Rufiji Environment Management Project[1]

Environmental Management and Biodiversity Conservation of Forests, Woodlands, and Wetlands of the Rufiji Delta and Floodplain

"We are all poor here"

Some Socio-economic Observations on Rufiji Floodplain and Delta.

From the results of village and household studies carried out in four villages from late 1998 to early 2000.

Hogan, A.R., Mwambeso, P.A., Chirwa, E.B., Chande, M.A., Nandi, R. X. and Mmbaga, N.O

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For more information, please contact:
Project Manager,
Rufiji Environment Management Project
P O Box 13513
Dar es Salaam, Tanzania.
Tel: 023 2402972 or 44 Utete Rufiji or 022- 2666088 / 0741 322366 Dar es Salaam
Email: rempute1@bushmail.net iucndar@epiq.or.tz

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Summary

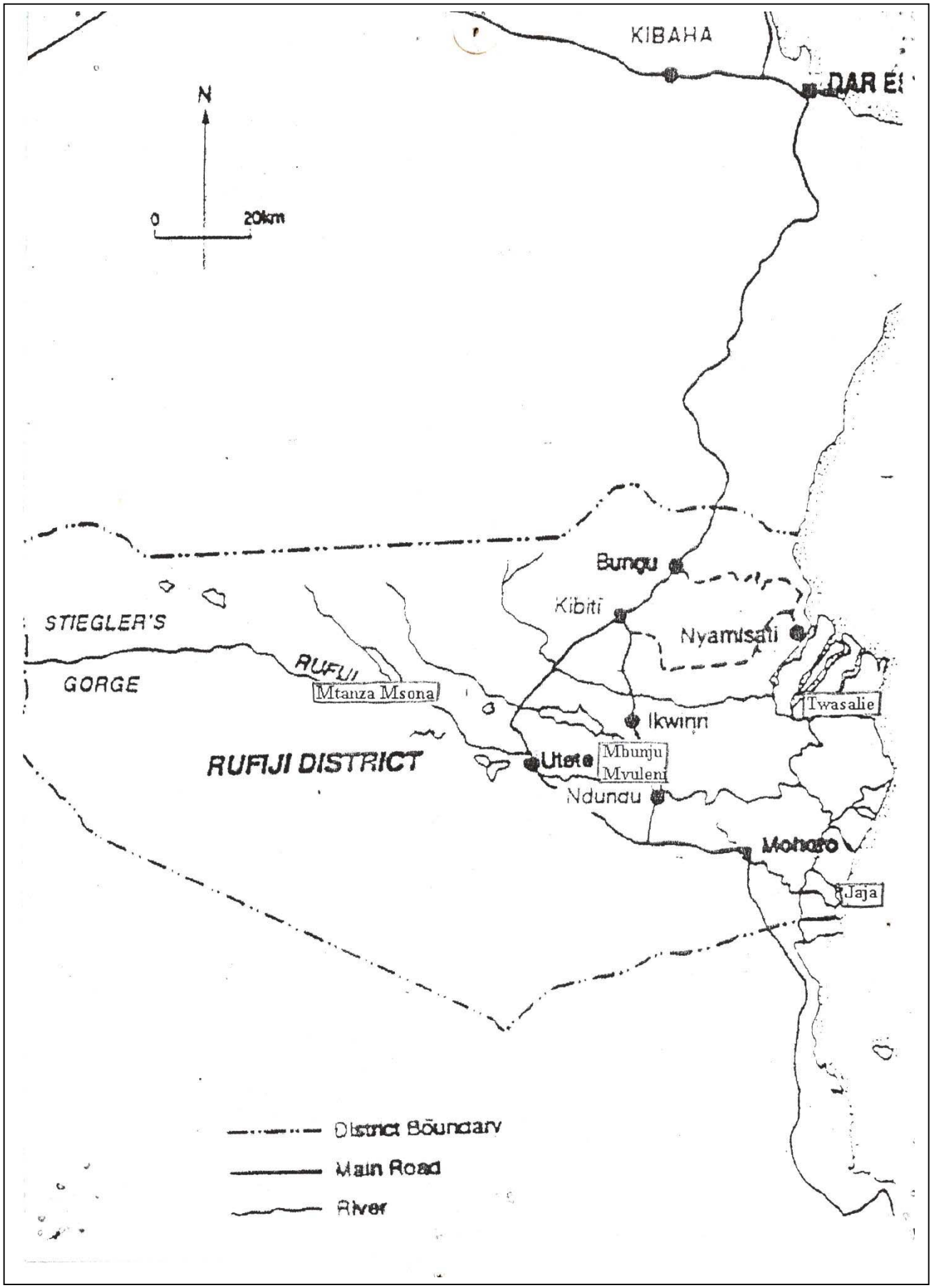
Rufiji district and the Coast Region compare poorly to most other districts and regions in Tanzania on criteria such as standard of living and access to services. Of all twenty regions in Tanzania, the Coast Region scored worst in terms of average income per person in 1994 (Regional Socio-economic Profile, 1999). This present study of 54 households in four villages confirms that most people are poor. However, although the overall picture may seem to be of uniform poverty, there are major differences between villages and households in terms of household income and educational levels.

The study contributes to the information base regarding economic activities, use of surplus, coping strategies, dependence on natural resources, opinions regarding the environment, energy use and other socio-economic issues in the floodplain and delta of the river Rufiji. It can also contribute to planning for interventions to improve people's livelihoods while sustainably managing natural resources. Wider sampling is needed for verification of some of the findings, however the main conclusions are that:

- Most households are poor.
- Incomes of those with primary education are higher than those without.
- Incomes of male-headed households are three times greater than female-headed households.
- Incomes in the delta are higher than in the floodplain.
- Agriculture is the main occupation.
- Households do not produce enough food to provide for all their household needs of food, clothing and service payments.
- The main household expenditure item is food.
- The respondents' main concern is to improve their agricultural production.
- The main perceived cause of agricultural loss is wild animals particularly baboons, Vervet monkeys and wild pigs.
- The main recourse when short of food, or cash to buy it, is to harvest more natural resources.
- Fuelwood is the main household energy source.
- The majority of households plant or tend trees.
- The majority of the respondents think that their environment is in good condition.

This study's recommendation regarding interventions to improve people's livelihoods while sustaining the rich biodiversity of their environment is to:
Concentrate on promoting environmentally friendly agriculture and environment management through intensive practical education of the population who can be accessed from the Rufiji River and its delta channels.

Map 1: Sketch Map of Rufiji District Showing the Four Pilot Villages (boxed)



Acknowledgements

The assistance of the Village Chairmen, Executive Officers and women's representatives of Mtanza Msona, Twasalie, Jaja and Mbunju - Mvuleni is gratefully acknowledged.

We would like to thank the groups of villagers who walked many miles with us, patiently mapped with us the 1612 households of the four villages, and gave us population and economic activity information. Without their good humour, tolerance and physical assistance, this work could never have been done.

The occupants of 54 households who gave their time, patience and views to the survey team are remembered with respect and gratitude.

Dedication

This report is dedicated to the 6,718 villagers of Twasalie, Mtanza Msona, Mbunju - Mvuleni and Jaja who, although they did not understand us and may never benefit from our intrusions, gave us every possible support to carry out these studies.

Table of Contents

List of Maps

List of Tables

1 Introduction

These studies were carried out as part of the work of Rufiji Environment Management Project, which, having been conceived seven years previously, became active in Rufiji in mid-1998. A short description of the project's goal and objectives and an explanation as to the purpose of the study in the context of the overall project is presented.

1.1 Rufiji Environment Management Project

Project Goal: To promote the long-term conservation through 'wise use' of the lower Rufiji forests, woodlands and wetlands, such that biodiversity is conserved, critical ecological functions are maintained, renewable natural resources are used sustainably and the livelihoods of the area's inhabitants are secured and enhanced.

Objectives

- To promote the integration of environmental conservation and sustainable development through environmental planning within the Rufiji Delta and Floodplain.

- To promote the sustainable use of natural resources and enhance the livelihoods of local communities by implementing sustainable pilot development activities based on wise use principles.

- To promote awareness of the values of forests, woodlands and wetlands and the importance of wise use at village, district, regional and central government levels, and to influence national policies on natural resource management.

Project Area

The project area is within Rufiji District in the ecosystems affected by the flooding of the Rufiji River (floodplain and delta), downstream of the Selous Game Reserve including several upland forests of special importance.

Project Implementation

The project is managed from the district Headquarters in Utete by the Rufiji District Administration through a District Environment Management Team coordinated by the District Executive Director. The Project Manager is employed by the project and two Technical Advisers are employed by IUCN.

Project partners, particularly National Environment Management Council, the Coast Region, the Royal Netherlands Embassy and the Ministry of Natural Resources and Tourism, collaborate formally through their participation in the Project Steering Committee and also informally.

Project Outputs
At the end of the first five–year phase (1998-2003) of the project the expected outputs are:

An Environmental Management Plan: an integrated plan for the management of the ecosystems (forests, woodlands and wetlands) and natural resources of the project area that has been tested and revised so that it can be assured of success - especially through development hand-in-hand with the District council and the people of Rufiji.

Village (or community) Natural Resource Management Plans: These will be produced in pilot villages to facilitate village planning for natural resource management. The project will support the implementation of these plans by researching the legislation, providing training and some support for zoning, mapping and gazettement of reserves.

Established Wise Use Activities: These will consist of successful sustainable development activities that are being tried and tested with pilot villages and communities and are shown to be sustainable.

Key forests will be conserved: Forests in Rufiji District that have shown high levels of plant biodiversity, endemism or other valuable biodiversity characteristics will be conserved by gazettement, forest management for conservation, and /or awareness-raising with their traditional owners.

1.2 Introduction to the studies

In order to plan environment management at village, district or higher levels some baseline information about the people and their relationship with their environment is necessary. Studies for selection of the four villages for piloting "wise use" activities and village environment management planning were carried out in 1998/1999. Throughout several visits in the pilot villages for meetings and fieldwork, other information was gleaned. For detailed planning, it was felt that an intensive baseline study should be carried out in each pilot village. Most of the information presented in this report was gathered during the intensive baseline study.

2 Methodology

The study area consisted of the four villages in which the REMP had chosen to pilot environment management planning and wise use activities. Two of the villages (Mtanza Msona and Mbunju - Mvuleni) are found in the Rufiji floodplain, while two (Twasalie and Jaja) are found in the Rufiji delta. (See Map 1).

Preliminary rapid appraisals using a checklist (Appendix 1A&B) and many interactive techniques were performed during 1998 and 1999 and are documented in a report [1]. In the context of joint information gathering for village environment management planning and exploration of wise use enterprises, several additional field trips were made.
Social–mapping with focus groups was used to make comprehensive lists (See Box 1 and Appendix 2) of all households using the villages' land and natural resources, their occupant numbers, numbers of able-bodied occupants and economic activities. Each household was assigned a card bearing the name of the head of household and a number. The cards were used for sampling and for wealth/livelihood-security (See Boxes 2 and 3) ranking.
Later, a detailed questionnaire (Appendix 3) and interactive techniques for listing, sorting, ranking, drawing and quantifying were used to interview 54 households from the four villages.
A household was defined as "a group of people who eat together each day". Female and male adults of the 54 households were interviewed. Each intensive interview took approximately one and a half hours.

Hamlets or sub-villages, referred to as "vitongoji" in Swahili were defined through village and social maps.

The survey results were entered and analysed in a specially designed database using MS Access. Other information was gleaned from wealth-ranking exercises and several field visit reports from the period (September 1998 to May 2000).

Box 1.Social Mapping

Social–mapping with focus groups was used to make comprehensive lists (On specially prepared forms) of all households using the villages' land and natural resources, their occupant numbers, numbers of able-bodied occupants and economic activities.

Key informants, a group of approximately ten people of mixed age and sex, drew the arrangement of all the houses in each sub-village and called out the name of the head of household. Each household was assigned a card and given a name and number. The cards were used for sampling and for wealth/livelihood-security ranking. The key informants discussed the number of inhabitants of each household and described their occupations.

They ranked their occupations in order of importance. The maps were too detailed to transcribe. The exercise, which was combined with visits to the main boundary points of each village, took approximately two days per village depending on the number of key informant groups which needed to be convened and on distances between sub-villages.

Box 2.Wealth Ranking

Fifty household cards were selected at random. Informants from different categories (age and sex) were asked to rank the households according to their livelihood security. Some informants grouped the cards into four categories, some into five, some six, seven or eight categories. For the village of Jaja the average number of categories was seven. For each category, the informant was asked to describe the criteria that they used to put a household into a specific category. The criteria were recorded and serve as descriptions of the economic interests of each of the final wealth/livelihood security categories.

At first the field staff thought that wealth/livelihood security ranking would be offensive to the householders but later found that most informants had no difficulty describing the wealth status of their neighbours and many thought it much fun. When the results were presented to a public meeting the participants concurred with the results.

The results of the exercise for Jaja are given in the Box 3 below.

Box 3. Wealth/Livelihood Security Ranking Results from Jaja 20.08.99

Category number	Status	% of households	Female: male ratio	Characteristics of the households in this category
1	Has a very secure livelihood	10.4	0:100	Many coconut trees, lots of livestock, big dhow, houses in Dar es Salaam.
2	Is fairly sure of livelihood	10.4	0:100	Some livestock, agriculture, employed, own a shop, trader.
3	Has an okay livelihood	25.0	17:83	Coconut trees, owns a food hotel, agriculture, livestock, fisher.
4	Has very little certainty of a livelihood	25.0	29:71	Small trader, carpenter, porter, chicken-keeper, fisher.
5	No certainty of a livelihood	19.8	21:79	Depends on agriculture alone, no chickens, and a big family.
6	Absolutely no security	9.4	66:33	Very old people, disabled or long-term ill people, no agriculture, no coconut trees, not even the price of fishing net.

3 Results and Discussion

The results are given and discussed in the following paragraphs.

3.1 Population

The village population is taken as the total of those who live in the village and use its natural resources for the major part of their income or time, regardless of whether they are officially registered there.

Dependency ratio is taken as the ratio of the number of dependents to the number of able-bodied persons expressed as a percentage. For the purpose of this study, "Able-bodied" persons are those whom the informant group assessed as making a productive contribution to the household. Dependents are those who through being very young, very old or having a long-term disability cannot make an economic contribution to the household. Thus, this study does not follow the conventional age – stratification method for determining dependency ratio that considers that all those of an age below 15 years or above 65 years are "dependents".

The total populations differed from statistics provided by the village leaders and the District Council. In the cases of Jaja and Mtanza Msona, this study counted 435 and 834 fewer inhabitants respectively than on record by the Village Executive Officer (VEO). In the cases of Twasalie and Mbunju - Mvuleni, this study counted respectively 522 and 345 more inhabitants than that on record by the VEOs. It must be remembered that this study team was counting the total number of resident users of the natural resources rather than the registered population.

For Jaja, the number of households corresponded closely with the figure given by the VEO. For Mtanza Msona the number (455) was 195 households less than the VEO's statistic (650). One reason for this is Msona's tendency to exaggerate its population statistics in its bid to form a separate village. Other reasons could be related to food-aid bidding.

In the cases of Mbunju - Mvuleni (over three times more) and Twasalie (61% more) the number of households using the village land and natural resources was found to be much greater than the number of registered households. In both cases, use of village land by "outsiders" who are registered in other villages is the most common explanation for the differences. Uncertainty, as to the physical position of boundaries and thus which village a household is actually in, is also a factor.

Hamlet or sub-village number is an indication of the distribution of settlement in a village. Of the four pilot villages, Twasalie is the largest village in terms of total population and number of households. It also has the highest number of sub-villages and the most widespread distribution of its population. Although Mtanza Msona's village area is big, its population is relatively compactly settled in five sub-villages leaving a large area of forest to the northwest that is unsettled and unknown to many of the villagers. This has implications for encroachment and future plans for better supervision by the villagers.

Jaja's formal settlement pattern is very compact and almost totally based on the main island of Jaja. However, informally, almost every household has a cultivation area inland in Ruma village (Kinon'go or Mpendeni) and spends at least eight months of the year at this site. Despite the amount of time spent there, the number of Jaja users there and the long tradition in cultivating in these areas the areas are not considered sub-villages of Jaja.

The reverse situation occurs in Twasalie where Twasalie is a seasonal recipient of villagers from the coast (mainly Msala and Kiasi villages) for cultivation in Msani, Chowe, Domwe and Nyafeda. Twasalie still maintains that these areas are its sub-villages. The extent of the village of Twasalie, and particularly the distance from the centre at Poloti to the North East corner North of the mouth of the Bumba River, makes supervision of the natural resources a very big challenge.

At Mbunju - Mvuleni, the administrative locations of the sub-villages of Mpima and Mupi are unclear and are subjects of disputes. This complicates any environment management plans that may be attempted to be devised.

Household size (Avg.4.21) is lower in all villages than the average for Tanzania (5. 2) and for Rufiji District (5.02) and the Coast Region (4.9)ii (See Table 1). Jaja, in the south delta, has the highest average (4.77) while Mtanza Msona, in the western floodplain, has the lowest (3.83).

Table 1: Village Population and Household (HH) Numbers

Village	Population	No. of HH	Avg. HH Size	Able-Bodied Population	Dependency Ratio
Twasalie	2122	502	4.23	996	113
Mtanza Msona	1744	455	3.83	829	110
Mbunju - Mvuleni	1445	360	4.01	720	101
Jaja	1407	295	4.77	614	129
Totals	6718	1612	4.21	3159	113

Table 2: Hamlet Population Statistics

Village	Hamlet	Total Population
Jaja	Bumbwamani	150
	Kitongani	772
	Mji Mwema	485
Village Total		**1,407**
Mbunju - Mvuleni	Kilalani	46
	Mbunju	294
	Mpima	439
	Mupi	275
	Mvuleni	391
Village Total		**1445**
Mtanza Msona	Bizi/Msona	611
	Bizi/Mturuma	33
	Msiga	261
	Mtanza	331
	Mturuma	508
Village Total		**1744**
Twasalie	Chowe A	138
	Chowe B	66
	Domwe	287
	Kioro	149
	Kisimbya	215
	Msani	348
	Nyafeda-Malondo	281
	Nyampendu	12
	Poloti	479
	Tarachu	147
Village Total		**2122**
Total Population four villages		**6,718**

3.2 Households by gender

The meaning of "Kaya" in the society of Rufiji district generally means 'a man and all who are under him'. This can include households which have their own house and fields and which the man only visits occasionally. For the purposes of this study the meaning of "kaya" was taken as "those who eat together daily". Therefore, if a man had three wives and families, two of them were recorded under the wives names and treated as *de facto* female-headed households (Table 3). Although not counted here, many male-headed households are in fact run by a wife. Polygamy can be taken as one explanation for the high proportion of female-headed households - approximately a quarter of all households. If a man has three wives, our survey will have assigned two of "his" households as female-headed. In addition, during the six to nine month growing season, husbands tend to stay more often at the village centre leaving the wife in the field. Fishing, fish trading, petty trading, logging and visits to distant wives take the male partner away from the household.

Table 3: Gender of Head of household (by Hamlet)

Hamlet	Male	Female	%Female
Jaja (Bumbwamani)	20	17	46%
Jaja (Kitongani)	125	33	21%
Jaja (Mji Mwema)	74	26	26%
Mbunju - Mvuleni (Kilalani)	9	00	00%
Mbunju - Mvuleni (Mbunju)	57	16	22%
Mbunju - Mvuleni (Mpima)	76	17	18%
Mbunju - Mvuleni (Mupi)	66	19	22%
Mbunju - Mvuleni (Mvuleni)	79	21	21%
Mtanza Msona (Bizi/Msona)	135	35	21%
Mtanza Msona (Bizi/Mturuma)		4	4 50%
Mtanza Msona (Msiga)	62	8	11%
Mtanza Msona (Mtanza)	65	21	24%
Mtanza Msona (Mturuma)	98	23	19%
Twasalie (Chowe A)	21	5	19%
Twasalie (Chowe B)	14	1	7%
Twasalie (Domwe)	52	23	31%
Twasalie (Kioro)	24	14	37%
Twasalie (Kisimbya)	39	15	28%
Twasalie (Msani)	54	25	32%
Twasalie (Nyafeda-Malondoni)	49	14	22%
Twasalie (Nyampendu)	2		1 33%
Twasalie (Poloti)	85	30	26%
Twasalie (Tarachu)	22	12	35%
Totals	**1232**	**380**	**24%**

3.3 Household Size by Gender of Head of Household

On the sample of 1612 households, female-headed households were found to be smaller than male-headed households by one unit/person or 23%. See Table 4 below. Is this because the male-partner is absent? Alternatively, is it because the greater livelihood insecurity of the female-headed households may have meant higher child mortality? Perhaps children migrate earlier and more frequently from female-headed households. The present information is inadequate to make a reliable conclusion.

Table 4: Household Size by Gender (Head of household)

Avg. Household Size	*Gender of Head of household*
4.4	Male
3.4	Female

3.4 Settlement and User Arrangements (See Maps 1- 4)

For all villages, most of the settlement is recorded in the central area of the village. For example, most people of Mtanza Msona have a home in the official centre of the village north of the river Rufiji, but most of their time, especially their productive time, is spent south of the river. Similarly, the people of Jaja have their homes mainly on the island of sand but much of their time is spent in their shambas (fields), which are up to three hours canoe ride away. It is obvious that fertility of the field sites attracts them to travel long distances for cultivation.

Twasalie villagers living in Poloti, the official centre also travel long distances to their fields and to prawn fishing grounds. A large proportion of the populations of Msani, Chowe, Domwe and Nyafeda are seasonal migrants from coastal villages including Msala and Kiasi, who seem to have traditional rights to cultivate there. The residents of Mbunju and Mvuleni are reasonably close to their fields and, although they move temporarily to their fields, many of them are able to maintain homesteads at the sub-village (hamlet) centres.

The inhabitants of Mpima hamlet of Mbunju - Mvuleni village, cultivate at Kilalani. Mupi residents cultivate close to their homes, but are over three hours walk from Mpima and further from the village centre of Mbunju. They do not have second homes out of the floodplain and therefore rent rooms in Ikwiriri in times of flooding.

Settlements in the shamba areas are in clusters where intervening fields separate individual households from each other. Most houses in the fields are on stilts and are occupied for many years. Some of the stilt houses (dungus) erected in the shambas are permanent structures up to 15 years old, large and very attractive. In some cases mud houses are erected on higher mounds within the floodplain and escape flooding in “normal flood” years. These indications of permanent settlement in floodplains are contrary to the general information on settlement available at district level. They are also contrary to first impressions given at village centres where administrators are not at liberty to admit that their villagers actually spend most of their time in hazardous zones.

There are fallowed areas of up to seven years old. Some of these areas have been planted with trees, which is a tenure marking method. However there are many fallow areas unmarked by planted trees, which appear to “belong” to those who cultivated them last no matter how long the interval since cultivation. The existence of a fallow system is not generally acknowledged by district agricultural information sources. Much more information on the floodplain agricultural systems is needed.

Seasonal migration into the floodplains - for six to nine months per year, allows advantage to be taken of the flood-recession (mlao) and rain-fed agriculture opportunities. Seasonal movement has implications for long–term crop establishment, e.g. trees, and for those planning education and health service provision.

Box 4: Rights and Lack of Official Boundaries

Rights to cultivate specific areas of land outside of their village of residence seem to be a very important feature of Rufiji life. Feelings of ownership or stewardship do not seem to go hand in hand with these user rights. For example, the Jaja villagers who cultivate at Kino'ngo in Ruma village do not feel that Kinon'go should be incorporated in their village environment management plan. When asked to map their village they do not draw this area, which is the main source of food for their families.

In Mbunju - Mvuleni, although the villagers from the central two hamlets consider that the sub-village of Mupi is within the village boundary they do not consider that the householders from there should have the right to take part in the village environment management planning exercise. They contend that the Mupi householders are not residents because they are not registered in Mbunju - Mvuleni.

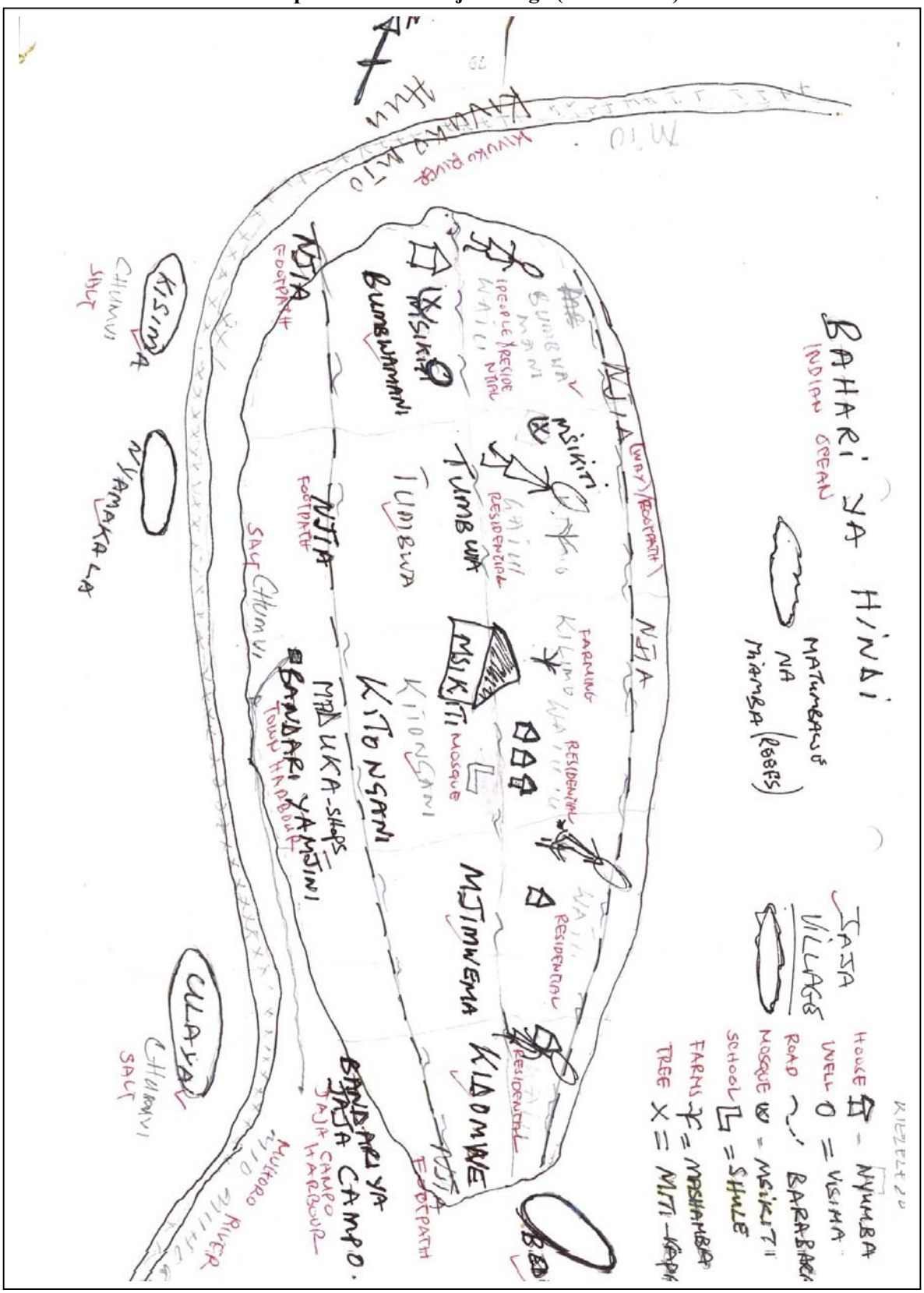
Historical re-settlement programmes, to mitigate flooding hazards, to create and extend the Selous Game Reserve and during the Ujamaa villagisation programme, have left a legacy of complicated user "rights". An example is the perceived, and uncontested, right of some villagers from Nyaminwili to fish lakes within Mtanza Msona's village's southern reaches.
A recent (1997-98) line clearance by Selous Game Reserve is considered a serious land encroachment by the villagers of Mtanza Msona. The ownership/control of Lake Utunge is another unsolved issue between Mtanza Msona, some other villages and the Selous Game Reserve.

Most village boundaries are not demarcated. The maps available from the Ujamaa villagisation period only cover the central part of the "new" villages and demarcation beacons - where available, are only found on a line basis on main roads.
Thus, with the many complicated land and resource user arrangements and disputes, one needs to tread softly regarding boundary issues and be extremely careful to avoid involvement in village demarcation activities which may deprive some groups of perceived and undisputed traditional user rights. One should however encourage boundary clarification and agreement between villages where no disputes occur, as this will make for easier definition of the future village management areas in the emerging Village Environment Management Plans. In addition, for mobile (e.g. wildlife) and other shared resources (e.g. water bodies), discussion towards joint management should be encouraged between villages.

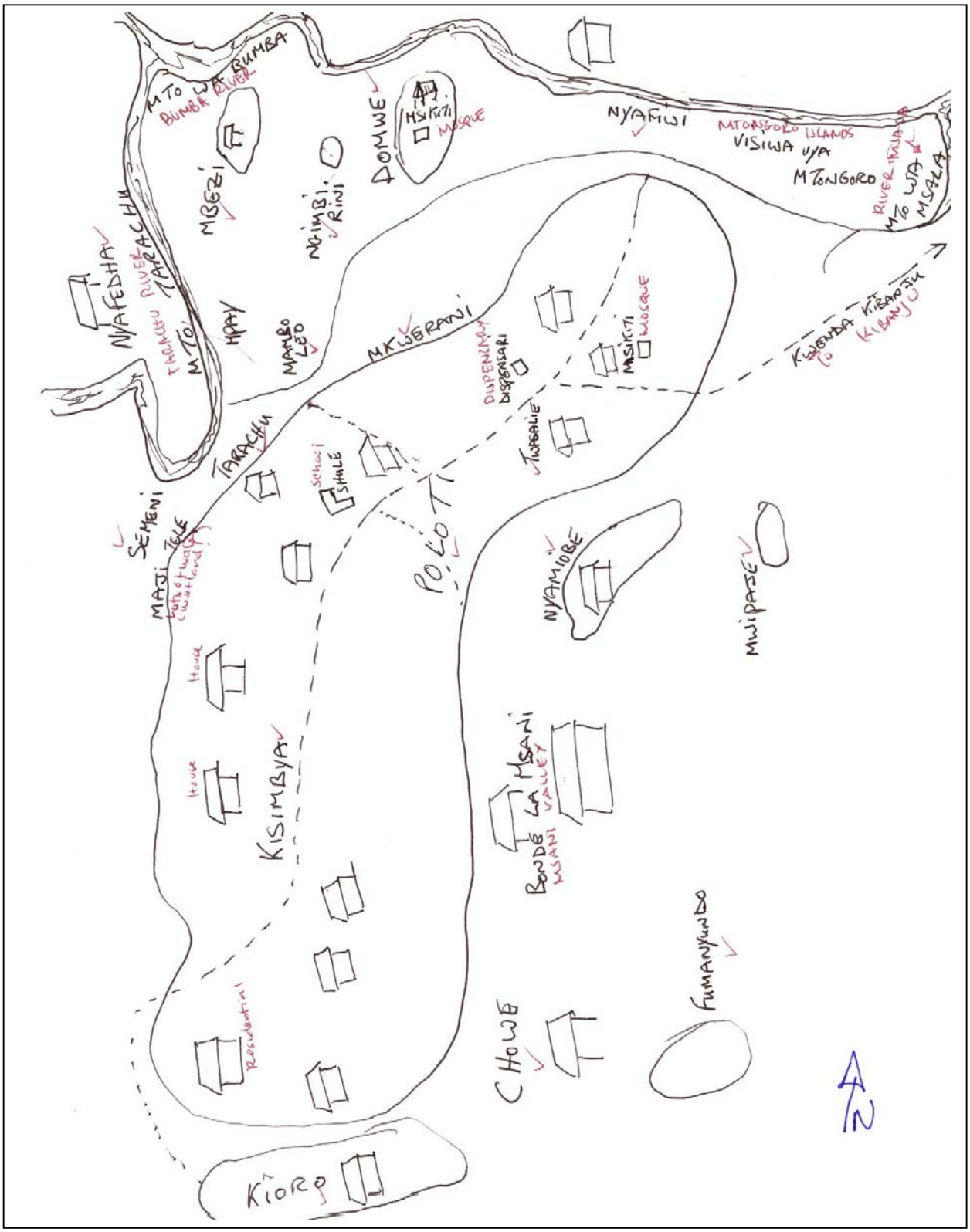
3.4.1 Village Sketch Maps

Village maps were drawn using participatory mapping methods. The mapping exercises gave the visiting team a preliminary overview of the villages' layout, in terms of settlement. They also widened many villagers' horizons to natural resources that they seldom have recourse to visit. The maps were first drawn on the ground with a stick or on a concrete floor with chalk. A villager transcribed the map onto a flipchart for village use and another villager transcribed it onto A4 sized paper for District/ REMP use. The A4-sized maps were scanned into MS Word 6 using a Canon Scanner head for Canon bubble-jet printer. It is hoped to align these simple sketch maps with digitised maps created using aerial photography in order to link villager information with information from remote and historical sources.

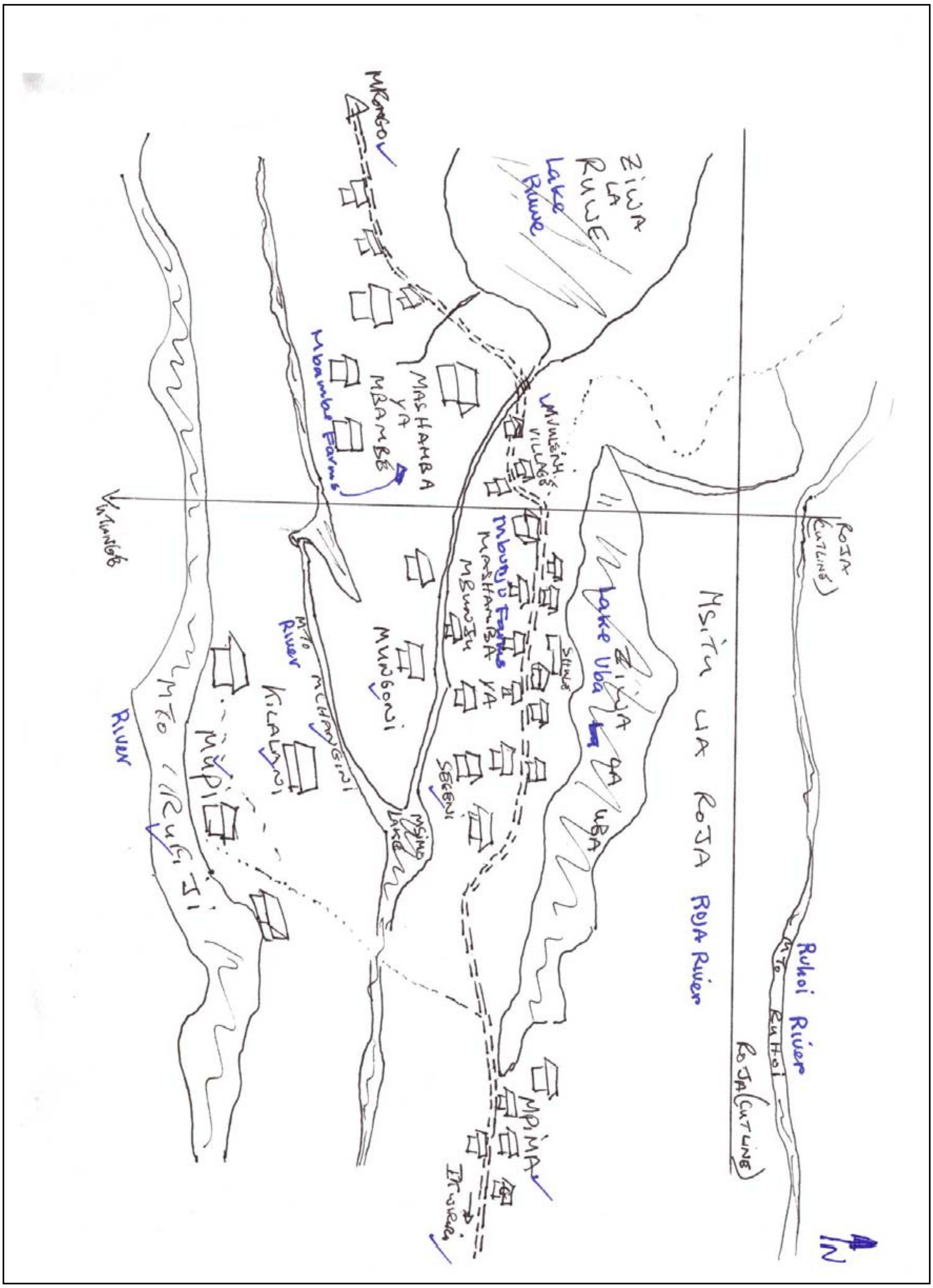
Map 2: Sketch of Jaja Village (not to scale)



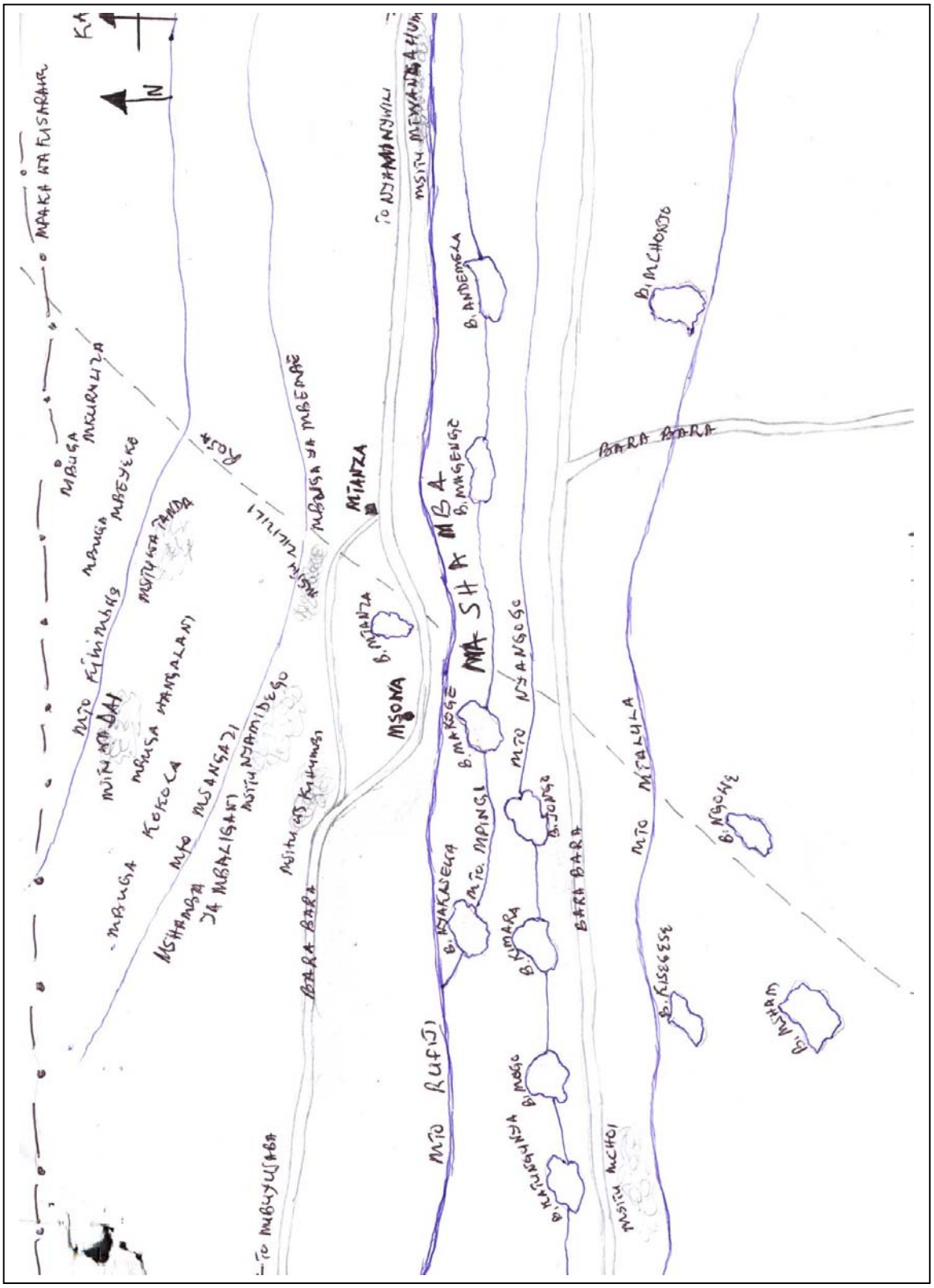
Map 3: Sketch of Twasalie Village (not to scale)



Map 4: Sketch of Mbunju - Mvuleni Village (not to scale)



Map 5: Sketch of Mtanza Msona village (not to scale)



3.5 Economic Activities

3.5.1 Number of Economic Activities

The number of economic activities per household ranged from none, where the occupant had long-term illness or was disabled, to seven (See Table 8). The average number of household activities was 2.9 (See Table 5). The diversity of activities within the households is probably an opportunistic strategy for survival. This would link with the information derived from wealth/livelihood security ranking studies, which show that those who have secure livelihoods are not dependent on sole enterprises, but have a range of sources of income. There was no clear relationship, either positive or negative, found between floodplain and delta villages with regard to the number of economic activities.

Table 5: Economic Activities by Village and Hamlet

Village	Hamlet	Average Number Activities	Maximum Number Activities	Minimum Number Activities	St. Dev. al No. Activities
Jaja		*3.6*			
	Bumbwamani	4.0	6	2	1.1
	Kitongani	3.5	7	0	1.5
	Mji Mwema	3.3	5	0	1.1
Mbunju - Mvuleni		*2.5*			
	Kilalani	2.2	5	1	1.4
	Mbunju	3.2	5	1	1.1
	Mpima	2.7	5	1	0.9
	Mupi	2.1	5	1	0.9
	Mvuleni	2.3	5	1	0.9
Mtanza Msona		*3.0*			
	Bizi/Msona	2.3	5	0	0.9
	Bizi/Mturuma	3.3	5	2	1.0
	Msiga	3.4	6	0	1.2
	Mtanza	3.2	7	0	1.2
	Mturuma	2.8	5	1	1.1
Twasalie		*2.8*			
	Chowe A	2.2	6	1	1.0
	Chowe B	3.7	5	2	0.9
	Domwe	3.5	6	1	1.3
	Kioro	2.2	4	0	0.9
	Kisimbya	2.4	4	0	0.8
	Msani	3.0	5	1	1.0
	Nyafeda-Malondoni	2.7	4	2	0.7
	Nyampendu	3.0	5	2	1.7
	Poloti	2.6	4	0	0.7
	Tarachu	2.9	4	2	0.8
Overall Average		2.9			

3.6 Main Economic activities

Forty different economic activities were encountered (see Table 8). These were categorised, by the survey team, into seven types: agriculture (Kilimo), fishing (Uvuvi), salt making (Chumvi), commerce/trade (Biashara), palms and weaving (Majani), forest harvesting (Misitu) and other (Nyingine). Forest harvesting enterprises include timber and non-timber wood products (e.g. poles, charcoal) and do not include palm, food, bee or other forest products. Subsistence type activities were not mentioned by householders as economic activities. Thus food-gathering from the wild, which is probably a very important survival technique during droughts and floods, has not been listed here.

Table 6 demonstrates that the majority of households (85.7%) in all four villages consider agriculture to be their main activity. This finding was surprising, as it was expected that it would take second place to fishing as the most important enterprise. Perhaps the interviewees' priority consideration was for the enterprise which consumes most time and which supplies the staple food to the household rather than the one with the most income potential. Thus, agriculture may be the most labour intensive activity for most households but it is not necessarily the highest contributor of income. Surprisingly, for riverine and coastal people, fishing is only considered the most important economic activity in a very small proportion of households (6.5%). However, as seen in Table 7, almost half of the 1612 households consider fishing as the secondary activity.

Table 6: Main Economic Activities by HH # involved in each

Main Economic Activity	Number of HH	% of HH Involved
Kilimo (Agriculture)	1362	85.70%
Uvuvi (Fishing)	104	6.50%
Chumvi (Salt-making)	40	2.50%
Nyingine (Other)	39	2.50%
Biashara (Trade)	33	2.10%
Majani (Palms/weaving)	8	0.50%
Misitu (Wood Product Harvesting)	4	0.30%
Count	**1590**	

3.6.1 Secondary Economic Activities

Fishing is the most common secondary activity of the 1612 households as seen in Table 7 below.

Table 7: Secondary Economic Activities (when agriculture is primary) by number of households involved.

Primary Activity	Secondary Activity	Number of Households	% Households
Agriculture	Fishing	517	45.2%
Agriculture	Palms/Weaving	294	25.7%
Agriculture	Salt-making	114	10.0%
Agriculture	Other	106	9.3%
Agriculture	Trade	75	6.6%
Agriculture	Wood product harvest	37	3.2%
Count		**1143**	

3.6.2 Range of Economic Activities

Forty-five different kinds of economic activities were encountered in the four villages. They are listed in Table 8 below. The range of activities gives a fascinating insight into village life. There were sub-categories, which could not be listed comprehensively including fish packer, fish drier, and forest harvest activities that need further more detailed exploration. Specialists such as cook of pilau (rice dish) for drumming occasions may indicate the importance of traditional drumming events in village life. The number of coconut related activities that are considered economic enterprises shows the importance of coconuts in delta life.

Table 8: Economic Activities in the four villages

Economic Activities	English
Asali, mlinaji	Honey hunter
Baharia wa Majahazi	Sailor, hired
Baisekeli, fundi	Bicycle repairer
Baisekeli, msafirishaji	Bicycle transporter
Biashara ndogondogo	Small scale trader
Boriti, Biashara	Mangrove pole trader
Chumvi	Salt-maker
Dini, mtumishi	Religious worker
Duka, mwenye	Shop owner
Jahazi au mashua owner	Owner of big boat e.g. dhow
Kilimo	Cultivator
Kuku, biashara ya kuuza	Chicken trader
Kuku, mfugaji	Chicken producer
Majahazi, fundi	Repairer of dhows
Majani	Palm (Hyphenae and Phoenix) harvester or weaver
Mfinyanzi	Potter
Mgahawa, mwenye	Café owner
Mganga wa Kieneji	Traditional healer
Mhunzi	Blacksmith
Mifugo mingine	Livestock keeper (other than chickens)
Misitu	Forest harvest activities
Mitumbwi, mchongaji	Canoe maker
Mkunga wa jadi	Traditional birth attendant
Mshonaji	Tailor
Mtumbwi, biashara ya kuvusha	Transporter by canoe
Nazi, biashara ya	Coconut trader
Nazi, msokotaji kamba	Coir rope-maker
Nazi, Mvunaji	Harvester of coconuts
Nazi, kusuka makuti	Weaver of coconut fronds
Nazi, mfuazi	Coconut stripper
Ngariba,	Male circumciser
Nyavu, fundi wa kushona	Net maker/repairer
Nyuki, mfugaji	Beekeeper

Table 8 Cont.

Economic Activities	English
Nywele, msukaji	Hair plaiter
Pilau, mpishi	Cook of pilau for occasions
Radio, fundi	Radio repairer
Samaki, biashara	Fish trader
Seremala, fundi	Carpenter
Serikali, mtumishi	Government worker
Sufuria, fundi	Tinsmith
Ujenzi, fundi	Builder
Uvuvi	Fisher
Vitafunwa, biashara ya	Snack seller
Vitanda, mchongaji	Bed-maker

3.6.3 Economic Activities, any Involvement

Involvement in an activity, regardless of its importance to the household, is considered in Table 9. Palms and weaving activities are carried out in 61.6 percent of households. The importance of salt making is hidden by the fact that it is only possible in two of the four villages. In Jaja and Twasalie 220 households of a possible 797, i.e. 28%, carry it out. The number of households involved in forest (woody) product harvesting is surprisingly low. In treks to distant parts of the four villages, very few people knew the extremities of the villages well. This could be an indicator that very few households are actually involved in forest harvesting activities. On the other hand, the interviewees were aware that the survey team comprised District Natural Resource and Environment project personnel and were unlikely to disclose complete information regarding the harvest of forest products.

Table 9: Economic Activities, any Involvement

Activity	Number of HH undertaking the activity	% of HH undertaking the activity
Agriculture	1501	93.10%
Fishing	723	44.90%
Salt	220	13.60%
Palms Weaving	993	61.60%
Chickens	471	29.20%
Forestry	113	7.00%
Commerce	188	11.70%
Other	225	14.00%

3.7 Incomes

Income data, given in Tanzanian shillings, is from a small sample of households, i.e. 54 from the total number of 1612. Further sampling would produce lower standard deviations and could verify or refute the present information. Useful observations can still be made using the present limited data.

3.7.1 Per Capita Income Compared to the National Poverty Line

The household income was divided by the household size to give a per capita income. The per capita income was compared to the national per capita poverty line of Tsh. 500,000 and expressed as a percentage of the poverty line. In most households, the per capita income is below the poverty

line. Of the 54 households interviewed, only five households (9%) were found to have a per capita income that is above the poverty line. See Table 10.

Table 10: Per Capita Income Compared to National Poverty Line

Number of household Members	Per Capita Income	Per Cap Minus Poverty line (Tsh 500,000)	Percent above or below Poverty Line
1	1,274,500.0	774,500	155%
1	645,150.0	145,150	29%
1	277,500.0	-222,500	-45%
1	26,700.0	-473,300	-95%
2	81,300.0	-418,700	-84%
2	247,750.0	-252,250	-50%
2	270,300.0	-229,700	-46%
2	79,700.0	-420,300	-84%
2	91,000.0	-409,000	-82%
3	454,066.7	-45,933	-9%
3	118,200.0	-381,800	-76%
3	13,666.7	-486,333	-97%
3	280,700.0	-219,300	-44%
4	407,525.0	-92,475	-18%
4	143,050.0	-356,950	-71%
4	98,500.0	-401,500	-80%
4	94,575.0	-405,425	-81%
4	43,343.5	-456,657	-91%
4	78,775.0	-421,225	-84%
5	56,292.0	-443,708	-89%
5	63,500.0	-436,500	-87%
5	134,360.0	-365,640	-73%
5	292,290.0	-207,710	-42%
5	45,716.0	-454,284	-91%
5	248,200.0	-251,800	-50%
5	95,900.0	-404,100	-81%
5	197,610.0	-302,390	-60%
5	58,680.0	-441,320	-88%
5	55,760.0	-444,240	-89%
6	53,633.3	-446,367	-89%
6	199,333.3	-300,667	-60%
6	385,116.7	-114,883	-23%
6	19,375.0	-480,625	-96%
6	27,766.7	-472,233	-94%
6	111,516.7	-388,483	-78%
6	301,300.0	-198,700	-40%
6	31,845.8	-468,154	-94%
7	10,714.3	-489,286	-98%
7	218,000.0	-282,000	-56%

Table 10 cont.

Number of household Members	Per Capita Income	Per Cap Minus Poverty line (Tsh 500,000)	Percent above or below Poverty Line
7	11,964.3	-488,036	-98%
7	47,457.1	-452,543	-91%
7	251,892.9	-248,107	-50%
7	72,885.7	-427,114	-85%
7	17,342.9	-482,657	-97%
8	41,125.0	-458,875	-92%
8	1,434,962.5	-934,963	187%
8	841,487.5	-341,488	68%
8	17,006.3	-482,994	-97%
9	289,974.4	-210,026	-42%
9	56,022.2	-443,978	-89%
9	165,666.7	-334,333	-67%
9	145,666.7	-354,333	-71%
10	17,676.0	-482,324	-96%
11	782,233.2	282,233	56%
Average (n=54)	**1,274,500.0**	**772,974**	**1%**

3.7.2 Income by Village

The two delta villages (Jaja and Twasalie) show higher average (by factors of over two) and maximum incomes (by factors of over four) per household than the two floodplain villages (Mbunju - Mvuleni and Mtanza Msona) (See table 11). An explanation for the higher delta incomes may be better agricultural productivity, more reliable rainfall, combined with a rich fishery and abundant mangrove resources. Therefore, despite the much cited problem of communications as an impediment to income improvement, at least some of the delta people seem to have overcome such limitations and achieved good incomes. Mtanza Msona and Mbunju - Mvuleni villages have daily bus services to the huge market of Dar es Salaam and Mbunju - Mvuleni has a nearby market at Ikwiriri, yet neither has shown household incomes better than the more "remote" villages of the delta. Factors such as the wealth of natural resource base, rainfall reliability, entrepreneurship, production skills, marketing skills and other factors need to be explored as well as access and communications in order to gain a greater understanding of income dynamics in the project area.

Minimum incomes are frighteningly low in all four villages and compare very badly with the 1994 national average per capita GNP of 140 USD[iii] or 112,000 Tsh., if divided by the average household size of 4.21. The minimum per capita incomes of Jaja, Mbunju - Mvuleni, Mtanza Msona and Twasalie are calculated as Tsh. 9,318, Tsh. 6,512, Tsh. 20,427, and Tsh. 29,610 respectively.

The range of household incomes from a maximum of Tsh. 11,479,700 (mainly from shrimp fishing) to a minimum of 41,000 within one village is remarkable. It is clear that households rely on sources of sustenance that are not necessarily considered as 'income' or 'enterprises'. Among these sources of sustenance, wild food must be significant.

Table 11: Household Income by Village

Village	Number of Interviews	Average Income (All sources)	Standard Dev.	Minimum	Maximum	
Jaja	16	1,831,995.3	3,288,406.2	41,000.0	11,479,700.0	
Mbunju - Mvuleni	11	512,107.3	490,349.6	26,700.0	1,461,450.0	
Mtanza Msona	12	751,881.6	876,076.9	83,750.0	2,609,770.0	
Twasalie	15	1,111,056.7	1,657,173.2	121,400.0	6,731,900.0	

3.7.3 Household Income by Gender of Head of Household

Male-headed households earned nearly three times (2.89 times) as much as female headed households (Table 12). During separate wealth/livelihood security ranking exercises in three of the villages, female-headed households were not represented in the wealthiest category, whereas they were disproportionately represented in the poorest category. Therefore, two sources of data support the notion that female–headed households are less livelihood secure than male–headed households are. Perhaps this is because females are not at liberty – due to social norms - to engage in enterprises, which quickly yield high levels of cash such as fishing, logging or honey harvesting. Women appear to be more limited than men in the range of enterprises which society allows them to engage in. Women are also less educated and less mobile, both within the village area and outside it, and this would mean that they have less access to information about enterprise and market possibilities.

Table 12: Average HH Income by Gender of Head of Household

Sex of Head of HH.	No. HH	Average income (All sources)	Standard Dev.	Minimum	Maximum
Female	16	482,350.3	605,632.4	26,700.0	2,310,700.0
Male	38	1,392,524.5	2,385,043.1	75,000.0	11,479,700.0
Count	54				

3.7.4 Income by the Highest Educational Level Attained within the Household

Only one household in the sample had achieved Form IV level of education, therefore the main comparison can be made between the households whose standard was below Standard Seven and those who were above that level (Table 13). Half of the households (50%) have at least one member who has completed primary education, while a little less than half (48%) have not. This is similar - though not directly comparable, to recent figures from the Tanzania Essential Health Interventions Programme-AMMP project.[iv] (December 1999) which found that 48% of the population, as opposed to the households, had Primary education and 44% had not. The National figure for adult illiteracy was 32% in 1996.[v] Those households who had attained Standard 7 earned over three times the income of those who had not. This finding suggests that education is a key factor in improving incomes and perhaps livelihood security.

Table 13: Household Income by Education

Education Level	Number of HH	Average Income	Std. Dev.	Minimum	Maximum
Below Standard Seven	26	506,316.5	492,667.6	26,700.00	1,763,250.
Standard Seven to Form One	27	1,740,363.1	2,764,059.0	83,750.00	11,479,700
Form One to Form Four	1	479,500.0		479,500.00	479,500.0
Count	**54**				

3.7.5 Comparison of Incomes from different economic enterprises

From the sample of 54 households, the economic activity giving both the maximum and best average income was fishing. The maximum income was exceptionally high, accounted for by prawn fishing on an almost continuous basis. Fishing also gave the greatest loss (see minima). The least profitable enterprise was salt making from both an average and a maximum income assessment.

Table 14: Incomes from Different Economic Activities

	Agriculture	Fishing	Wood Product Harvest	Palms and weaving	Salt-making	Chicken and livestock	Trading	Other
Average	175,297	716,934	29,821	33,835	6,906	45,113	96,755	18,184
Maximum	913,515	11,116,000	688,400	360,000	90,000	386,900	1,849,350	285,000
Minimum	-3,000	-16,000	0	0	0	0	0	0
Standard Deviation	192,339	1,902,802	104,869	75,473	17,952	88,304	288,527	47,800

3.7.6 Comparison of stated versus calculated contribution to HH income from agriculture.

Interviewed households were initially asked to calculate - by dividing counters (Box 5), the contributions of their various enterprises to household income.

Box 5. Ranking Enterprise Contributions to Income

The householder was asked to list her/his economic enterprises and to represent each enterprise by some convenient marker or by an image drawn on the ground. For example, a hoe for agriculture, a stick for wood product harvests, a palm leaf for weaving a net for fishing. The householder was then given 50 beans (representing the total household income) to distribute among the images or markers to represent the proportion of income contributed by each of the enterprises. When the householder was satisfied that s/he had distributed the beans correctly, the interviewer counted the number of beans attributed to each enterprise and multiplied each figure by two to convert it to the percentage of income contributed by each enterprise.

The results (stated) for the agricultural enterprise are averaged in column A of Table 15. Then interviewees were asked about yields of product and value of product from each of their enterprises. The results (calculated) for the agricultural enterprise are summarized as B in Table 15. The differences between the stated and the calculated contributions of agriculture to the household income were calculated. The average is given as C in Table 15. Generally, the contribution was slightly exaggerated, on average by 6.5%. Income calculations are notoriously difficult to make. This method of crosschecking gives us a sense that the data is somewhat reliable.

Table 15: Contribution of Agriculture to Total Income; stated vs. calculated

A. Stated Contribution of Agriculture to Total Income. Average of 54 HH	B. Calculated Contribution of Agriculture to Total Income. Average of 54 HH	C. Difference Between columns B-A.
42.9% (max 100%, min 0%)	36.3% (max 100%, Min –0.3%)	-6.5% (max 90% min-46%)

3.7.7 Comparison of Income and Expenditure

For 54 households, income and expenditure are compared. The figures show that 31 out of the 54 households (57.4%) were in positive balance i.e. the income was greater than the expenditure (Table 16). The remaining 23 households spend more than they say they earn. In a situation where there is little access to cash as credit and where the expenditure was given as cash expenditure, it can be assumed that the income figures were probably downplayed. Simply put, "if they've spent it and they owe no cash to anybody, they must have earned it in the first place, therefore it is uncounted income".

Table 16: Comparison of Income and Expenditure

Income Total	Percent Difference	Difference between Income and Expenditure	Total Expenditure
8,604,565.00	1843.7%	8,161,865.0	442,700
176,760.00	-84.6%	-974,240.0	1,151,000
41,000.00	-89.7%	-355,450.0	396,450
495,500.00	40.9%	143,800.0	351,700
1,311,000.00	79.2%	579,500.0	731,500
1,630,100.00	141.5%	955,060.0	675,040
75,000.00	-75.9%	-236,700.0	311,700
315,100.00	27.4%	67,830.0	247,270
182,000.00	-21.2%	-49,065.0	231,065
11,479,700.0	773.6%	10,165,700.0	1,314,000
329,000.00	-36.3%	-187,680.0	516,680
842,100.00	194.8%	556,440.0	285,660
669,100.00	42.0%	197,840.0	471,260
394,000.00	-12.6%	-56,870.0	450,870
1,526,000.00	20.3%	257,700.0	1,268,300
1,807,800.00	112.0%	955,100.0	852,700

Table 16 cont.

Income Total	Percent Difference	Difference	Total Expenditure
162,600.00	-72.3%	-424,500.0	587,100
321,800.00	-7.8%	-27,100.0	348,900
281,460.00	-72.3%	-733,278.0	1,014,738
645,150.00	101.6%	325,202.0	319,948
2,310,700.00	623.6%	1,991,380.0	319,320
191,075.00	-67.1%	-390,406.0	581,481
572,200.00	372.0%	450,980.0	121,220
116,250.00	-77.6%	-402,539.0	518,789
2,609,770.00	491.7%	2,168,676.0	441,094
136,050.00	-68.7%	-298,700.0	434,750
173,374.00	-47.2%	-155,226.0	328,600
83,750.00	-88.4%	-637,391.0	721,141
1,362,200.00	314.9%	1,033,864.0	328,336
540,600.00	259.2%	390,080.0	150,520
1,461,450.00	260.9%	1,056,450.0	405,000
159,400.00	-26.3%	-56,800.0	216,200
277,500.00	271.7%	202,850.0	74,650
1,274,500.00	2251.5%	1,220,300.0	54,200
317,500.00	-26.4%	-113,910.0	431,410
354,600.00	85.3%	163,275.0	191,325
378,300.00	174.3%	240,409.0	137,891
988,050.00	224.0%	683,090.0	304,960
166,600.00	-68.2%	-356,600.0	523,200
228,580.00	-42.0%	-165,695.0	394,275
26,700.00	541.8%	22,540.0	4,160
1,241,000.00	174.2%	788,350.0	452,650
332,200.00	-54.0%	-389,980.0	722,180
293,400.00	1.1%	3,260.0	290,140
504,200.00	-41.6%	-358,640.0	862,840
479,500.00	-21.7%	-132,500.0	612,000
6,731,900.00	2495.2%	6,472,500.0	259,400
1,763,250.00	233.0%	1,233,824.0	529,426
1,491,000.00	25.6%	303,970.0	1,187,030
671,800.00	-43.1%	-508,500.0	1,180,300
1,196,000.00	248.5%	852,800.0	343,200
510,200.00	1174.2%	470,160.0	40,040
121,400.00	60.3%	45,660.0	75,740
278,800.00	-48.0%	-257,490.0	536,290
Average Total Income 1,122,843.22	**Average difference 230.9%**	**Average difference 646,133.2**	**Average Expenditure 476,710**

3.8 Main expenditure Item

Most of the households interviewed said that their main expenditure item was food. (Table 17). This is because the quantities of food crops produced are not adequate to cover all the household needs of food and cash. See Section 4.9.1.

Table 17: Main Expenditure Item

Village	Main expenditure	# HH mentioning/ #HH interviewed	Percent of HH Interviewed
Twasalie	Food	(15/15)	100%
Jaja	Food	(15/16)	93.75%
Mtanza Msona	Food	(11/12)	91.7%
Mbunju - Mvuleni	Food	(10/11)	90.9%

3.9 Losses from Various Economic Activities and Reasons

3.9.1 Likelihood of loss

Quantifying loss is not an easy exercise when the levels of possible yields are themselves difficult to quantify. Nevertheless, householders gave estimates where they felt losses had taken place. For natural resource harvesting activities, where any yield is looked upon as a bonus, many householders did not consider losses except where equipment failure or damage caused loss of yield. Post harvest losses were mentioned in the case of fish. Table 18 compares three economic activities on a proportion of loss basis. For agriculture and fishing the highest proportion of mentions of losses were in the 25-50% range. In the case of forest harvest, most mentions were in the "less than 25%" range. The likelihood of losing more than half (>50%) the possible yield is more probable for agriculture (32%), than fishing (25%), or forestry (14.3%).

Table 18: Losses: Comparison of levels of losses for Agriculture, Fishing and Forestry

Proportion lost last year	Agriculture Number of Mentions	Proportion of mentions	Fishing Number of Mentions	Proportion of mentions	Forestry Number of Mentions	Proportion of Mentions
<25%	13	22.6%	7	29.0%	4	57.1%
25-50%	23	43.4%	11	45.8%	2	28.6%
>50%	17	32.0%	6	25%	1	14.3%
Count	**53**		**24**		**7**	

3.9.2 Reasons for Losses from Agriculture

Almost half (44%) of respondents said that wild animals were the biggest cause of losses in cultivation. The main wild animals mentioned were baboons, Vervet monkeys and wild pigs, followed by seed -eating birds. Although elephants and hippopotami cause some damage, their encroachment is seasonal and people have scaring methods that seem to work. Hippopotami can improve a rice crop by early encroachment. Their grazing increases tillering that can increase yield. Floods are the second most important reason for crop losses. However, floods are also the main reason for bumper crops, as some farmers demonstrated after El Nino in 1998/1999. Lack of floods is a major reason for losses. This phenomenon was observed in the 1999/2000 growing season.

Table 19: Reasons for Agricultural Losses

Reason for Loss	Number of Mentions by Interviewees	Percent of Interviewees
Bad Human health (Afya Mbaya ya Wakulima)	1	2%
Late in planting (Chelewa Kupanda)	1	2%
Leafhoppers (Gongo Panzi)	1	2%
The weather (Hali Ya Hewa)	7	13%
We don't know (Hatujui)	1	2%
Rice didn't set grain (Kutokuzaa Mpunga)	2	4%
Floods (Mafuriko)	12	23%
Plant diseases (Maradhi Ya Mimea)	3	6%
God (Mungu)	2	4%
Weak weeding (Upalizi Dhaifu)	1	2%
Wild animal damage (Wanyama Waharibifu)	22	42%
Count	53	

3.9.3 Reasons for Fishing Losses

The most common causes for losses from the fishing enterprise are rotting of the catch and rain which causes the catch to rot. These account for 38% of the responses. Lack of good preservation facilities and markets are related problems (Table 20).

Table 20: Reasons for Fishing Losses

Reason For Losses	Reason (English)	Number of Mentions	Percent of mentions
Oza	Rotting	5	21%
Mvua Oza	Rain causing rot	4	17%
Haba Samaki Nov hadi Jan	Shortage of fish from November to January	3	13%
Uvuvi Hafifu	Weak fishing methods	2	8%
Nyavu ku Haribika	Nets getting damaged	2	8%
Mwezi Mwanga Mno	Moon too bright	2	8%
Upepo Mkali	Strong winds	1	4%
Soko Ndogo	Small market	1	4%
Nyavu ku Potea	Nets getting lost	1	4%
Gawia Majirani	The custom of giving to neighbours	1	4%
Fukuzwa na Selous	Being chased out of Selous Game Reserve	1	4%
Barafu Kukosa	Having no ice	1	4%
	Observations	**24**	

3.9.4 Reasons for Palms /Weaving Losses

The most commonly mentioned reason for loss of potential income from sales of palms or woven products is the low price obtained.

Table 21: Reasons for Palms /Weaving Losses

Reason	Reason English	Number of Mentions
Bei Ndogo	Low price	4 (30.1%)
Mchwa Kula	White ant damage	1 (7.7%)
Moto Unaunguza Miaa Ukindu	Bush fires damage the Hyphenae and Phoenix palms	2 (15.4%)
Mvua Unaozesha	Rain rots the palms and the products	3 (23.1%)
Soko Ndogo	Small market	2 (15.4%)
Ususi Mbaya	Bad quality weaving	1 (7.7%)
	Observations	**13**

3.9.5 Reasons for losses in Chicken/livestock production

Wild animals, including snakes and predatory birds, which kill poultry are the major cause of losses. Diseases are also important causes of losses. See Table 22.

Table 22: Reasons for Chicken Production Losses

Reason	English	Number of Mentions	Percent of Mentions
Fensi Hamna	No fence	1	6.3%
Maradhi Udondo Newcastle	Diseases incl. Newcastle	5	31.3%
Wanyamapori Kuuwa	Kills by wild animals	10	62.5%
	Observations	16	

3.9.6 Reasons for Commerce Enterprise Losses

Since the number of interviewees engaged in commerce was low, it is difficult to draw conclusions from their stated reasons, which are given in Table 23.

Table 23: Reasons for Commerce enterprise Losses

Reason	Number of Mentions	Percent of Mentions
Fahamiana Na Ndugu (Knowing relatives)	1	16.7%
Mabaki Yana Haribika (Leftovers go rotten)	1	16.7%
Shindana Na Magari (Competing with cars)	1	16.7%
Usafiri Duni (Bad Travel and communication facilities)	1	16.7%
Wateja Wachache (Few customers)	2	33.3%
Observations	**6**	

3.9.7 Reasons for losses from Salt–making

Since the number of interviewees engaged in salt making was low, it is difficult to draw conclusions from their stated reasons, which are given in Table 24.

Table 24: Reasons for Salt-Making Losses

Reason	English	Number of Mentions	Percent of Mentions
Kisima kinatobowa na Ngowe	Salt well broken by small animal	2	28.57%
Ungua Na Moto	Burn salt in the boiling	1	14.29%
Ugongwa Wa Watu	Salt-maker's ill health	1	14.29%
Mvua	Rain	1	14.29%
Chumvi Inamwagika	Spillage of salt	1	14.29%
Bamvua Kuharibu	High Spring tides	1	14.29%
Count		**7**	

3.10 Food Supply, Security and Insecurity

3.10.1 Occurrence and Reasons for Food Shortages

Occurrences of food shortages were said to happen in 53 of the 54 households interviewed. Inadequate harvest is the most common reason given.

Table 25: Reasons for Food Shortages

Reason for Food shortage (English)	Reason for Food Shortage (Kiswahili)	Number of Mentions	Percent of Mentions
Sell food to pay for health services	Afya Huduma Kulipa	2	3.7%
Sell/give food to pay debts	Deni Kulipa	1	1.9%
Small area cultivated	Eneo Ndogo La Shamba	1	1.9%
Big family	Familia Kubwa	1	1.9%
Trading losses	Hasara Ktk Biashara	1	1.9%
Shop out of supplies	Imeishiwa Dukani	1	1.9%
Strong sun/drought	Jua Kali	1	1.9%
No Casual labouring jobs available	Kazi Ya Kibarua Hamna	1	1.9%
Floods	Mafuriko	3	5.6%
Payment for mangrove poles is delayed	Malipo kuchelewa kwa Boriti	1	1.9%
Rice diseases	Maradhi Ya Mpunga	1	1.9%
The harvest is not enough	Mavuno Hayatoshi	27	50.0%
Food is used for drumming celebrations	Ngoma Inatumia Chakula	1	1.9%
Depending on one type of food	Tegemea Aina Moja Ya Chakula	2	3.7%
Drought	Ukame	7	13.0%
Don't know	Hatujui	1	1.9%
Shortage of equipment	Vifaa Haba	1	1.9%
Wild animals	Wanyama Waharibifu	1	1.9%
Number of observations		**54**	

3.10.2 Coping strategies /short-term solutions to food shortages

What do people do in times of food shortage? They buy food (37% of respondents). If they do not have the money to buy food (20.4%), they harvest, hunt, fish or log more natural resources. Even the casual labouring mentioned by 11.1% of respondents is likely to be natural resource based e.g. cut mangrove poles. Thus, the community is reliant on Natural Resources not only for "enterprise" income and for normal building, fuelwood and medicinal plant needs, but also as a fallback, when normal agricultural harvests fail to supply their needs. Most years, almost every household has a

period of food shortage (suggesting that food shortages are the norm). It is therefore possible to conclude that almost every household uses forests, fisheries or wildlife as a source of cash income for food purchase. The sustenance of the natural resource base is vital for the maintenance of the villagers' lifestyles. Therefore, the villagers have a strong case to be the managers of their local resource base.

Table 26: Solutions to Food Shortages

Solution English	Utatuzi	Number of mentions	Percent of mentions
Do Casual Labour	Kibarua	6	11.1%
Eat something else	Kula Kitu Kingine	4	7.4%
Harvest, fish or hunt more natural resources	Maliasili Vuna Zaidi	11	20.4%
Beg help from relatives, neighbours or friends.	Ndugu Rafiki Jirani Ombamsaada	8	14.8%
Buy food	Nunua Chakula	20	37.0%
Other	Nyingine	3	5.6%
Beg government help	Serikali Omba Msaada	1	1.9%
	Unknown	1	1.9%
Count		**54**	

3.10.3 Yields of main food crop

The main food crop in all four villages is rice. The yields are very variable within villages and from season to season (Table 27). There are sometimes bumper crops, but there is a high risk of loss. The main causes of loss are mentioned in Table 19. With an average household size of 4.21, the average annual yield of rice per person is calculated as 203kgs. Assuming no post-harvest losses or sales, that provides 0.56 Kg's of rice per person per day. However, this is an unrealistic assessment of the availability of the staple food because sales and storage losses occur.

Table 27: Yields of rice in the previous year (1998/1999)

Village	Maximum Yield (Kgs)	Minimum (Kgs)	Average (Kgs)	Number of Households interviewed
Jaja	1,600	50	811	16
Mbunju - Mvuleni	1,500	200	534	11
Twasalie	5,000	100	1330	15
Mtanza Msona	2,500	16	758	12
Average yield			**858**	**54**

3.10.4 Uses of surplus income or harvests

Householders were asked what they do with a surplus, or the proceeds from a bumper harvest or fish catch. The most common response (38.9%) was "buy food" (Table 28).

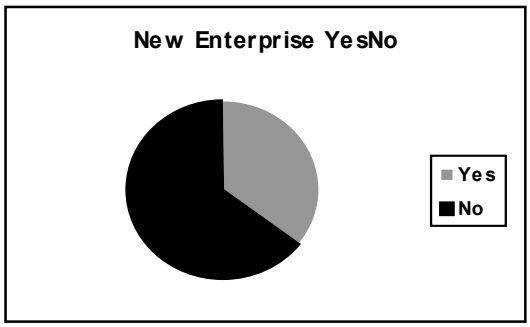
Table 28: Uses of Surplus

Use of Surplus	Uses of surplus	Number of Observations	% of Observations
Build or repair house	Nyumba Jenga Rekebisha	2	3.7%
Other	Nyingine	2	3.7%
Buy livestock	Mifugo Nunua	2	3.7%
Buy equipment, tools	Zana Pembejeo Nunua	3	5.6%
Buy household equipment	Vyombo Vya Nyumbani Nunua	3	5.6%
Sell and stash the money	Uza na Hifadhi Hela	8	14.8%
Buy clothes	Nguo Nunua	13	24.1%
Buy food	Chakula Nunua	21	38.9%
Count		**54**	

3.10.5 New Enterprises, Crops or Methods tried

Over thirty -five percent of respondent households had tried a new, method, crop or enterprise in the past five years.

Table 29: New Enterprise Whether or Not Tried



New enterprise tried	Number of households
Yes	19 (35.2%)
No	35 (64.8%)
Count	**54**

3.10.6 New Enterprises, Crops or Methods tried in the past five years.

Table 30 summarises the responses from the householders when asked if they had tried any new enterprises or methods in the past five years. The new types of enterprises are listed as to whether first or second new enterprise. Just over a third of households interviewed have tried some new enterprise, mainly with the aim of increasing cash income.

Table 30: New Enterprises Tried

Type Of Enterprise (English)	Type of enterprise	As a first new enterprise	As a second new enterprise	Total
Weave a new product/design	Ususi Wa Kitu Kipya	4	1	**5**
Plait hair	Nywele Usukaji	1	0	**1**
Transport people by bicycle	Baisekeli safirishaji	0	1	**1**
Make baskets from webbing from DSM port	Mabanzi Ya Bandarini	0	0	**0**
Grow bananas	Migomba Kuotesha	1	0	**1**
Sorghum tried variety "Serena"	Mtama Serena tesha	0	1	**1**
Produce chickens	Kuku Zalisha	1	0	**1**
Pottery	Finyanzi	1	0	**1**
Cashew tree growing	Korosho Panda	1	0	**1**
Tomato growing	Nyanya Bustani	3	0	**3**
Goat husbandry	Mbuzi Mifugo	1	0	**1**
Fix radios	Radio Tengeneza	1	0	**1**
Fish by tanda method	Uduvi Tanda	1	0	**1**
Dry fish with salt	Samaki kaushia kwa chumvi	1	0	**1**
Increase number of fishing nets	Nyavu Idadi Ongeza	1	0	**1**
New type of fishing	Uvuvi Aina Mpya	1	2	**3**

3.10.7 Reasons for not trying new enterprises

Households which had not tried new enterprises were asked "why not?'

'No expertise/knowledge' was the most commonly mentioned reason for not having tried new enterprises (Table 31).

Table 31: Reasons for Not Trying a New Enterprise

Reason for not having tried a new enterprise	Sababu ya kutokuwa na Mradi	Number of Mentions
No reason	Hakuna sababu	1 (2.9%)
No Ideas	Hamna Mawazo	6 (17.1%)
No expertise/knowledge	Hamna Ujuzi/Utalaamu	11 (31.4%)
No time	Hamna muda	2 (5.7%)
No market for products	Hamna soko kwa bidhaa	2 (5.7%)
No resources, money or equipment	Rasimali/Uwezo/pesa hamna	8 (22.9%)
We have enough ways to earn money already	Mbinu zilizopo zinatosha	1 (2.9%)
Old age	Mzee	1 (2.9%)
Just married & not settled yet	Ndoa mpya hatujakaa	2 (5.7%)
Enough problems already with the present enterprises	Shida nyingi tayari katika shughuli zetu	1 (2.9%)
	Count/Observations	35

3.10.8 New Enterprise Preferences

Households were asked, "If given an opportunity to learn a new skill or enterprise, what would you/your spouse/household like to learn?" This was a difficult question for some householders to answer, because they did not have ideas. The replies to this question are summarised in Table 32. Good agricultural practice is the most popular choice of skill, which householders want to learn. Related skills, like irrigation, tree growing, pest control, growing fruits and vegetables, chicken

keeping, were also mentioned. This shows that the people's main interest for learning is cultivation of a range of crops.

Table 32: Preferences for New Enterprises

Preferred enterprise/skill	Mradi Pendekeza	Number of Mentions
Commerce, trade, café	Biashara	3 (5.6%)
Improved salt-making	Chumvi Boresha Mradi	2 (3.7%)
Good Agricultural practices	Kilimo Bora	13 (24.1%)
Irrigation	Umwagiliaji	3 (5.6%)
Cashewnut shelling	Korosho Bangua	1 (1.9%)
Chicken-keeping	Kuku Fuga	4 (7.4%)
Crop protection against insects	Mazao Linda Dhidi Wadudu	1 (1.9%)
Grow fruits and vegetables	Mboga Na Matunda Kulima	4 (7.4%)
Plant trees	Miti Panda	1 (1.9%)
Beekeeping	Nyuki Fuga	2 (3.7%)
Repair nets	Nyavu Rekebisha	1 (1.9%)
Improved fishing	Samaki Uvuvi	7 (12.9%)
Handicrafts	Sanaa Za Mikono	2 (3.7%)
Carpentry	Selemala	4 (7.4%)
Sewing with a sewing machine	Shona Cherehani	1 (1.9%)
No time	Sina muda	1 (1.9%)
Too old	Hapana mzee mno	2 (3.7%)
Knitting	Fuma Knitting Crochet	1 (1.9%0
Car Mechanics	Gari Mekanika	1 (1.9%)
Count		**54**

3.11 Energy

3.11.1 Energy sources

Households were asked what energy source they usually use for cooking (Table 33). The majority use firewood. The most common cooking method is by three stones (mafiga matatu) or lumps of earth. Only one household had a supplementary method of cooking. It was a 'jiko la china' or a kerosene stove. There is interest in using stoves that reduce the fuel quantities required to cook a meal. Some villagers, without any assistance, have copied stoves that they saw during a study tour. A wider study of energy issues has been commissioned in Mbunju - Mvuleni village and the adjacent township of Ikwiriri[vi].

Box 6. Cooking Upstairs in a Stilt House

The "mafiga matatu" or "three-stone" method is used even upstairs in the 'dungu" (stilt house) where a mat, covered in sand or soil, is first placed on the slatted wooden floor of the dungu. The three stones are placed on the sand/soil and the fire is made between them. Amazingly, the wooden slats or poles are protected from the heat of the fire.

Table 33: Fuel Type Used for Cooking

Fuel type	Nishati pika	Number of households
Firewood	Kuni	50
Parts of the coconut tree, fronds, nut shells etc.	Nazi Makumbi Mabaki Yoyote	4
Count		**54**

3.11.2 Fuelwood Collection, Quantities, Time Taken and Species Preferred

For all fifty-four households in the four villages, the average time spent in fuel collection per day is less than one hour (0.7Hrs) (Table 34). This time includes travelling to and from the collection site. It totals approximately 255 hours per year, which is 33 working days (8 hour days) per year spent in fuel collection. This compares well with other parts of Tanzania and sub-Saharan Africa where women can spend 300 days per year in fuelwood collection. It shows that there is not a shortage of fuelwood at present.

The average number of head loads collected per week is 1.9. Multiplied by the number of households in the village, weekly village fuelwood consumption figures total 560.5 head loads, 953.8 head loads, 684 head loads and 864.5 head loads for Jaja, Twasalie, Mbunju - Mvuleni and Mtanza Msona respectively.

As to species preference for fuelwood, in Jaja five tree species are used, two of which, coconut and cashew, are planted.
In Twasalie ten species are used, three of which, coconut, cashew and mango are planted. Coconut wood is seldom used. It is mainly the husks and leaf sheaths of the coconut palm which are burnt. Use of fuelwood for salt boiling is not considered in these studies. It is probably a significant use of mangroves in these delta villages and needs to be quantified.

Six species were mentioned in Mbunju - Mvuleni, none of which are planted.
In Mtanza Msona, six species were also mentioned, none of which are planted. In Mtanza Msona and Mbunju - Mvuleni "any species" was mentioned, suggesting that there is a wide variety of species suitable for fuelwood.

Table 34: Quantity and Time Taken for Fuel Collection, by Village and Species

Location (Tree Species)	Daily fuel Time	Ave. No. of Head loads per week
Jaja (Mchu)	0.9	3
Jaja (Minazi Makumbi)	0.1	1
Jaja (Mkandaa)	0.8	7
Jaja (Mkorosho)	0.4	1
Jaja (Mvinje)	0.8	4
Mbunju - Mvuleni (Minepa)	0.4	1
Mbunju - Mvuleni (Mjembajemba)	1.1	1
Mbunju - Mvuleni (Mnyamwea)	0.9	1
Mbunju - Mvuleni (Mpangapanga)	0.1	1
Mbunju - Mvuleni (Mtondoo)	0.4	2
Mbunju - Mvuleni (Mtopetope)	0.3	1
Mbunju - Mvuleni (Yoyote)	0.4	4
Mtanza Msona (Kitutuma)	0.3	1
Mtanza Msona (Mkwala)	0.5	2
Mtanza Msona (Mnyenze)	0.6	1
Mtanza Msona (Msona)	0.9	6
Mtanza Msona (Mtama)	1.1	1
Mtanza Msona (Yoyote)	0.3	1
Twasalie (Mbura)	1.1	1
Twasalie (Mgama)	0.1	1
Twasalie (Minazi Makozi)	0.3	1
Twasalie (Mjembajemba)	0.9	1
Twasalie (Mkandaa)	0.9	2
Twasalie (Mkorosho)	0.1	1
Twasalie (Mkuruti)	0.9	3
Twasalie (Mpilipili)	2.2	2
Twasalie (Msiba)	1.1	2
Twasalie (Mwembe)	2.0	1
Overall Averages	**0.7**	**1.9**

3.12 Tree Care and Management

In order to find out people's levels of interest in tree care and management, householders were asked if they care for, manage or grow any trees. If so, they were asked their two main reasons for growing them. If not, they were asked their reasons for not growing/caring for trees. The results (Table 35) show that almost two thirds (69%) of households grow or tend trees which have either self-propagated or have been planted.

Table 35: Grow/Care for Trees

Grow Trees	Number of Households	Percent of Households
Yes	37	69%
No	17	31%
Count	**54**	

3.12.1 Reasons Why People Grow Trees

Two reasons for growing trees were given equal importance "commercial crop" and "fruit to eat"(Table 36).

Table 36: Reasons We Grow Trees

Reason	Number of mentions 1st reason.	Reason	Number of mentions 2nd reason.	Number of mentions overall	Percent of overall mentions
Kapa Hifadhi (protect the mangrove land)	1			1	**1.5%**
Kivuli (shade)	7	Kivuli	6	13	**19.1%**
		Kuni (fuelwood)	4	4	**5.9%**
		Maji Hifadhi (protect water sources)	1	1	**1.5%**
		Makuti (coconut fronds for thatching)	1	1	**1.5%**
Matunda Kula (Fruit to eat)	12	Matunda Kula (Fruit to eat)	11	23	**33.8%**
		Mitumbwi Chonga (for canoe carving)	1	1	**1.5%**
Mila (Customary habit)	1	Vinwaji Vikali (alcoholic drinks)	1	1	**1.5%**
Zao La Biashara Pesa (Commercial crop)	16	Zao La Biashara Pesa (Commercial crop)	7	23	**33.8%**
Count	**36**	**Count**	**32**	**68**	

3.12.2 Reasons Why People Do Not Grow Trees

A summary of the reasons why people do not grow trees is given in Table 37 below.

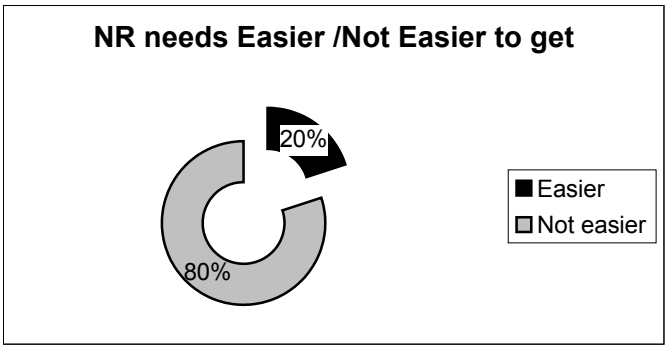
Table 37: Trees, Why People do not grow them

Reason	Number of Mentions
Afya Mbaya (bad health)	1
Kivuli Shambani (they bring shade to the fields)	1
Mafuriko Yanaondoa (floods rip them out)	2
Mawazo Hamna (no thoughts about it)	1
Miti Mingi Ipo Tu (there are lots of trees here)	3
Sehemu Ya Kupanda Hamna (have no place to plant them)	2
Sijui Kwa Nini (don't know why)	1
Tunaishi Sehemu Mbili (we live in two different places)	1
Utalaamu Mdogo (very little knowledge)	2
Wanyama Waharibifu (wild animals damage them)	3

3.13 People and their Natural Resources

This part of the study concerns indicators of the status of the natural resources and people's opinions and attitudes towards them.

3.13.1 Access to natural resource needs; easier or harder to get natural resource needs than ten years ago?



Out of the 54 households, eleven (20.4%) said that it was easier now than ten years ago to get their household needs of natural resources e.g. firewood, water, fish, building and thatching materials. Table 38 gives their reasons for saying so.

Table 38:Reasons why natural resources needs easier to get than ten years ago.

Reason	Number of Mentions
Bwawa na misitu ni karibu (lake/water and forests are near)	4
Hakuna magumu (no problem)	1
Hamna uhaba wa kuni au ukindu (no shortage of fuelwood or phoenix palms)	1
Mafuriko yanaleta samaki (the floods bring fish)	1
Miliki nzuri zaidi na kijiji (the village has better control)	1
Miti mingi ipo (There are lots of trees)	2
Nimehamia karibu na kapa/misitu (I moved nearer to the mangroves/forest)	2

3.13.2 Reasons why it is harder to get natural resource needs of the household

Approximately 80% of householders believe that it is more difficult to get their natural resource needs now than it was ten years ago. Their reasons for saying so are summarised in Table 39. Over-fishing and over-harvesting of forests are recognised directly and indirectly as the causes for households finding it more difficult to get their needs of natural resources. There is recognition that some of the natural resources are already depleted and that the number of people who are harvesting them has increased. Bad or inadequate management is also cited as a problem; therefore, some ordinary householders already see the need for better management.

Table 39: Reasons why household needs of natural resources are harder to get than ten years ago.

Reason	Number of Mentions	Percent of Mentions
Uvuvi (Fisheries problems include an increase in the number of people fishing, fish and prawn stocks have reduced, over-fishing, unmanaged fishing, fish nursery grounds damaged, trawlers damage /over fish, fish is expensive, different type of fishing, not enough fishing gear, Selous game reserve doesn't let us fish)	34	38.6%
Misitu, Kapa (Trees/Mangrove Forests problems including over-harvesting, unmanaged harvesting, bush fires, forests are further away, government stops us cutting, timber levies, increased number of firewood cutters, trees have died)	19	21.6%
Watu wengi mno (too many people/users)	10	11.4%
Maji Shida (Water problems including pump system has broken down, water in wells has salt and in lakes is dirty, fear of crocodiles)	8	9.1%
Ukindu/Miaa (Phoenix palm problems including damage by bush fires, too many cutters)	5	5.7%
Usimamizi mbaya uongozi (bad management and leadership)	6	6.8%
Maliasili haba zaidi (Natural Resources are less)	2	2.3%
Asali (Honey problem afraid of authorities)	1	1.1%
Mapato machache (low Income)	1	1.1%
Ufundi wakuvuna umeongezeka (greater knowledge on harvesting methods)	1	1.1%
Kilimo Kwenye kappa (agriculture in the mangroves)	1	1.1%
Count	**88**	

3.13.3 Opinions on the State of the Environment

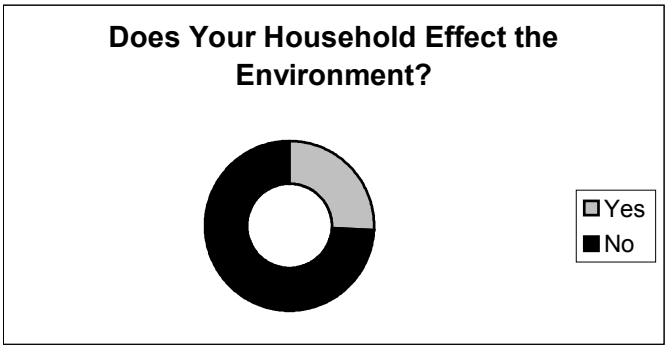
Most householders (43%+20% = 63%) interviewed think that the environment is either in a good or very good condition. This result seems to conflict with their contention that natural resources are more difficult to get than previously. However, if one compares most areas of Rufiji floodplain and delta with other parts of Tanzania one sees that there are still trees and water and a variety of wildlife which other areas do not have.

Table 40: Opinion of state of the environment

State (English)	State (Score out of 10)	Number of interviewees	Percent of Interviewees
Very bad	Mbaya Sana 0-1	7	13%
Bad	Mbaya 2-3	13	24%
Good	Nzuri Tu 4-6	23	43%
Very good	Nzuri Sana 7-10	11	20%
	Count	**54**	

3.13.4 Effect of the Household on the Environment

Fourteen households (26%) thought they were having an effect on the environment while 40 (74%) believed that they have no effect on it.



3.13.5 How the household affects the environment

Table 41 gives a list of the ways the 26% of householders think they impact on the environment. All but one, who mentioned the positive results of planting trees, thought their impacts were negative. The types of impacts they mention show some awareness of the need for consideration of the long-term supply of the resource when planning to harvest part of it.

Table 41:How the household affects the environment

Ways households affect the environment	Mazingira Badili Vipi	Number of mentions
Salt –Making uses a lot of firewood	Chumvi imepunguza miti ya kuni	1
Cutting Hyphenae Palm	Kata miaa	1
Cutting trees which are too young	Kata miti michanga zaidi	1
Cutting trees for timber	Kata miti ya mbao	1
Cutting phoenix palm	Kata ukindu	1
By harvesting our needs	Katika kuvuna mahitaji yetu	2
Exposing soil to the sun	Kufungua ardhi kwa jua Kata	1
Planting trees	Kupanda miti	1
Reducing soil organic matter/fertility by cultivating	Kupunguza rutuba kwa kilimo	3
By using natural resources	Kutumia maliasili	1
Wiping out *Afzelia quanzensis* trees	Malizia Mkongo	1
Too much fishing	Uvuvi mno	1

3.13.6 Changes People Would Like to See in Their Environment

The most common change mentioned was to improve agriculture including tree-growing, vegetable-growing and irrigated agriculture. The list of preferred changes covers a whole range of conflicts and potential conflicts between humans and their environment. The overall desire to get a

better income while managing the environment well is represented. This concurs with the objectives of REMP, the District and with National policies.

Table 42: Preferences for environmental change

Preferences	Mapendekezo	Number of Mentions
Leave it as it is	Acha yalivyo	1
Develop agriculture, fruit/nut tree/timber tree growing and livestock	Endeleza kilimo	13
Get more profit from fishing, salt-making, farming	Faida zaidi kutoka uvuvi, chumvi, kilimo	4
Teach people not to cut young trees/cut trees according to a plan	Fundisha wanakijiji kutokukata miti ovyo	2
It is not possible to change	Haiwezikani kubadilisha	2
Build good houses	Jenga nyumba nzuri	2
Permanent water supply	Kisima cha kudumu, bomba	3
Control, reduce numbers of wild animals	Kudhibiti wanyamapori	6
Cooperate in managing Natural Resources	Kushirikiana katika matumizi ya maliasili	6
Wildlife management area, have one	Hifadhi ya wanyama	1
Fix the roads	Lima tengeneza barabara	1
Protect the forests and fisheries	Linda misitu na uvuvi	6
Make trawlers fish far from the coast and reduce their numbers	Meli zisogezwe mbali	3
Get equipment and inputs for fishing, farming, irrigation	Pata pembejeo	5
Get better markets	Pata soko	2

4 Conclusions and Recommendations

Conclusions can be reliably drawn from the village level information, as every household using the village lands was included and great pains were taken to verify information. The household information is also considered reliable, with reasonably high consistency between interviewers. However, caution must be taken in making generalised conclusions regarding households since a very small sample of households (#54) from the total number (# 1612) was taken.

Most households are poor, on an annual income per capita basis. Only 9% of the sample of 54 households had a per capita income above 500,000 Tsh, the national poverty line. The statement "We are all poor here" was a frequent response to questions about wealth and poverty. Except for a small proportion, people are poor (91%). However, the levels of poverty are very diverse within the population. In addition, the levels of expenditure vary greatly. Even though incomes are low, 57.4 % of households had a small surplus of income over expenditure. Poverty in a situation where there is almost complete dependence on land and natural resources means that these resources are the first and main recourse during crises. The main recourse when short of food, or cash to buy it, is to harvest more natural resources. Thirty –seven percent said they buy food and 20% said they harvest natural resources to get the money to buy the food. Strategies which reduce poverty *per se* and which reduce dependence on natural resources are needed.

Incomes of those with primary education are more than three times higher than those without i.e. an average household income of Tsh. 1,740,363 for those households with Standard Seven level education compared to Tsh 506,317 for those without. This suggests that improved education could improve incomes by increasing the diversity of income-earning strategies. Improved educational levels would also make environmental awareness raising easier by widening the range of materials and methods that could be used to access the population.

Incomes of male-headed households are three times greater than female-headed households. Male-headed household incomes averaged Tsh. 1,392,524 compared to TShs.482,350 for female-headed households. Efforts to raise the economic as well as social status of women could have spin-offs in terms of overall poverty reduction. Deliberate efforts to give women equitable or even greater opportunities than men to benefit from project interventions, such as training, are justified. Raising the consciousness of men to the unequal economic position of women should also be a policy.

Incomes in the delta are higher than in the floodplain. The two delta villages had average household incomes of Tsh 1,471,524, while the floodplain villages averaged Tsh 631,995. Since it is generally considered that the delta is more remote than the floodplain, this finding seems to challenge the hypothesis that isolation from markets is a cause of poverty. It raises interesting questions about possible solutions to poverty, which may be answered by investigating further, why delta villagers have higher incomes than floodplain villages. Is it the wealth of the resource base e.g. that a mangrove ecosystem is far more productive than a floodplain? How important is human innovation? Is it because of greater dependence on particularly profitable enterprises such as shrimp fisheries in the delta?

Agriculture is the main occupation. Ninety-three percent of households engage in agriculture and 85.7% consider it their main occupation. The variability of harvests from household to household within one season should lead us to the conclusion that some farmers have skills that others do not. In addition, farmers have declared an interest in learning new and better farming techniques. It is clear that improved yields and profits from agriculture could take pressure away from forest, fisheries and wildlife resources.

Most households do not produce enough food to provide for all the household needs of food, clothing and service payments. Fifty percent of households say that the harvest is not enough to provide for their needs. Food shortages occur in the majority of households each year. All

households buy staple food at sometime during the year. The main expenditure item of over 90% of households is food. In times of surplus, food is the first "luxury" item purchased with the surplus. Improvements in food crop yield can be achieved by first understanding the complicated, opportunistic agricultural systems well and by facilitating farmers to make adaptations which improve the security of a harvest e.g. household-scale irrigation to extend the rice season, natural pest and disease control and others.

The respondents main concern is to improve their agricultural production. Over fifty percent of households mentioned an agricultural type skill or enterprise as their preferred choice of a new skill. Since the national agricultural extension system has little capacity, either in the short or long term, to reach Rufiji's villages it is suggested that villagers themselves be given adequate direct training to be able to pass on the new skills to their fellow villagers. In the long term the villagers who gain benefits from the new skills and methods learned may be able to pay the trainers (para-experts) in cash or in kind.

The main perceived cause of agricultural loss is wild animals forty – two percent of respondents blamed wild animals for their agricultural losses, while 62% blamed wild animals for poultry production losses. The most frequently mentioned problematic animals were baboons, Vervet monkeys and wild pigs. Community efforts need to be made to revive wild animal control measures that were effective in the past. Good records and clearer understanding of the numbers, movements and habits of the troublesome animals would help to build cases for permission for their reduction in numbers either by trading, or hunting them. If villagers received greater direct benefits from wild animals, they may have more reason to tolerate them than to exterminate them. For example, the present profit from illegal harvest of a hippopotamus is approximately Tshs.80,000/=, which is a tiny fraction of the legal value (over Tshs.1m) of its meat, skin and teeth. If a village could legally harvest just one hippopotamus per year and get the true value for it, it would be a very strong incentive to stop illegal harvest of hippopotami. Such direct benefits could achieve even greater income than some agricultural enterprises. At least two of the pilot villages are interested in developing Village Wildlife Management Areas. They should be encouraged to keep records of their wild animal populations in order to make a case for their future direct management.

Ninety-three percent of households depend on fuelwood for their energy needs. Unsustainable logging for timber is depleting the forest resource as a whole. Rufiji has become one of the main sources for fuelwood and charcoal for the households of Dar es Salaam. There is evidence that harvesting pressure on the forests around Ikwiriri township is threatening even the future local fuelwood energy needs. In order to maintain adequate fuel wood supplies in the future their consciousness regarding the depletion of the resource needs to be raised urgently. When the local communities decide that action is needed to protect their future energy supply, technical know how will also need to be supplied.

The majority of households (69%) plant or tend trees. This gives a head start for the promotion of sustainable forest management as well as the production of tree crops from the fallow areas of the floodplains.

The majority of the respondents think their environment is in good condition (63%) and that they do not impact (74%) on it. This finding shows that there is need to raise awareness that there is no room for complacency about the state of the environment. Individual households may not be having much negative impact on the environment, but proactive measures on a community level need to be promoted if the unsustainable logging and fishing activities are to be controlled.

4.1 Recommendations

The main question is "What interventions are most suitable in order to raise people's livelihood security while maintaining the integrity of their bio-rich environment?" The following

recommendations provide some ideas on the ways in which the floodplain and delta people could be supported to achieve these two aims simultaneously.

4.1.1 Improve Agricultural Production

The people's answer to the main question is: "*kilimo bora"* i.e. "improve agricultural production " They refer to diversity of production, quantity and quality of product as indicators of "improved" agriculture. "Everyone having enough food to eat" was mentioned in all four villages as an indicator of a good life. They have been receiving food aid, but they never depend on it. They look on it as a bonus having survived the crisis. It is usually too little and comes too late.

Management of baboons, Vervet monkeys, wild pigs and seed-eating birds and management of water would transform their agriculture. Past methods for scaring wild animals involved cooperative action. Because of disillusionment with cooperative organisation and general institutional weakness at village level, community cooperation systems including that for wild animal control have broken down. Encouragement of new institutions and investigation of suitable methods for field protection from wild animals and birds could make an appreciable difference to crop yields and labour demands.

Large-scale irrigation projects have been tried in Rufiji since colonial times. It is clear that large-scale investment in permanent irrigation structures is unwise in the floodplain and that there is inadequate capacity for management of such large schemes. However, it is also obvious that there is an imperative for investigating the most suitable small-scale irrigation methods for different sites and purposes throughout the floodplain and delta. There is keen interest in dry season production of vegetables and there are accessible markets available for these products.

The farmers have an almost totally "no input" agricultural system. We encountered no farmer who buys fertiliser in the period between September 1998 and May 2000. Flood alluvium supplies rich soil for cultivation. Some legumes are already found in the field system, but further soil enrichment methods could be tried with the aim of increasing yields, widening the range of crops and lengthening the period before fallowing.

Organic methods of pest and disease management could improve yields, without financial costs. Natural, local plant-based remedies would also increase appreciation of the value of the natural vegetation.

Exposure to good cultivation methods and new varieties and species of crops could stimulate increased production while providing further safety valves in times of staple shortages. Of interest for improved food security as well as commercial purposes would be the development of enterprises around the wild food sources such as wild greens, fruits, fungi and starches. This would increase awareness of the values of these "free" foods and would form an incentive for better care of the woodlands, forests and thickets where they grow.

4.1.2 Forests and trees

Good forest management could provide all the spin-off benefits of sustainable supply of wild fruits, medicines, meat, fuel, bee products, building poles, timber and other items that are presently taken for granted. One of the major limitations to good forest management is the feeling by communities that the forests are not theirs and that they are under the supervision of a remote power (the District Council or the Central Government). As with the wild animals, the villagers gain very little from the resource and have no incentive to control the harvest. If their right to manage the resource is established and they can gain direct benefits from it then they will have a very strong incentive to use it wisely. Present policy and the emerging Forest Bill provide for community and private management of forests. In Tanzania, almost 600 forests are already under community or joint community/government management. There are examples being developed in Rufiji, at Mbwara and Nambunju, which need stronger support from the local authority. Further village forest

reserves, village forest management areas and joint (Village and Forest and Beekeeping division) forest management areas can be created in the REMP pilot villages as models for copying throughout the district. Both villagers and senior district staff need information on the new policies and emerging law and how to implement strategies towards community-based forest management.

In contrast to many other parts of Tanzania, Rufiji has missed the intensive national efforts of the mid 1980's to early 1990's to promote private tree growing. Therefore, most farmers, although they grow or retain trees, have not learnt technical skills in tree propagation or management. Tree crops, by managing regenerating trees in existing forests and woodlands and by planting more productive introduced species in floodplain fallows, could improve livelihood security by providing cash income. The new plantings could reduce pressure on the existing forests while native (some threatened) species in the existing forests could be actively supported to return to commercial status.

In present law, a farmer must request permission from the local forest officer to cut trees on his/her own farm, even if s/he has planted them herself. This has been a particular disincentive to planting native species. It is hoped also that the new Forest Bill will establish a tree-planter's right to the trees s/he has planted.

4.1.3 Fisheries Management

There are signs that villages commanded some rights over lake fisheries in the past and had developed arrangements for closing fisheries for specific periods. There are now signs that over-fishing is a problem. An example is that youths risk their equipment and lives to go fishing within the Selous Game Reserve because the lake fisheries east of the reserve e.g. in Mtanza Msona are completely "fished-out" each year. The small sizes of fish in trade are also an indicator of over-fishing. Training on sustainable fisheries has raised awareness about the use of illegal fishing methods, particularly the small net size, but fishers find it difficult to admit that they are offending and will need alternative income opportunities if they are to change their habits. Much more research needs to be done regarding fish species and their replenishment potential before villagers can be advised on better fisheries management. Simple initial steps such as enforcement of national laws that forbid cultivation or other methods of vegetation removal near water bodies could be encouraged immediately.

A holistic approach which considers all the village's land and natural resources, studies their present uses and plans for their future careful management is advocated. Villagers see the land, the forests, the lakes, the rivers and trees as an integrated supply of their needs. They can be facilitated to plan their use or conservation in an integrated fashion. As facilitators coming from and dealing with many sectors (lands, agriculture, fisheries, forests, beekeeping, wildlife) we should be careful not to sectoralise their plans.

4.1.4 Educational level improvements

This study shows that those households who have gained a Standard Seven education earn more than those who have not. The population of Rufiji is known to have lower educational standards than most other parts of Tanzania. Non-attendance of both teachers and children was noted throughout these visits to the villages. Teachers do not want to live permanently in the delta or other remote floodplain areas. Children have difficulty travelling to schools far from their parents' fields. The proliferation of children along the banks of the Rufiji River during school hours and the fact that it is not possible to site schools in the floodplain, should cause planners thoughts to be directed towards aquatically mobile and distance education methods. The curriculum could be focussed on agricultural, wildlife and environmental management issues which are of much interest to the villagers. There is a hunger for new ideas which villagers have demonstrated while developing their village environment management plans[vii]. This 'hunger' should be responded to.

5 Appendicies

Appendix 1: Checklist for fieldwork

Village Name:
Name of Village Chairman and Executive (Mwenye Kiti Mtendaji)
Location of village:
Lat.: Long.:
Distance from Utete:
Time to get there from Utete:

Issue	How to get the information
B. Representative of its Zone	
1.Size- Area	Ask at village office
	Do a social map
	Do a transect walk
2.Population	Ask at village office
	Do a social map with sub-village leaders
3. Natural Resource wealth and use/pressure	Revenue figures –proportions from fisheries, forest products (timber and non-timber) etc
	Direct observation during transect walk
	Natural resource maps with women and men separately. Site the resources and their uses e.g. water and where it is collected for domestic use, where people fish etc.
4.Economic activities	Ask at village office for numbers of people involved in each occupation
	Ask at least four people (two women, two men) to individually score the occupations for economic importance.
5.Uniformity of ethnicity	Ask at least four individuals (two women, two men) what is the tribal mix and if the tribes live well together.
	Ask at village office
6. Uniformity of religion	During social mapping observe presence of mosques and churches
	Ask at least four individuals (two women, two men) what religions are present and whether they live in harmony.
7.Social organisation at household level	Ask sub-village leaders during social mapping, what constitutes a kaya
	During transect walk make observations of who is present in at least five kayas
8. Wealth /Poverty of village	Number of bicycle licenses issued by village
	During social mapping, ask who is wealthy and where in the village they live. Ask if the village is better or worse off than the surrounding villages.
9. Service delivery	Social map- sites of services
	Direct observation- is there a school? Is it operating? Are there many children not at school?
	Ask at least four individuals (2 women, 2 men) where they get their water, health care and education
C. Coherence of the community	
1. Physical closeness	Social map-get some rough distances, or a rough scale on the map.

	Take GPS readings in each extremity of the village.
2. Evidence of trust in the leadership	Payment of taxes and development levy- see records at village office.
	Ask at least four (two women, two men) what collective tasks have been done in the village in the past five years. Ask if those tasks were successfully completed and why?
	Ask the leaders how they view their own performance/capacity (Do you think you are good leaders?)
	What do we the team think of the capacity of the leaders we have met?
3. Organisations (are there NGO's for social or environment purposes?)	Venn/leaf/stone diagram representing each organisation and their importance. Do separately with a group of women and men.
4. Migratory habits	School attendance according to seasons Ask at least four people where do people go to get their income throughout the year. Other means? / Occupancy of houses depending on seasons, nature of housing.
5.Conflicts and solidarity	Look for signs of conflict during discussions at all levels
	Look for signs of solidarity e.g. helping each other at times of harvest, shortage, flooding, level of and regularity of community activities.
6.Women's freedom, participation and confidence.	Observe whether women are seen in public places. Ask about women's associations for business, sport or cultural activities. Ask about women's participation in village decision-making. Ask women and men separately about gender division in control of household assets and income.
D. Signs of enthusiasm and initiatives	
1.Environment management measures at any level (household, ten-cell, sub-village, village)	During Transect walk look for natural forest management measures, tree-planting, permanent plants in fields, tree-coppicing, pollarding, patterns of fallow, mulching or other fertility or conservation measures.
2. Environment destruction	During transect walk. Removal of forest, charcoaling, small fish, few fish. Use direct observation and ask people how the environment was before.
3. Expression of worries about the environment.	Complaints to village government.- ask to see minutes of meetings and letters of complaint about over-use of natural resources e.g. timber removal, charcoaling, fishing
	Ask the village leaders and at least four individuals if the government sells licenses to people for natural resource use. How many per year?
	Does the village have any byelaws regarding the environment? Which ones does it enforce? Have they made any new byelaws recently?
	Court records re: cases and fines for illegal use of natural resources.
4.Initiatives for development	Transect walk- observe any private or group activities

	and make enquiries.
5.Attitudes to outsiders and government	Opinion of the team regarding, enthusiasm, dependence or independence, suspiciousness, fatalism
	Social map. Any new buildings or enterprises ?
E. Accessibility	
1.Physical accessibility	Take mileage reading
2.Psychological (see D above)	Note road conditions and ask if the road is passable in the wet season. Note possible mooring points for a twenty-foot boat and access by car and trailer to these points. Also note security for a boat.
	Measure time taken to get there from Utete.
	Note mode of transport used. Consider travel within the village and how best to access the whole village.
F.Capacity	
1. Standard of village management	Direct observation –opinion of RRA team
	Satisfaction of villagers with their leadership(See C.2)
2. Number and demands of other development projects	Ask government what other projects they have or are planning and how much time and labour they involve
	Ask at least four villagers the same question
G Biodiversity	
	Transect walk- note any areas that look very unspoilt and diverse in species.
	Resource map

Appendix 2: Fieldwork for pilot village selection

It was decided that one and a half days, including one night sleeping there, would be spent per village.

Timetable at each village with suggested methodologies

Day 1	
1.a. Introduce ourselves to the Village Chairman and Village Executive Officer	Suggested Introductory explanation: Tumetoka wilayani. Wilaya imepata mradi wa usimamizi mzuri wa mazingira. Mradi unaitwa MUMARU/REMP. Madhumuni yake ni kuwashauri wananchi na Halmashauri katika ngazi zote kuhusu matumizi bora na udhibiti bora wa mazingira. Mradi unapenda hasa kufanya kazi katika bonde la Rufiji kwenye tambarare ya mafuriko na visiwani (delta). Haiwezikani lakini kuanza katika vijiji hamsini na viwili vyote vya eneo hilo mara moja. Kwa hio lazima kuchagua vijiji vichache vya kuanzia. Vigezo vya Timu ya Mazingira ya Wilaya ni vingi kama vifuatavyo; A.Ikologia, B.Uakilishi wa kanda yake (kwa ukubwa, makazi,uchumi, dini, kabila,jamii, huduma n.k.) , C. Umoja wa jamii, uongozi, tabia za kuhama, D.Hali na matumizi ya mazingira, E. Ufikiki , F. Uwezo, na miradi mingine mabalimbali.
1.b. Logistics	Kueleza kwamba tunapenda kulala na kufanya mpango wa chakula, malazi. Kueleza ratiba yetu na kuomba kukutana na wanawake wakilishi wa vitongoji vyote na viongozi wa vitongoji kwa kesho muda wa kuwafaa wao.
2.a. Collect statistics from the village office	Verification of data already collected at district level. Collection of new information as per the checklist.
2.b. Take a G.P.S Reading	Take a G.P.S. reading in the most central part of the village, for example at the school, village office.
3.a. Natural resource mapping	Ramani ya maliasili na matumizi yake. It is important that both women and men do this exercise preferably in separate groups.
4.a. Transect walk	Following the mapping exercise it is useful to choose a transect across as many ecological / agro-ecological zones as possible and if possible the whole length or breadth of the village. See the checklist for items to note during the walk that should be done with a small number of men and women who know the village well.
5.a. Check the checklist/tidy notes	Read the checklist together and see what has been achieved and what is outstanding.
6.a. Rest/relaxation	Food, organising tents, sleeping accommodation etc.
Day 2	
1.a. Walk to fields, forests, and lakes and meet the people.	It is good to split the appraisal team so that they can meet a wider range of people and ask the outstanding questions or further opinions on the same questions as the previous day.
1.b. Venn Diagrams about village organisation	Venn diagramming can be used with individuals or groups to learn about the way the village is organised and what NGOs, religious other bodies have power in the village. This can lead into discussions about leadership quality and the unity or conflicts occurring between the power groups.
1.b.1	This is very useful for learning about the major events in the village over

Historical time line	the lifetime of an older person or persons. It is particularly helpful for learning about floods and droughts and how people coped with them.
1.c School visit	School attendance can be an indicator of seasonal migration, the health of the children an indicator of wealth, nutritional status of the whole village and other issues. Teachers are often from outside and have a particular perspective on a village. They also have a role in environment education and their willingness and past efforts in relation to the environment should be noted.
2.a. Meet women representatives of sub-villages and sub-village leaders.	Do the introduction of the purpose of the visit again. Do a social map (see checklist for the issues a social map can cover)
3.a. Review checklist	Review checklist again and complete undone items.
4.a. Say “thank you” and “goodbye”	Do not forget to mention that we will send a report of our visit and that we will write a note to the village chair and executive as to whether or not we have selected the village. Leave the flipchart copies of the maps behind and only take a copy transferred onto A4 paper.

Appendix 3: Form used in combination with social mapping to gather detailed HH information.

MUMARU/REMP *Draft* Fomu; SENR1

Orodha ya Kaya[2] ya Kijiji cha Mtanza Msona, Mbunju - Mvuleni, Twasalie, Jaja [3]

1Jina la Kitongoji:……..

2.Jina la Mtaa: ……

3.Namba	3.Jina la kaya	4.Jinsia la "mkuu wa kaya"[4]	5.Idadi ya weneji wa kaya/? wanakaya[5]	6.Idadi ya weneji wa kaya/? wanakaya wazima ?wenye uwezo ??	7.Shughuli Kuu za kaya[6]					
					Uvuvi	Kilimo	Misitu[7]	Majani	Chumvi	Nyinginе[8]
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
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23										
24										
25										
26										
27										
28										
29										

[2] Watu wanaokula kwa pamoja.

[3] Circle the appropriate village name

[4] Put the gender of the adult/parent who is living (sleeping and eating)there every day

[5] Weka idadi ya watu waliolala leo usiku au waliokula kila siku kwa wiki iliopita

[6] Tick as few options as possible to a maximum of four.

[7] Woody materials (mbao, magogo, boriti,fito,mkaa ……..tu)

[8] Weka M for Mifugo, F for Mfinyanzi; BS for biashara ya Samaki;BP for Biashara ya Prawns (kamba n.k) ;BK for biashara ya Nafaka;BN for biashara ya Nazi;BK for Biashara ya Korosho;BB for Biashara ya Boriti; B D for Biashara ya Duka; S for useremala: T for mshonaji (tailor); C for ufundi baisekeli (cycle).

Appendix 4: Household Profile Form SENR 2 Draft

Sababu ya kukuhoji ni kuelewa uchumi wa kaya katika kijiji hiki. Kaya yako ilichaguliwa kwa mafano tu. Taarifa unayotoa zitakuwa siri. Takwimu hizi zitasaidia kutafuta njia mbadala zakujaribisha kuinua uchumi wa kijiji pamoja na kuboresha usimamizi wa mazingira.

Kijiji; **0.1 Kitongoji;** **0.2Mtaa;**

Date Enumerators' Initials

1.Confirmation of previously obtained information about the household

***Confirm the following information*:** (*Check against the data which you have noted from the relevant SENR1 Form)*

1.1 Kaya Number, REMP Identification Number. ☐

1.2 Jinsia ya mkuu ya kaya/Gender of HH ; ☐

1.3 Idadi ya wanakaya /Total number of occupants; ☐

1.4 Idadi ya wenye uwezo/Number of able-bodied occupants; ☐

2.Highest Educational level/Kiwango kikuu cha elimu.

2.1 Katika kaya hii kiwango kikuu cha elimu ni nini? *Tick one box* **only**

Chini ya Darasa la saba,
Darasa la saba,
Form 4,
Form 6,
Zaidi ya Form 6

3. Household Expenditure/Matumizi ya kaya

3.1 *Ask, "What are the main outgoings of the household?" and do the bean exercise to get proportional expenditure on the four/five main items of expenditure. Enter the number of beans in the column below. Enter the name of the biggest expenditure item in box* **"3.1 Biggest Expenditure"**.

3.2 *Ask* "Approximately how much does your household spend/use/consume each year in cash or in kind on each of the following items?" *Calculate the total expenditure and enter it in the* ***box "3.2 Total Annual Household Expenditure".***

Types of Expenditure	Number of beans.	Annual Expenditure in Tsh
Food		
Health		
Education (school fees, books,)		
Clothes		
Tools, equipment, fishing, farming, marketing gear, seeds, chemicals, fertilisers		
Development levies, taxes, cess licence fees		
Fuel for cooking/lighting (kerosene, fuelwood, charcoal)		
Contributions to funerals, weddings and other cultural/traditional events.		
Water		
House building & repair		
Savings		
Other expenditure. What?		
3.1Biggest Expenditure Item		
3.2 Total Household Expenditure		

4.Household economic activity ranking

Tafadhali utaje shughuli kuu nne (4) zinazochangia katika maisha ya kaya hii.

4.2 Shughuli ipi ni muhimu kuliko zote? Ipi inayofuata? …inayofuata? Inayo fuata? Weka *majibu katika column inayoitwa* "Rank". *Jaza moja (1) mbele ya shughuli kuu ya kwanza*, *mbili (2) mbele ya shughuli kuu ya pili, tatu (3) mbele ya shughuli kuu ya tatu, na nne (4) mbele ya shughuli kuu ya nne.*

4.3 Approximately what proportions of your income come from each of the activities? (*Use the 50 beans to get the relative proportions) Jaza asilimia inayotoka shughuli kuu ya kwanza katika box "***4.3 Asilimia kutoka shughuli kuu 1"**

	Rank (4.2.1 to 4.2.4)	Number of beans	Proportion of income %
Kilimo			
Uvuvi			
Misitu			
Ukindu, milala, au majani mengine.			
Chumvi			
Kuku, ufugaji			
4.3 Asilimia kutoka shughuli kuu ya kwanza (% from the number 1 activity)			

5.Shughuli kuu nne za kiuchumi. Mapato kutoka shughuli mojamoja.
5.1 Kilimo
Kwa kila zao ufuate column zote na ufanye hesabu kama inavyoelezwa.

Zao	**Mavuno ya kaya kwa msimu (kgs au kiloba au…)**	**(A) Mavuno ya kaya kwa mwaka (kgs au kiloba au…)**	**Amount consumed /yr (kgs au kiloba au…)**	**(B) Price/kg Tsh.**	**(C) = (AxB) Total value Tsh.**	**(D) Costs (labour, seeds, land rent, sacks, fert. , other) Tsh.**	**E=(C-D) Net value of production Tsh.**
Mpunga							
Mahindi							
Muhogo							
Maboga							
Kunde							
Choroko							
Mbazi							
Zao lingine aina ya mikunde							
Nazi							
Korosho							
Ufuta							
Matunda							
Miwa							
Mboga za majani.							
Zao ningine							
5.1 Total Net Annual value of production (Thamani ya mavuno baada ya kutoa gharama, mazao yote.) *Jumlisha E zote*							

5.1.1 Kiasi gani ya zao kuu (mpunga au mahindi au muhogo) yako inaapotea kila mwaka?
Tick one box only

Chini ya robo	*Robo hadi nusu*	*Zaidi ya nusu*

5.1.2 Nini sababu kuu ya kupoteza mavuno?

5.1.3 Nini haswa ingeongeza faidha kutoka kilimo?

5.2 Uvuvi au Utandaji
Kwa kila zao upite column hadi column na kuhesabu kama inavyoelezwa.

Aina ya samaki	Average daily catch (Tenga / kg.)	No of fishing days per month	No of fishing days per year	(A)Total catch per year	Amount consumed per year. Kgs.	(B) Price per tenga/kg/ unit (fresh or processed)	(C = A x B) Total annual value of the product.	(D)Costs per year. (labour, gear,)	(E =C-D)Net value of production
Finfish									
Prawns									
Other									

(crab, lobster, squid, octopus)									
5.2 Total Net Annual Value. Jumla ya thamani ya aina zote kwa mwaka baada ya kutoa gharama. *Jumlisha E zote.*									

5.2.1 Kiasi gani cha mavuno yanaotarajiwa yanapotea kila mwaka?
Tick one box only

Chini ya robo	Robo hadi nusu	Zaidi ya nusu

Nini sababu kuu ya upotevu na upunguvu wa mavuno ?

5.2.3 Nini haswa ingeongeza faidha kutoka uvuvi ?

5.3 Mvuvi aliyeajiriwa (Fisher employed)
Ufuate column zote na kuhesabu kama inavyoelezwa

Number of fishing trips per week (A)	(B) Payment per fishing trip Tsh value	(c) = (AxB) Total value per week. Tsh.	(D) Number of weeks fishing per year.	(E) = (CxD) Total income per year
5.3 Total Income per year. Mapato yote kwa mwaka				

5.3.1 Nini haswa ingeongeza faida kwa mvuvi aliyeajiriwa?

5.4 Biashara ya samaki na prawns
Ufuate column zote na kuhesabu kama inavyoelezwa

Aina ya samaki	(A1)Ave. daily purchase (Tenga / kg, au ……)	No of buying days per month	(A2)No of buying days per year	(A)=(A1xA 2)Total amount of fish traded per year (kgs au tenga au rwambo...)	(B) Average difference between buying Price and selling price per tenga/kg	(C) = (AxB) Total annual value of trading	(D) Costs per year. (labour, transport, procesing, packing,)	(E) = (C-D) Net annual value of trading
Finfish								
Prawns								
Other kaa, kamba koche, ngisi, pweza								
5.4 Total Net Annual Value of trading. Jumla ya mapato yote ya mwaka baada ya kutoa gharama zote. *Jumlisha E zote*								

5.4.1 Kiasi gani ya thamani kina potea kila mwaka?
Tick one box only

Chini ya robo	Robo hadi nusu	Zaidi ya nusu

5.4.2 Sababu kuu ya kupoteza faida katika biashara ya samaki ni nini?

5.4.3 Nini haswa ingeongeza faida kutoka biashara ya samaki ?

5.5 Primary Harvester of Wood products (mkata boriti, mpasulsihaji wa mbao, mkata fito au kongowele, kuni, ……..) ***Ufuate column zote na kuhesabu kama inavyoelezwa***

Aina ya zao	**Kiasi gani kinavunwa wa kaya yako kwa msimu (unit plank, head load, korija(score) , gogo, au..**	**(A) Total Amount harvested by the household per year**	**Amount used for home consumption.**	**(B) Bei kwa unit**	**(C = AxB)Total annual value of the product**	**(D)Costs per year**	**(E= C-D)Net annual value of the production**
Mbao za mninga, mkongo, mvule ….							
Mpingo, vipande, magogo							
Magogo ya ……..							
Boriti							
Kuni							
Fito							
Mkaa							
5.5 Total Net Annual Value of production. Jumla ya mapato yote ya mwaka baada ya kutoa gharama zote. *Jumlisha E zote*							

5.5.1 Kiasi gani cha thamani inapotea kila mwaka ?
Tick one box only

Chini ya robo	Robo hadi nusu	Zaidi ya nusu

5.5.2 Sababu kuu ya kupoteza faida katika shughuli za msitu ni nini?

5.5.3 Nini haswa ingeongeza faidha kutoka shughuli za misitu ?

5.6 Non-timber forest products. Mazao ya porini/msituni yasiyo ya mbao.
Ufuate column zote na kuhesabu kama inavyoelezwa

Aina ya zao. Type of product.	**Kiasi gani kinavunwa na kaya yako kwa msimu (unit head load, fungu, gunia)**	**(A)Jumla ya mavuno kwa kaya hii kwa mwaka.**	**Amount used for home consumption.**	**(B)Price per unit Bei kwa unit**	**(C = AxB) Thamani kwa kaya kwa mwaka.**	**(D) Gharama jumla kwa mwaka.**	**(E= C-D)Net annual value of the production**
Miaa/ milala							
Ukindu							
Umondo mwingine							
Madawa							
Magamba							
Gundi							
Miche							
Matunda e.g. fulu							
5.6 Total Net Annual Value of production. Jumla ya mapato yote ya mwaka baada ya kutoa gharama zote. *Jumlisha E zote*							

5.6.1 Kiasi gani ya thamani kina potea kila mwaka ?
Tick one box only

Chini ya robo	**Robo hadi nusu**	**Zaidi ya nusu**

5.6.2 Sababu kuu ya kupoteza faida katika biashara ya mazao ya porini ni nini?

5.6.3 Nini haswa ingeongeza faidha kutoka biashara ya mazao ya porini ?

5.7Chumvi, Mtengenezaji Salt- maker

Kiasi gani kinavunwa wa kaya yako kwa msimu (pishi, viloba)	**(A)Total Mavuno kwa kaya kwa mwaka (pishi, viloba)**	**Amount used for home consumption. Kiasi kinacho tumikwa nyumbani.**	**(B)Price per unit Bei kwa gunia**	**(C = AxB)Total annual value of the product. Jumla ya thamani kwa mwaka**	**(D)Costs per year**	**(E= C-D)Net annual value of the production**
5.7 Total Net Annual Value of production. Jumla ya mapato yote ya mwaka baada ya kutoa gharama zote. *Jumlisha E zote*						

5.7.1 Kiasi gani ya thamani kina potea kila mwaka ?

Tick one box only

Chini ya robo	**Robo hadi nusu**	**Zaidi ya nusu**

5.7.2 Sababu kuu ya kupoteza faida katika mradi wa chumvi ni nini?

5.7.3 Nini haswa ingeongeza faidha kutoka mradi wa chumvi ?

5.8 Mifugo

Ufuate column zote na kuhesabu kama inavyoelezwa

Type of livestock product Aina ya zao ya mifugo.	**Household yield of product per week/month/season**	**(A) Household Yield per year**	**Amount used for household consumption**	**(B) Price per unit (whole chicken for , egg, kg of meat, litre of milk)**	**(C) =AxB)Total value of annual production**	**(D) Annual costs of production**	**(E = C-D) Net value of annual production.**
Chicken for egg production or for fattening							
Chicken for meat							
Chicken eggs							
Goat meat							
Cattle meat							
Milk							
Other							
5.8 Total Net Annual Value of production. Jumla ya mapato yote ya mwaka baada ya kutoa gharama zote. *Jumlisha E zote*							

5.8.1 Kiasi gani ya thamani kina potea kila mwaka ?

Tick one box only

Chini ya robo	Robo hadi nusu	Zaidi ya nusu

5.8.2 Sababu kuu ya kupoteza faida katika mradi wa mifugo ni nini?

5.8.3 Nini haswa ingeongeza faidha kutoka mradi wa mifugo ?

5.9 Shughuli nyingine ya uchumi

Kiasi gani kinavunwawa kaya yako kwa msimu	**(A) Total Amount harvested by the household per year**	**Amount used for home consumption.**	**(B) Price per unit Bei kwa unit**	**(C = AxB) Total annual value of the product**	**(D) Costs per year**	**(E= C-D)Net annual value of the production**
5.9Total Net Annual Value of production. Jumla ya mapato yote ya mwaka baada ya kutoa gharama zote. *Jumlisha E zote*						

5.9.1 Kiasi gani ya thamani kina potea kila mwaka?

Tick one box only

Chini ya robo	Robo hadi nusu	Zaidi ya nusu

5.9.2 Sababu kuu ya kupoteza faida katika mradi wa ……..?

5.9.3 Nini haswa ingeongeza faidha kutoka mradi wa ……..…….. ?

5.10 Shughuli Nyingine……

Kiasi gani kinavunwawa kaya yako kwa msimu	**(A) Total Amount harvested by the household per year**	**Amount used for home consumption.**	**(B) Price per unit Bei kwa unit**	**(C = AxB)Total annual value of the product**	**(D) Costs per year**	**(E= C-D) Net annual value of the production**
5.10 Total Net Annual Value of production. Jumla ya mapato yote ya mwaka baada ya kutoa gharama zote. *Jumlisha E zote*						

5.10.1 Kiasi gani ya thamani kinapotea kila mwaka?

Tick one box only

Chini ya robo	Robo hadi nusu	Zaidi ya nusu

5.10.2 Sababu kuu ya kupoteza faida katika mradi wa…….?

5.10.3 Nini haswa ingeongeza faidha kutoka mradi wa……?

6.Savings/Insurance

6.1 Kaya ikiwa na mapato/mavuno ya ziada yanatumika hasa kwa vipi? When you have a surplus what is your main use of it ? *Tick only one box. Enter other option if appropriate.*

Sell it and save the money	
Buy livestock e.g. chickens, goats, cattle	
Do house repairs/build	
Buy tools, fishing gear equipment	
Buy household goods	
Buy clothes	
Buy food	
Buy a canoe	
Other . What ?	

7. Food Security/ Uhakika wa chakula

7. Je, kaya hii inakuwa na uhaba wa chakula kikuu wakati fulani ? Ndiyo ……. Hapana ……
(If "No" skip to Question 8 Kama Hapana ruka hadi Swali 8.)

7.1 Kama Ndiyo, sababu kuu ya kuwa na uhaba wa chakula kikuu ni nini ?

7.2 Kama Ndiyo mnafanya nini haswa ? (If yes, what is the main coping strategy? *Tick on option only*

Buy food Nunua chakula	
Eat an alternative food… what ? List them opposite. Kula kitu kingine	
Beg assistance from relatives, friends or neighbours. Omba msaada wa ndugu, rafiki, jirani	
Beg assistance from government. Omba serikali	
Other . what ? Ningine. Nini?	

8. Alternative Enterprises/ Miradi au mbinu mbadala

8.1 Je, katika miaka mitano iliopita, kaya hii imejaribu mbinu zozote mpya za kuotesha mazao, kuvua samaki, kutumia miti na mazao ya misitu, za kutengeneza sanaa za mikono ? Has your household tried any new crops, ways of growing crops, fishing methods, wood product use, handicraft ideas ,or other project during the past five years ? Ndiyo……. Hapana…….

8.1.1 Kama ndiyo, nini ?

8.1.2 Na nini ?

8.2 Kama hapana, sababu kuu ni nini ?
Enter one item only
8.3 Unge kuwa na fursa ya kujifunza kuhusu shughuli/mbinu/mradi fulani ungechagua kujifunza nini? *Enter one item only.*

9.0 Household Energy Needs/ Mahitaji ya nishati ya kaya

9.1 Kwa kupikia kaya hii inatumia haswa nishati gani ? What **main fuel** is used for cooking ?
Tick one box only

Firewood	
Charcoal	
Coconut husks/ shells	
Other crop remains Eleza……..	
Other materials. Eleza……	

9.2 Ni aina gani ya jiko kaya hii inatumia kwa kawaida? What kind of stove is usually used? *Select/enter one option only.*

Mafiga matatu	
Other –what?	

9.3 Aina kuu ya mti unaotumika kwa kupikia ni nini ?(*Enter in the box below)*

Tree species/local name / kiswahili/ scientific name

9.4 Kaya inatumia kiasi gani cha nishati (fuel) kila wiki ? ……Head loads /Bags

9.5 Inachukua muda gani kukusanya (kwenda, kukusanya na kurudi nyumbani) fungu moja ya kuni au nishati nyingine ?……. Hours(masaa)……Minutes (dakika)

9.6 Je, kaya hii inaotesha/tunza/miliki/simamia miti ? Ndiyo……
Hapana……..

9.6.1 Kama ndiyo sababu kuu tatu ni nini ?
Enter the three main reasons for growing trees below

9.6.1Sababu kuu ya kwanza	
9.6.2 Sababu kuu ya pili	
9.6.3 Sababu kuu ya tatu	

9.7 Kama hapana, sababu kuu ya kutootesha miti ni nini ?

10. Kaya inavyoona mazingira/Attitudes to the environment

10.1 Je ni rahisi zaidi sasa kuliko miaka kumi iliopita kupata mahitaji ya kaya ya mali asili (kuni, samaki, ukindu, miaa, maji safi n.k) Ndiyo……. Hapana……

10.1.1 Kama ndiyo, sababu kuu ni nini?

10.1.2 Kama hapana, sababu kuu tatu ni nini?

10.1.2 Sababu kuu ya kwanza	
10.1.3 Sababu kuu ya pili	
10.1.4 Sababu kuu ya tatu	

10.2 Unaonaje hali ya mali asili ya kijiji hiki? (misitu, ardhi, samaki, miti, ndege, wanyamapori). *Atoe score kati ya 1 na 10, kulingana na hali anavyoona. Nzuri sana (10) Nzuri tu (5) Mbaya (3) Mbaya sana (1).*

Score ☐

10.3 Je shughuli za kaya hii zinabadilisha hali ya mazingira ? Do you think your economic activities effect the environment? Yes …….. No……

(*If "No " skip to question 10.3.2)*

10.3.1 Kama ndiyo kwa njia kuu ipi ? If Yes in what main way?

10.3.2 Ni badiliko kuu gani ungependa kuona katika mazingira/mali asili ya kijiji chako?

10.3.3 Ni badiliko gani wewe unaweza kufanya katika mazingira yako?

Asante sana kuwa mvumilivu na maswali haya yote kuhusu uchumi wa kaya na mazingira.

Appendix 5: References

[i] Hogan, A.R. et al May 1999 *Selection of pilot villages: A report on the methodology used and the selections made together with eleven individual village profiles.*

[ii] Regional Socio-Economic Profile 1999, Coast Region

[iii] *The World Guide* 1997/8, New Internationalist Publications Ltd.

[iv] Mradi wa Takwimu za watu na afya ya jamii. Tehip-AMMP Rufiji

[v] World Bank *Human Development Indices*. 1996

[vi] *Fuelwood and Charcoal energy needs and alternatives, Ikwiriri and Mbunju - Mvuleni* June 2000 draft in preparation.

[vii] Village Environment Management Plans were prepared in the four study/pilot villages and are available there and at the REMP offices, Utete, Rufiji.