFT WINDOWS**
- **MICROSOFT OFFICE**
 - Word (Letters)
 - Excel (Data Analysis)
 - Power point (Data Presentation)
 - ACCESS (Database)
 - Outlook (eMAIL)

Currently, all District offices have at least one computer with the required specifications. However, in the case of the Pangani District Office, the computer is by a number of departments and requested that a new computer is bought specifically for the data and information management system.

ii) Backup at the District Level

The data and information management system will need to be backed up every month, at a minimum. For this, all Districts will need to invest in one of the following:

- Compact Disk writer (approx US\$100 each);
- 2 Flash Disk (512K) (approx US\$6 each) ; or
- Zip Drive (approx US\$200 each)

iii) Storage & Archiving at the Regional Level

Every month, copies of the District databases should be sent to the regional office for archiving. There is a dedicated computer with the required specifications (see i) above) that may be used for storage purposes at the regional office. However, the data & information management system should also be archived on Compact Discs and stored in the office safe.

ANNEX ONE: DOCUMENTS CONSULTED

Anderson, J. (2004) *Analysis of reef fisheries under co-management in Tanga*. IUCN- EARO, Nairobi. 59pp.

Othina, A. (in prep.) *Analysis of coral reef health in response to management in Tanga*. IUCN-EARO, Nairobi.

Horrill, J.C., Kalombo, H. and S. Makoloweka (2001) *Collaborative Reef and Reef Fisheries Management in Tanga, Tanzania*. SEACAM and IUCN. 37pp

Samoilys, M. (2004) *Review of the Village Monitoring Team's coral reef monitoring programme in Tanga Region*. IUCN EARO, Nairobi. 15pp.

TCZCDP (2004) *Strategic Plan for the fourth Phase of the Tanga Coastal Zone Conservation and Development Programme (TCZCDP) 2004-2007*. 10pp

TCZCDP (2004) *Exit Strategy for the Tanga Coastal Zone Conservation and Development Programme (TCZDP)*, Tanga. 22pp

TCZCDP (2004) *Tanga Coastal Zone Conservation and Development Programme (TCZCDP), Phase IV Monitoring and Evaluation Strategy*. 32pp

TCZCDP (2004) *Tanga Coastal Zone Conservation and Development Programme (TCZCDP), End of Phase Report*. 49pp

Van Ingen, T., Kawau C., and S. Wells (2002) *Gender Equity in Coastal Zone Management: Experiences from Tanga, Tanzania*. IUCN EARO, Nairobi. 26pp

ANNEX TWO: STAKEHOLDERS INTERVIEWED

1. Muheza District (25th January)

Surname	First Name	Position
Abdallah	Mohamed Y	District Enforcement Officer
Hatibu		District Community Development Officer
Kabamba	John	District mangrove & Community Forestry Officer
Kuziwa		District Prog. Coordinator & Socio-economic Coordinator
Mvugaro	Kessy	District Fisheries Officer

2. Tanga Municipality (25th January)

Surname	First Name	Position
Dengo		District Natural Resources Officer
Mpenba	Shabani	Extension Officer
Mreba		District Mangrove Officer
Mtaweza	Halima	GIS Officer
Nyerenda		District Fisheries Officer

3. Mwandusi Village (26th January)

Surname	First Name	Position
Athumani	Abdala	
Charunga	Msanifu	Chair
Jalala	Hamadi	
Mebala	Rajabu	
Mohamedi	Omari	
Mwanauua	Abdi	
Mwanakombo	Hassan	
Nfaume	Abdi	
Ramadhani	Omari	
Rukia	Ali	
Seleman	Rajabu	
Zaharani	Rashidi	

4. Kwale Village (26th January)

Surname	First Name	Position
Amiri	Ajalii	Mjumbe Mazingira & CCC
Bakari	Abdala	Mjumbe Mazingira
Juma	Ali	Mkusanyaji Takwimu
Jundu	Kihela	Mjumbe S/Kijiji
Kiziwa	Mohamed	Mkiti Kijiji
Kombo	Rehema	Mjumbe S/Kijiji
Kopi	Imamu	Mjumbe S/Kijiji
Mbukuzi	Jumbe	Mjumbe Mazingira
Mgeni	Azizi	Mjumbe S/Kijiji
Mohamedi	Ali	Katibu Mazingira
Moya	Mohamed	Veo Kijiji
Mtumbatu	Ally	Mjumbe S/Kijiji
Mwaita	Mwanakondo	Mjumbe S/Kijiji
Mwaita	Mwanakombo	Mjumbe Kamati Mazingira

Surname	First Name	Position
Omari	Saumu	Mjumbe S/Kijiji
Ramadhani	Shabani	Mjumbe CCC
Sarai	Mwandege	Mjumbe Mazingira
Shali	Omari	M/Kiti Kijiji
Shehe	Bakari	Mjumbe S/Kijiji
Shekuwe	Kijiti	Mjumbe Mazingira CCC
Zuberi	Mohamed	M/Kiti Kijiji

5. Chongoleani Village (26th January)

Surname	First Name	Position
J'Moyo	Mohamed	VEO
Kiziwa	Mohamed	M/Kiti Kijiji
Mbukuzi	Jumbe	Mjumbe Kamati ya Mazingira
Mohamed	Ali Idi	K/Mazingira
Shali	Kombo	M/Kiti Kamati

6. Ndaoya Village (26th January)

Surname	First Name	Position
Athumani	Hamadi	Mjumbe CCC
Hassani	Omari	M/Kiti wa Kijiji
Mshenga	Mtoro	A/M/Kijiji

7. Machui Village (27th January)

Surname	First Name	Position
Bakari	Mariam	Mjumbe
Gau	Mwidadadi	M/Kiti Kijiji
Jamamag	Mwani	
Jononi	Selemani	Mjumbe
Kidunya	Pembe	Mjumbe
Mfaki	Kisiwa	Mjumbe
Mohamed	Amina	Mjumbe
Mohamedi	Ali	Katibu Wamazingi
Shame	Gendo	Mjumbe

8. Tongoni Village (27th January)

Surname	First Name	Position
Baamiri	Bakari	Mjumbe Mazingira
Bushiri	Omari	M/Kiti Kijiji
Funidi	Hadija	Mjumbe Mazingira
Goma	Hamadi	M/Kiti Mazingira
Hamiss	Pongwe	Mjumbe Mazingira
Hasoro	Yaya	Katibu Mazingira
Kombo	Mwana'sha	Mjumbe Mazingira
Magudi	Hassan	A/MK Kijiji
Miawazo	Mzee	Mjumbe CCC
Mwajuma	Hassan	Mjumbe Mazingira
Mwanjada	Hassan	Mjumbe Mazingira
Omari	Mwanahawa	Mjumbe Mazingira
Salimu	Mohamedi	Mjumbe Mazingira

9. Kigombe Village (27th January)

Surname	First Name	Position
Kombo	Tajiri	Mjumbe Serkali
Maliwaza	Abdalla	Mjumbe Serkali
Mbaruki	Kitwana	Mjumbe Serkali
Mbuyu	Supen	Mjumbe Serkali
Mdoe	David	Afida Levuvi Kehombe
Mumbi	Haji	M/Kiti
Mussa	Suleman	Mjumbe Serkali
Ussi	Juma	Mjumbe Serkali

10. SEEGAAD Project (28th January)

Surname	First Name	Position
Savoie	Rebecca	Chief of Party/Country Representative
Urio	Frida	Business Development Advisor, Agriculture Products

11. Pangani District (28th January)

Surname	First Name	Position
	Rashidi	
		Acting DFO
		Extension Worker
Athman	Salim	District Community Development Officer
Mfuko	Agnes	
Mihina	S.S	District Natural Resources Officer
Nassor	Haroun	Forestry Field Officer

12. Ushongo Village (28th January)

Surname	First Name	Position
Ailida	Nuren	Mjumbe
Akida	Nureni	Mjumbe
Hamadi	Mwinyi	Mjumbe
Humpa	Victoria	Mjumbe
Mapunda	E.	VEO
Mdoe	Mtoo	Mjumbe
Mdoe	Ashukura	Mjumbe
Mgaza	Mungia	Mjumbe
Mlagard	Simon	Mjumbe
Mnyanhi	Kombo	Mjumbe
Mohamed	Kipapai	Mjumbe
Mviny	Shabani	Mjumbe
Ridhilvani		Mjumbe
Uvaziri	M.	M/Kiti

13. Kipumwi Village (28th January)

Surname	First Name	Position
Hatibu	Juma	Dive Kipumbwi
Mnyamisi	Akida	Veo Kipumbwi
Mnylhaji	Ally	Mw'Kitongoji-Mtoni
Mrisho	Jumbe	K/M Ulinzi
Mwambasi	Omari	M/Ushuru
Naggoro	Jamali	M/Kiti