

# **NATURAL RESOURCES SYSTEMS PROGRAMME**

## **FINAL TECHNICAL REPORT**

### **R8116 ANNEX A**

#### **Improving Management of Common Pool Resources in Rainwater Harvesting Systems**

**SOIL-WATER MANAGEMENT RESEARCH GROUP**

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## Table of Contents

Table of Contents .....	ii
List of Figures .....	iii
Abbreviations and Acronyms .....	iv
Summary .....	v
<b>1 Introduction .....</b>	<b>1</b>
1.1 Background .....	1
1.2 Rationale for the Research .....	2
1.3 Objectives .....	3
<b>2 Methods .....</b>	<b>3</b>
2.1 The Study Area .....	3
2.2 Study Approach and Data Collection .....	5
2.2.1 Identification of Socio-economic Groups using Local Criteria .....	5
2.2.2 Assessing Transaction Costs and Benefits in CPR Management .....	6
2.2.3 Assessment of Land use Conversion .....	6
2.2.4 Assessing Institutional and Regulatory Systems .....	7
2.2.5 Assessing Tenure and Management Approaches .....	7
2.2.6 Development of Guidelines for Making CPR Management Plans .....	8
2.2.7 Enhancing Capacity of Stakeholders in CPR Management .....	8
<b>3 Results and Discussions .....</b>	<b>9</b>
3.1 Local Criteria for Wealth Ranking/Socio-Economic classification .....	9
3.2 Transaction Costs and Benefits in CPR Management .....	10
3.2.1 Elements of Transaction Costs in RWH Systems .....	10
3.2.2 Quantification off transaction costs .....	11
3.3 Extent of Land Use Conversion in RWH Systems .....	13
3.4 Aspects of Institutional and Regulatory Systems for Equitable Access to CPR .....	16
3.4.1 Key Features of the Existing Institutional and Regulatory Mechanisms .....	16
3.4.2 Current Institutional and Regulatory Mechanisms .....	18
3.4.3 Proposed Improvements in Institutional and Regulatory Systems .....	21
3.5 Tenure and Management Approaches for Equitable Access to CPR .....	24
3.5.1 Current Approaches to Tenure and Management of CPR .....	24
3.5.2 Proposed improvements in Approaches to Tenure and Management of CPR .....	24
3.6 Guidelines for making CPR management plans .....	25
3.6.1 Information and data for CPR management planning .....	25
3.6.2 Key Features of Plans at Community to District Level .....	25
3.6.3 Communication and negotiation mechanisms .....	25
3.6.4 Development, Piloting and Refining Planning Guidelines .....	26
3.7 Enhancing Capacity of stakeholders in CPR management .....	26
3.7.1 Training Needs .....	26
3.7.2 Communication Products .....	27
3.7.3 Training and awareness raising .....	27
3.8 Strengthening Community Capacity to Manage CPR: A Broader Context .....	29
<b>4 Conclusions .....</b>	<b>30</b>
<b>5 References .....</b>	<b>32</b>

## List of Figures

Figure 1: Makanya River catchment (in WPLL) showing the location of Makanya, Mwembe, and Tae villages. ....	4
Figure 2: Ndala River catchment (in Maswa District) showing the location of Bukangilija, Njiapanda, and Isulilo villages. ....	5
Figure 3: Transaction costs by age in WPLL.....	11
Figure 4: Transaction costs by sex in WPLL.....	12
Figure 5: Transaction costs by wealth in WPLL.....	13
Figure 6: Land use conversion between 1980s and 2000s in Tae village.....	14
Figure 7: Land use conversion between 1980s and 2000s in Mwembe village.....	14
Figure 8: Land use conversion between 1980s and 2000s in Makanya village.....	15
Figure 9: Land use conversion between 1980s and 2000s in Ndala River catchment.....	16
Figure 10: Access to runoff in RWH systems by age in WPLL.....	19
Figure 11: Access to runoff in RWH systems by age in Maswa.....	19
Figure 12: Access to runoff in RWH systems by sex in WPLL.....	20
Figure 13: Access to runoff in RWH systems by Sex in Maswa District.....	20
Figure 14: Access to runoff in RWH systems by wealth in WPLL.....	21
Figure 15: Access to runoff in RWH systems by wealth in Maswa District.....	21

## Abbreviations and Acronyms

ASDP	Agriculture Sector Development Programme
ASDS	Agricultural Sector Development Strategy
ASPS	Agricultural Sector Program Support
CARE	Cooperative for Assistance and Relief Everywhere
CBO	Community Based Organization
CPR	Common Pool Resources
DADP	District Agricultural Development Programme
DALDO	District Agricultural and Livestock Development Officers
FGD	Focus Group Discussion
GIS	Geographic Information System
Ha	Hectare
MAFS	Ministry of Agriculture and Food Security
MIFIPRO	Mixed Farming Improvement Project
NGO	Non Governmental Organization
PPA	Participatory Poverty Assessment
PIDP	Participatory Irrigation Development Project
PRSP	Poverty Reduction Strategy Paper
RBM-SIIP	River Basin Management- Smallholder Irrigation Improvement Project
RWH	Rainwater Harvesting
SUA	Sokoine University of Agriculture
SWMRG	Soil-Water Management Research Group
TM	Thematic Mapper
TALP	Tanzania Agriculture and Livestock Policy
TShs	Tanzanian Shillings
UK	United Kingdom
URT	United Republic of Tanzania
WDC	Ward Development Committee
WPLL	Western Pare Lowlands

## Summary

Wide adoption of RWH in Tanzania is leading to changes in tenure, access and management of runoff and related CPR. Often these changes have led to decreased access to CPR by groups of the poor. Poor governance has been identified as the core problem. The overall goal of the research was to develop and promote strategies that can improve the livelihoods of the poor living in semi-arid areas through improved integrated management of natural resources under varying tenure systems. The objectives of the research were: (i) to assess transaction costs and benefits in CPR management, (ii) to assess the extent of conversion of land use, (iii) to recommend aspects of institutional and regulatory system requiring improvement, (iv) to identify, verify and promote tenure and management approaches, (v) to develop guidelines for CPR management and (vi) to enhance capacity of stakeholders to plan, negotiate and implement institutional, regulatory and management systems for CPR.

The research was conducted in two target sites, representing semi-arid areas of Tanzania. The locations are the Western Pare Lowlands (WPLL), in Kilimanjaro Region and Maswa District in Shinyanga Region. The research employed a combination of participatory and non-participatory methods for data collection. The methods included: Participatory workshops, Participatory Poverty Assessment (PPA), Participatory mapping, Interpretation of remotely sensed data, GIS, Focus group discussion (FGD), Key Informant discussions, In-depth Interviews, Consultation meetings, Questionnaire surveys and Literature review (including grey literature).

The results showed that farmers incurred transaction costs in planning for runoff use, allocation, and maintenance of RWH systems, regulation enforcement and conflict management. Highest transaction costs were incurred in the maintenance of RWH infrastructure. Men incurred more of fiscal costs while women incurred more time. Likewise, rich farmers incurred more financial transaction than those in the medium rich and poor categories. Benefits distribution from RWH seemed to favour rich, elder and men farmers; while marginalizing the poor, youth and women. The results from Geographic Information System (GIS) analysis showed a relationship between water availability and cropland suitability and land tenure system. The highly suitable land is located close to or along water sources and can mostly be acquired through inheritance. Land use conversion analysis revealed that, generally, agricultural land has expanded over the 1980s – 2000 period in both study sites at the expense of other land uses/covers, including grazing land and woodlands. On institutional aspects, the results showed high level of inequity in gender representation in the institutions responsible for CPR management. In all the surveyed villages men dominated composition of the organs. However, there was no indication that the rich dominate representation in the organs, and thus influence the plans that affect access to resources. The findings indicated that the middle category is the one which is most represented. Needs for improving plans and by-laws have been realised in the context of CPR tenure arrangements. Set backs existed in traditional procedures for allocating and owning land and therefore rights to access and use of runoff. The current land tenure system in both study sites was found to have shortcomings as it allows few households to hold a large proportion of the most suitable agricultural land through inheritance. The categorization of land suitability was based on availability of water as the most important factor. Thus, provision of more water for agriculture, through for example RWH, could be the key to solving the observed inequity in accessibility to good land and hence boosting agricultural production in the area. In WPLL, for example, villagers proposed that the Government and other stakeholders should look for ways of assisting them to construct a dam and rehabilitate existing water storage structures, locally known as *ndiva*.

## 1 Introduction

### 1.1 Background

Poverty in Tanzania is caused by many factors, but the most important are inadequate access and poor utilisation of resources to acquire basic human needs for decent life and development. The youth and female-headed households are often in the poor categories with respect to all types of assets. They form an important part of the agricultural households in the study areas. For example, in Western Pare Lowlands (WPLL) 20% of agricultural households are female-headed. Similarly, 20% of heads of agricultural households are less than 35 years old (NBS, 2001). Livelihoods of the majority depends on common pool resources (CPR) such as runoff and rangeland, which are defined as natural or man made resources used simultaneously or sequentially by members of a given community or group of communities (Williams, 1998). Examples of CPR are runoff, rangelands, rivers and streams.

CPRs share two important characteristics, namely non-excludability and subtractability. Non-excludability arises from several factors like costs of parcelling and/or fencing the resource and the cost of designing and enforcing property rights to control access to resources. Subtractability attribute creates rivalry between different users as use of resources by one person subtract from the welfare of other users. Because of the two attributes, CPR are potentially threatened by over exploitation, depletion and degradation (Lovett et al., 2001). The critical challenge in CPR management is therefore, how coordination can be achieved in order to avoid over exploitation of the resources as population grows and especially under multi-stakeholders environment.

Rainwater harvesting, is an important entry point in poverty reduction in most of the semi-arid agriculture. Adoption of RWH leads to changes or need for change in the access to CPR such as runoff, rangelands, rivers and streams. Given its scarcity, access to rainwater is key to control and utilisation of land in the semi-arid areas. Well-designed and robust institutions are therefore required for the management of such complex CPR (Huggins, 2000).

Tenure, control and access to runoff and related CPR is important. Of particular interest is to find out their interactions to see if control of resources by one part (e.g. upstream) or group (e.g. rice cultivators) does not disadvantage sustainable use of resources by another part (e.g. downstream) or group (e.g. pastoralists). This is a critical issue, since often the resource could be commonly available but only those with means to access it become its de facto owners or controllers. The poor segment of the population mostly suffers by being marginalized.

Management of RWH systems, just like any other CPR, has transaction costs. Since RWH systems are run through collective actions, ideally all beneficiaries should share transaction costs and benefits accruing from the system. Management of RWH system may break if these costs exceed benefits leading to free riding phenomenon (Ostrom, 1999; Lovett et. al, 2001 and Adhikari, 2001). This is likely to happen where there is a high degree of heterogeneity among resource users and where institutions fail to accommodate interests of different groups of users. These groups are often engaged in a struggle for access to resources and power (Sick, 2002).

The overall goal of the project was to deliver new knowledge that would enable poor people who are largely dependent on the natural resource base to improve their livelihoods. The aim of the research was to investigate and recommend tenure, institutional, regulatory and planning framework that improve access and beneficial use of CPR by the poor groups. It was envisaged that by promoting equitable access by groups of the poor to runoff and

associated CPR in semi-arid areas, the research would contribute to poverty reduction through improved livelihoods.

## **1.2 Rationale for the Research**

The work done under project R7857 (Review of common pool resource management in Tanzania) showed that water is the most critical CPR in semi-arid Tanzania. Findings from R7888 (Assessment of RWH demand and efficacy) showed that there is already a high level of adoption of RWH. Recently the technology of RWH has received high attention from policy makers and planners in Tanzania. Rainwater harvesting is now part of key elements of the Agricultural Sector Development Strategy (ASDS) (URT, 2001c). Unfortunately, there has not been an equal effort in the development of governance of the runoff and associated CPR in the target areas (Lovett et al., 2001).

Rainwater harvesting is linked to land tenure and use, and thus the new Land, and Village Land Acts of 1999 provide an opportunity for improving planning and governance of runoff and associated CPR at community or watershed scales. Adoption of RWH leads to changes in land use, which affect livestock keepers, and reforms in land tenure. Most of this land is now being converted into maize and rice fields through rainwater harvesting, reducing land available for grazing. Furthermore, rainwater harvesting has important implications on the environment especially in relation to river basin management. The success of many small RWH schemes can lead to large-scale water management and environmental problems.

Integrated management of CPR in the target Districts is apparently missing. This research was designed to address this issue as a follow-up to findings of the project R7857. The previous project found that governance was the core issue and most important researchable constraint in relation to integrated management of CPR. The findings of R7857 also identified decision making (i.e. planning) and institutional arrangements to be key issues contributing to governance. All these were taken on board in this research.

It is now widely acknowledged that sustainable and integrated management of CPR at watershed or catchment level, requires the participation of all local stakeholders (Lerise, 1997). This requires major changes in the tenure, management, institutional and regulatory arrangements, and planning processes. A major challenge is to ensure that the poor participate and their interests are taken into account during planning. However, participatory planning and management is often associated with high transaction costs which may be a potential constraint on collective action and more importantly limit participation of the poor (Falconer, 2000; Adhikari, 2001).

Equitable distribution of benefits and costs depends on the institutions that shape these interactions (Knox and Gupta, 2000). Those who are benefiting most will often resist developments towards more equitable distribution. Therefore, harnessing runoff for improving livelihoods of poor people requires the collective action of all stakeholders, including those with large share of CPR at catchment and basin levels (Scott and Silva-Ochoa, 2000). However, without good governance there is a high potential for conflicts within the community, resulting mainly to non-compliance (especially by the powerful) to even participatory drawn and agreed plans (Hatibu et al., 2001).

Several institutions (formal and informal) and regulations for managing CPR exist in Tanzania at all levels. The outstanding research issue is the conflicting roles and approaches of the institutions especially in relation to the interests of the poor (Lovett et al., 2001). It was also observed by Hatibu et al. (1999) that a gap exists between the emphasis given in national

policies, strategies, and programmes and what is actually practised by farmers in semi-arid areas. There is, therefore, a real problem in Tanzania, whereby national level strategies and policies are not diffused down and reflected in the practices at the grass root.

### **1.3 Objectives**

The main objective of the research was to develop and promote strategies to improve livelihoods of specific groups of the poor through improved integrated management of CPR. Specific objectives were:

- i). To assess transaction costs and benefits in CPR management and their effect to the poor.
- ii). To assess the extent of conversion of land use and their implication to the different groups in the society.
- iii). To recommend aspects of institutional and regulatory system requiring improvement to facilitate equitable access to runoff and related CPR in rainwater harvesting systems.
- iv). To identify, verify and promote tenure and management approaches that enhance equitable access to CPR affected by rainwater harvesting, by different stakeholders and the environment.
- v). To develop guidelines for use by District Councils, Wards, Villages and Communities in making CPR management plans that protect the interest of the poor while ensuring optimum and sustainable benefits to the communities using rainwater-harvesting systems.
- vi). To enhance capacity of stakeholders to plan, negotiate and implement/enforce institutional, regulatory and management systems for CPR, in a way that protects the interests of the poor.

## **2 Methods**

### **2.1 The Study Area**

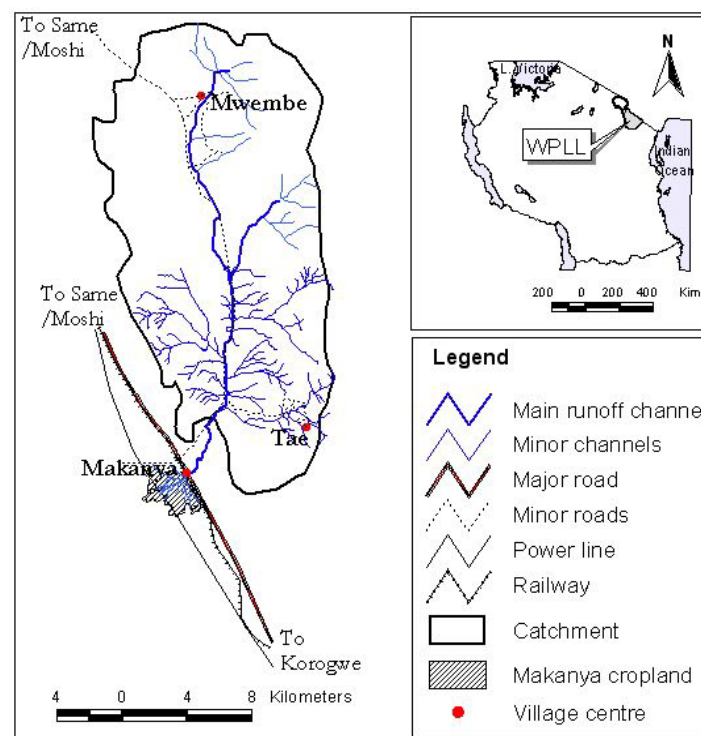
The research was conducted in two target sites, representing semi-arid areas of Tanzania. The locations were the Western Pare Lowlands (WPLL), (Mwanga and Same Districts) in Kilimanjaro Region, and Maswa District in Shinyanga Region, south of Lake Victoria (Figures 1 and 2).

The WPLL run from the foot of the south Pare Mountains westward to Pangani River. The lowland part of the watershed is about 500m to 700m above mean sea level while the upper part reaches 2462 m above mean sea level. The annual rainfall in the lower zone of the catchment is too low to support agricultural production without water management interventions. It ranges between 250mm and 400 mm, falling in two seasons: short rains (Vuli) between November and January and long rains (Masika) between March and May. Agricultural production in this zone is only possible through RWH using supplementary water mainly from ephemeral flows during the rainy season. The rains fall mostly in the upper zone of the catchment as heavy storms, which produce a lot of runoff. The runoff flows downstream where it is diverted to farms through canals. Dry spells are very common in the area even during the long rainy season. The most disastrous dry spells are those occurring in January and February when the maize crop is tasseling. This is why RWH is very important in the area. RWH mitigates the risks of intra-seasonal dry spells by bridging the gap between rainfall events.

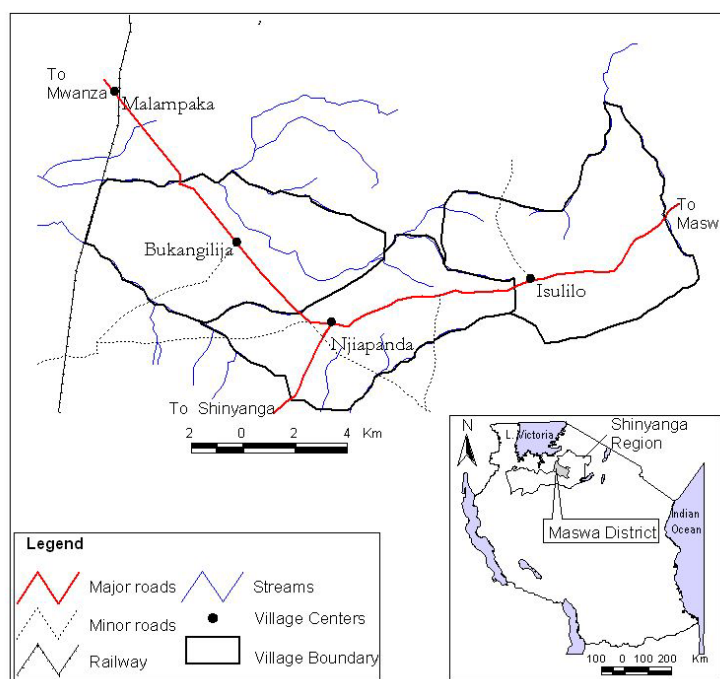


Maswa District falls within the extensive central semi-arid agro ecological zone, which is characterized by gently undulating plains with long slopes and wide valley bottoms. Annual rainfall ranges between 600 and 900 mm with a transitional regime. Availability of adequate soil-moisture for plant growth is a major constraint, mainly due to the occurrence of long dry-spells during the growing season. The land use pattern is linked to the recurrent toposequence of soils, known as Sukumaland catena (Milne, 1947). Up to the 1980s, common crops grown were cotton and other drought resistant crops like sorghum and finger millet. However, in recent years, farmers' preferences have shifted in favour of maize and paddy rice as dual-purpose crops. Rice cropping system, based on RWH techniques involving excavated banded fields known as Majaluba, is now a common component of the farming system.

Three villages from each target site were selected to represent major landscape positions on the toposequence on a catchment, i.e. runoff producing area (upstream), run-on area (middle), and runoff receiving area (downstream). This is due to the fact that runoff as a CPR is shared by communities located on different positions along the toposequence. The representative villages selected for the study are Makanya (downstream), Mwembe (middle), and Tae (upstream) for WPLL (Figure 1), and Bukangiliya (downstream), Njiapanda (middle), and Isulilo (upstream) for Maswa District (Figure 2).



**Figure 1:** Makanya River catchment (in WPLL) showing the location of Makanya, Mwembe, and Tae villages.



**Figure 2:** Ndala River catchment (in Maswa District) showing the location of Bukangilija, Njiapanda, and Isulilo villages.

## 2.2 Study Approach and Data Collection

Given the type and nature of information required, use of a combination of methods that are complementary was necessary in this research. Methods for data collection included those using participatory approaches (Participatory workshops, Participatory Poverty Assessment (PPA), Participatory mapping, Focus group discussion (FGD), In-depth Interviews, Consultation meetings) and non-participatory approaches (Key Informant Interview, in depth interview, Questionnaire surveys, Interpretation of satellite images and literature review). The research used participatory approaches to encourage relevant stakeholders to take active role in the research processes (Annex B1).

The data collection focused on the already identified stakeholders, e.g. pastoralists and agro-pastoralists, women, youths and institutions that are involved in planning and regulating resource use at all levels. Detailed methods are given in subsequent sections.

### 2.2.1 Identification of Socio-economic Groups using Local Criteria

Socio-economic endowment usually influences access to CPR and therefore, it was a pre-requisite to understand local criteria for wealth assessment and poverty situation in the community. Local criteria for socio-economic classification were studied using a three step process, starting with identification of broad socio economic groups, followed by developing criteria for each group and finally by ranking individuals into different wealth groups. The details for each step are described in the following sub sections.

#### *Identification of broad social economic groups*

The process involved participatory workshops with key informants including divisional and ward leaders, community development officers, village leaders and opinion leaders. During these workshops, the research team provided briefing on the findings of previous researches in the area and introduced the research objectives. During the workshop, informants listed different CPR associated with runoff and different groups whose livelihoods depend on CPR.

### ***Developing ranking criteria.***

This was again accomplished through participatory approaches that brought together different stakeholders. It involved conducting separate focused group discussions with key informants from each of the identified groups of the poor. Participants from each group proposed, discussed and agreed on criteria for differentiating individuals into distinct socio-economic groups.

### ***Ranking individuals***

Hamlet registers were prepared which included all households in the hamlet in each village. Individuals who have a wide knowledge about the livelihoods of the hamlet residents were identified and asked to group all households into the broad social groups based on livelihood options and CPR they depend on and then ranked the whole population into wealth groups using developed local criteria. The output was a list of individuals in different socio-economic groups in each study village.

### ***2.2.2 Assessing Transaction Costs and Benefits in CPR Management***

Management of RWH systems, just like other CPR, has transaction costs. Since most of RWH systems are organised through collective actions, ideally all beneficiaries should share transaction costs and benefits accruing from the system. Transaction costs of managing RWH were studied using participatory approaches (FGD and key informant meetings) and questionnaire survey. FGD and key informant meetings were conducted to identify major transaction costs of managing RWH systems. The process involved listing, grouping and ranking transaction costs.

A questionnaire on CPR management (Annex B3) was administered to 1196 households (596 in WPLL and 600 in Maswa), while a questionnaire on transaction costs was administered to 379 households in WPLL (Annex B4).

Transaction costs were in fiscal and time dimensions. Direct fiscal costs and time spent in attending different transaction activities (planning for resource use, resources allocation, RWH system maintenance, policing and enforcing resources agreement, rule and by-laws and conflict management) were calculated by summing up all costs per activity. The approach was adapted from Rutherford (2000).

### ***2.2.3 Assessment of Land use Conversion***

Adoption of RWH leads to changes and or need for change in the access to land. Most of this land is being converted into agriculture through RWH, reducing land available for grazing. Furthermore, RWH has important implications on the environment especially in relation to river basin management. In order to locate and quantify land use changes (e.g. from grazing to cultivation and vice versa) that had occurred between 1980s and 2000s in both runoff producing and runoff receiving areas, a combination of participatory and non-participatory approaches were used. Participatory techniques included key informant interviews and field visits, while non-participatory approaches included analysis of temporal remotely sensed data and GIS techniques. These methods are further elaborated in following paragraphs.

### ***Key informant interviews and field visits***

Key informants, with knowledge about the community's history, were identified and asked to locate (on a timeline as well as on the ground) land use changes, particularly expansion/reduction of agricultural and grazing land, in their villages. Each informant was

then asked to draw sketch maps depicting the changes. The informants were also asked to map qualitative changes in runoff amount and frequency.

Following the discussions, the team, i.e. researchers and key informants, visited the area to observe, confirm and map the location and distribution of the identified land use changes. GPS, transect walks, and topographic maps (1:50,000 scale) were used to facilitate mapping. The information was later used to refine the interpretation of remotely sensed data.

### ***Analysis of temporal remotely sensed data***

Using Erdas Imagine software, temporal remotely sensed data i.e. aerial photographs (1:50,000 scale of 1990 for Maswa District and 1:30,000 scale of 1988 for WPLL) and Landsat TM images (Landsat TM\_167-063 of 1984 and 1997 for WPLL and Landsat TM\_170-062 of 1985 and 2002 for Maswa District), were enhanced and then visually interpreted to extract past and present land covers/uses in the study area(s). Participatory maps produced during key informant interviews were used to guide the interpretation. A change detection analysis was then performed to locate and quantify land cover/use changes both on runoff producing and runoff receiving areas.

### ***2.2.4 Assessing Institutional and Regulatory Systems***

Key features of institutions for CPR management were studied. The features included membership composition of organs responsible for CPR management, existing by-laws and sectoral and hierarchical integration in CPR management plans. The process involved: identification of CPR management committees, obtaining lists of members to each committee in the study villages and assessing the composition by sex, age (youth vs elders) and wealth categories (rich vs, poor).

The research team collected and analysed secondary data particularly grey literature (reports, minutes of different meetings and plans) from village, ward and Districts. From the collected information the team assessed integration in sectoral plans and their compatibility with national strategies, policy and legal procedures.

Two participatory workshops were organized, one in Maswa District and another in WPLL, to capture undocumented rules and procedures and identify weaknesses in the existing organs and propose new institutional and regulatory mechanisms. The participants included Ward Councillors, District Executive Directors, District Agricultural and Livestock Development Officers (DALDO), local NGOs, and farmers from the study villages.

### ***2.2.5 Assessing Tenure and Management Approaches***

In order to get ideas and opinions on acceptable approaches to tenure and management of CPR related to RWH from target groups, two participatory workshops were conducted one in Maswa and the other in Same District (Annex B9 and Annex B10). These were followed by in depth group discussions complemented by key informant interviews in target villages (Annex B13). The following information was explored:

- The existing approaches to tenure
- The current approaches available for the management of CPR.
- What should be done to improve the use and management of CPR related to RWH?
- How do people respond on the activities concerning the management of CPR related to RWH in this area?

The discussion was facilitated in such a way that the ideas of each person in the group were considered, synthesized and recorded. Systematically, after one question being fully

answered by the participants, another question was introduced. At the end of the discussion, each member was requested by the facilitator to give comments.

### ***2.2.6 Development of Guidelines for Making CPR Management Plans***

#### ***Minimum Information Need For Planning CPR***

The task was accomplished through consulting various stakeholders. Consultations were carried out at different levels. Detailed process is described in Annex B8 and summarised hereunder:

- i) Meeting with individual District officials including District Executive Directors, Agricultural and Livestock Development Officers, Extension Officers in the three target Districts.
- ii) Consultation meetings with leaders at ward level and farmers. This was done specifically in Same District where a member of the project team was co-opted as a member of Ward Development Council.
- iii) Consultation meeting with representatives of river basin management stakeholders.
- iv) Consultation meeting with policy makers and planners from the three target Districts.

#### ***Development, Piloting and Refining Planning Guide***

A draft-planning guide was prepared using secondary information. The guide was tested to get real life experience and comments from various stakeholders. The process is detailed in Annex B8. In summary the process involved:

- Village community meeting,
- Joint village governments meeting (Makanya and Mgwasi),
- Joint meeting at sub village level,
- Consultation with Mohamed Enterprise Sisal Estate and Tanzania Railway Corporation at Makanya village, and
- Feed back meeting at Ward level.

### ***2.2.7 Enhancing Capacity of Stakeholders in CPR Management***

#### ***Training Needs Assessment***

Assessment of training needs was accomplished through consultation at different levels as summarised hereunder and detailed in Annex B7.

- A meeting with District Executive Directors, Agricultural and Livestock Development Officers, Extension Officers from Same, Mwanga and Maswa District,
- Consultative meetings with leaders and farmers at ward levels. This was done specifically in Same District,
- A meeting with representatives of river basin management stakeholders. Information was also gathered from other basin-wide dialogue workshops organized by other organizations for the Pangani Basin, and
- A consultative meeting with policy makers and planners from Mwanga and Same Districts was held in Moshi, as part of wider consultation on up-take products for NRSP supported projects under SWMRG.

#### ***Communication Products***

Communication of the research and its products was an integral part of the research since the main method of research engaged target users in workshops, focus group discussions, advisory panels, and training and awareness raising. Stakeholders were involved in the

communication process including development and pre-testing of the communication products. (Annex (R8))

### 3 Results and Discussions

#### 3.1 Local Criteria for Wealth Ranking/Socio-Economic classification

Local criteria for identifying socio economic groups was assessed and detailed findings are presented in Annex B2. It was noted that perceptions on who is poor or rich varied with ethnicity, sex, enterprise age groups and location. Tribes whose main economic activities are farming put more value on land with access to runoff while tribes with pastoralism background put much value on livestock. Elders and youths used different rating to classify individuals with regard to resource endowment. To be rich among youths entail owning assets or having access to factors of productions, which on comparison are less than the amount that qualifies elders to be categorized as rich. In WPLL, for example adult agro-pastoralists would need to own at least 10 heads of cattle while youth regarded an individual with only 2 heads of dairy cattle as rich. Similarly, the amount of resources that would make men to be classified as rich are much more than those required to classify women as rich. In pastoralists community, men would regard someone with more than ten heads of cattle as rich while for women 10 heads of cattle was sufficient to classify them as rich. Findings indicate that local criteria for poverty assessment included material and non-material parameters as shown in

Box 1. Material resources included durable assets like houses and machines and short-term consumables like clothes. Using a combination of these criteria agro-pastoralists in Makanya classified their community to be composed of 20%, 70%, and 10% rich, medium rich and poor respectively. While similar socio economic group in Bukangilija was said to be composed of 20%, 50% and 30% rich, medium rich and poor respectively.

In both study sites, the majority of the population was locally classified as medium rich group while the rich constituted the smallest proportion. For example, 12%, 58% and 30% of the community in Mwembe village (WPLL) were classified as rich, medium rich and poor, whereas in Bukangilija (Maswa) 15%, 47% and 38% were rich, medium rich group and poor respectively.

**Box 1:** Materials and non-material criteria for assessing poverty

i) Material criteria

Housing  
Livestock  
Land  
Food security  
Business enterprises  
Clothes  
Remittances  
Farm implements

ii) Non-material criteria

Access to social services  
Access to farm inputs  
Marital Status  
Self-confidence  
Begging  
Membership of local networks  
Wage labour  
Ability to pay bride price

## 3.2 Transaction Costs and Benefits in CPR Management

### 3.2.1 Elements of Transaction Costs in RWH Systems

Transaction costs for managing RWH systems were found to be both fiscal and time dimension. Individuals and communities incur transaction costs in planning for runoff use, resource allocation, RWH system maintenance, policing/enforcement of regulations and conflicts management (Box 2). These are briefly discussed in the following sub-sections.

**Box 2:** Transaction cost activities in managing RWH systems

- i) Planning for resource use
- ii) Runoff allocation,
- iii) RWH system maintenance,
- iv) Policing/ enforcement of regulations and
- v) Conflicts management

#### *Planning for resource use*

Planning for runoff involves allocation and scheduling. Normally this occurs soon before the onset of the rainy season and continues throughout the season. For RWH system with storage structures planning meetings are held once a week during the cropping season. Performance in the previous week is assessed and allocation schedule is reviewed where necessary to fit with circumstance (amount of runoff available). In RWH systems without storage structures, frequency of meeting for resources allocation is very much dependent on rainfall events particularly in the highlands. Normally lowlanders depend on rainfall events in uplands for runoff. However, weekly meetings are also held by committee members to discuss allocation regimes but flexibility of timetable is much limited. During such meetings, farmers incur financial costs in terms of transport charges, foods and cash contribution for buying stationeries.

#### *Runoff allocation*

Water resources allocation is a daily activity and involves three parties. The first one operates the water gate. The second is a member of management committee who observes that the allocation is in line with the agreed procedures. The third comprises of farmers to be allocated water. Individuals taking part in runoff allocation incur time and fiscal costs. These costs are transport and their up keep since the exercise is time consuming sometimes lasting for the whole day.

#### *RWH system maintenance*

Maintenance of RWH infrastructure is an important component for transaction costs while managing RWH systems. This involves costs of maintaining the canals and the storage structures (*ndiva*). Maintenance of canals is normally done during the dry months between August and October. In Makanya, the village government assign secondary canals to hamlet leaders who mobilises fellow residents in maintenance works whereas canal leaders provide technical inputs during supervision of the work. During this period the village government sets one day per week normally Monday for communal works. Each household is supposed to contribute one member to attend in the communal work (*Msaragambo*). A primary canal from which all secondary canals originate is cleaned by all households with farms in the area. The village government is responsible for mobilising villagers and the chairman of the

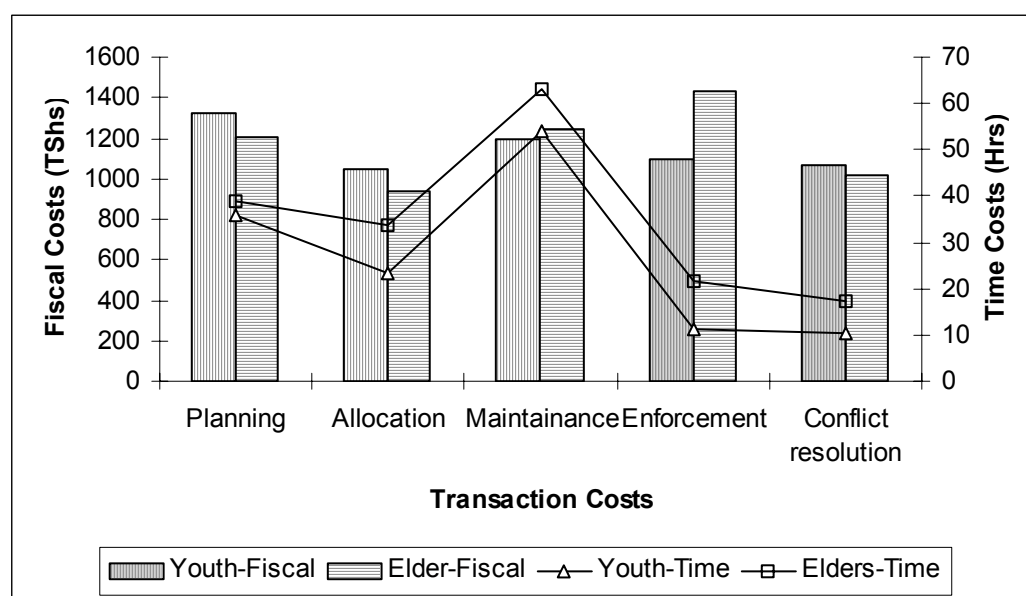
irrigation canal committee provides technical assistance in the accomplishment of such tasks. Fiscal costs are incurred for purchasing working tools, transport and upkeep (food).

### ***Policing, enforcement of regulations and conflict management***

In the management of RWH systems, most activities are done under communal works. It is mandatory that all households should attend in the communal works. Should it happen that some of the households fail to comply, they are punished as per the regulations that guide management of the system. This practice bears some costs for enforcing the rules and conflict management. A team of about five people is formed for collecting fine from all the defaulters. They collect both cash and non-cash materials ranging from furniture and utensils or chicken as a compensation for not taking part in communal works. The offenders are given an opportunity to appear in the scrutiny committee to present reasons for not accomplishing their responsibility. If their reasons are genuine, they normally recover their confiscated properties. Otherwise the items are sold at a price that covers the equivalent of the fine and costs of the enforcers. This process involves transaction costs both in time and fiscal dimensions. Again fiscal costs are associated with transport, fines for non-compliances and self-upkeep during the meetings.

### ***3.2.2 Quantification off transaction costs***

All transaction costs were quantified and compared across age, sex and wealth of the respondents. Comparison by age shows little variation in fiscal transaction costs except in policing and regulation enforcement. In this regard, elder farmers incur substantially more fiscal costs than the youths. However, it was evident that elders incur more transaction costs in time dimension than the youth in almost all transaction activities (Figure 3). Comparison of transaction costs in monetary value (Table 2, Annex B14) showed that transaction costs related to law and regulation enforcement was higher ( $p=0.01$ ) for elders than youths and total transaction per annum was statistically different ( $p=0.1$ ) between youths and elders. This confirms that elderly farmer incurred higher transaction cost than youths.

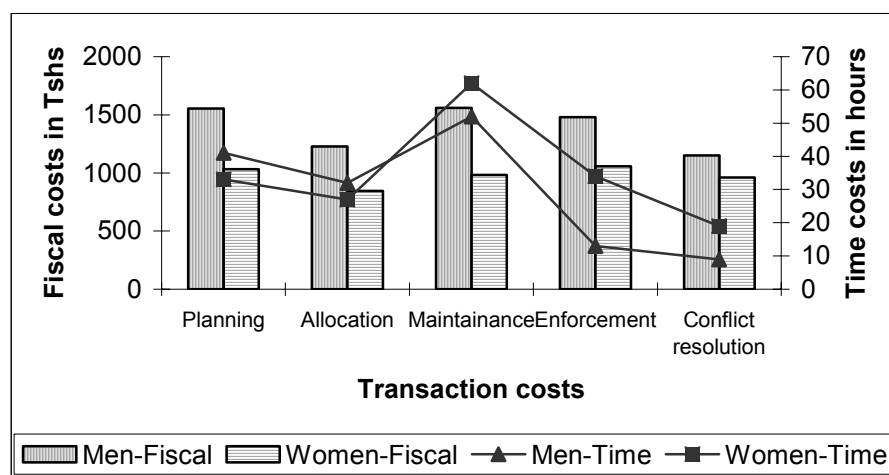


**Figure 3:** Transaction costs by age in WPLL

Comparison of transaction costs by sex showed that men incur more fiscal transaction costs than women. On the contrary, women incur more transaction costs in time for managing

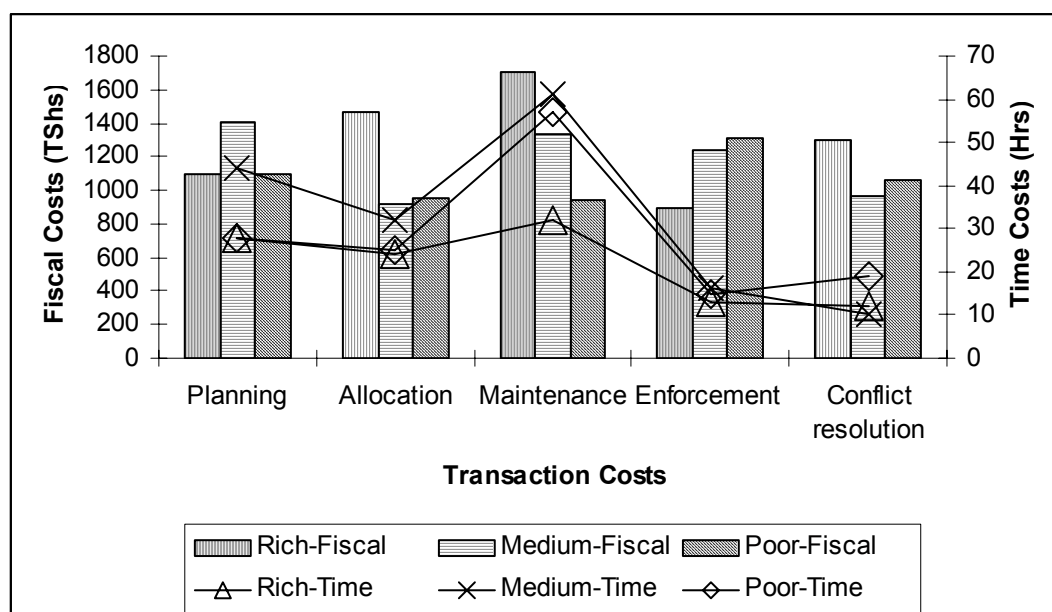


RWH systems than men. It was further noted that women involvement in planning and allocation of resource is lower than that of men (Figure 4). This suggests that women are rarely involved in planning. However, after monetising time, overall transaction costs incurred by men and women were not proved to be significantly different (Table 4, Annex B14).



**Figure 4:** Transaction costs by sex in WPLL

Differences in the amount of transaction costs were also noted across wealth status of respondents. Results indicated that farmers incurred more fiscal costs in maintenance, planning and enforcement. Rich farmers spent much money in RWH maintenance than in other activities. This might be attributed to arrangements where there is provision for some members to provide working tools instead of physically attending to the communal works. It was further shown that the medium rich group incurred more time in all transaction activities except conflict resolution where their contribution was out-weighted by the poor (Figure 5). This is because the poor group are the most vulnerable group and in most cases their farms are located at the tail ends where access to runoff is relatively difficult. Comparison of monetary value of transaction costs (table 6, Annex B14) showed that medium rich farmers incurred significantly more transaction costs for planning for runoff use than the poor ( $p=0.05$ ). Again it was noted that transaction cost associated to RWH system maintenance was significantly higher to poor than the rich ( $p=0.01$ ) and to medium rich than the rich ( $p=0.1$ ). Likewise, transaction costs for conflict management was higher to poor ( $p=0.1$ ) than well off groups. These findings confirm that poor farmers incur higher transaction costs than rich farmers in managing transaction costs.

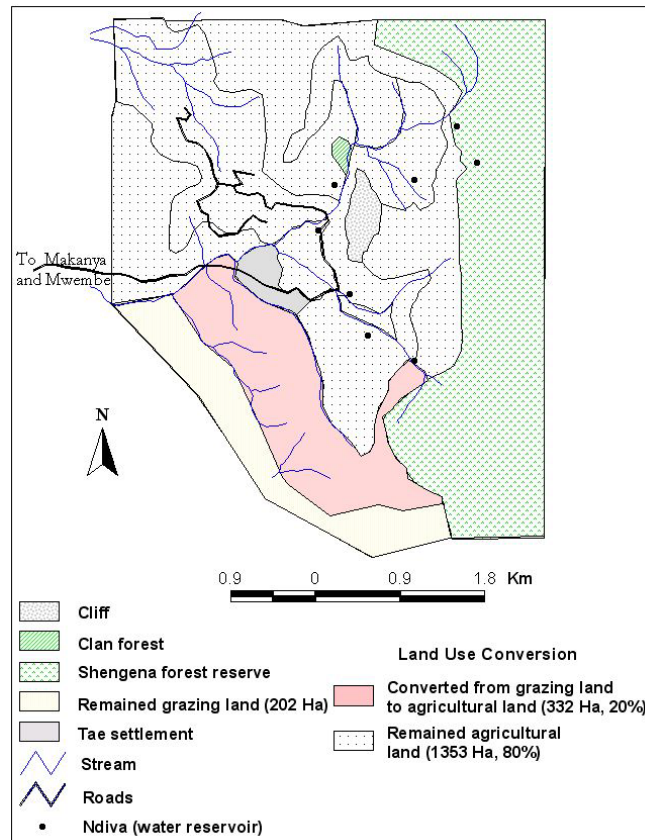


**Figure 5:** Transaction costs by wealth in WPLL

### 3.3 Extent of Land Use Conversion in RWH Systems

The results of extent of conversion of land showed that, agricultural land has expanded over the 1980s – 2000s period in both study sites at the expense of other land uses, including grazing land and woodlands (Annex B6). The results also showed a relationship between land use conversion and toposequence of the Makanya River catchment. This includes an expansion of the agricultural land in the highlands. As a result, more runoff is being abstracted at the expense of lowland agriculture. In addition, more grazing land has been encroached through lateral expansion of agricultural land forcing livestock keepers to move further down.

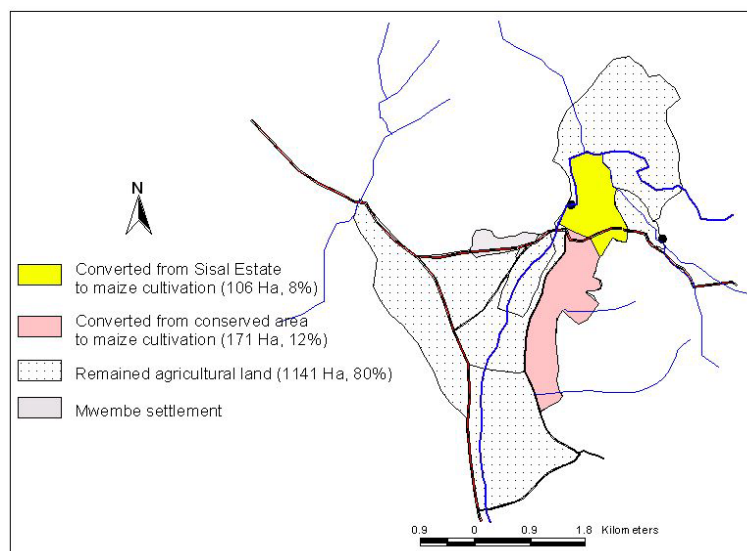
In Tae village, (highlands) areas under supplementary irrigation and rainfed agriculture have increased. In the past (1980s) large parts of the current area under rainfed agriculture was used for grazing and a small part for wild animals, e.g. wild pigs. The change detection analysis revealed that, between 1980s and 2000s, 332 ha of grazing lands have been converted into agricultural land (Figure 6).



**Figure 6:** Land use conversion between 1980s and 2000s in Tae village

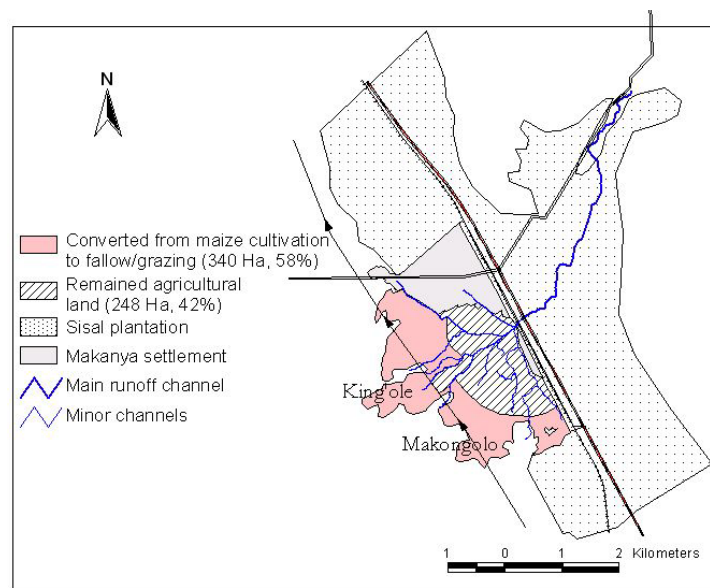
Although the converted land is only 20% of the total agricultural land, it is 62% of the 1980s grazing land. As a result of land use conversion, livestock keepers had to move to downstream areas, including Makanya village. According to key informants, population growth is the main reason for the observed land use conversions.

The same trend was observed in Mwembe village (middle slope). The results showed that 106 ha has been converted from sisal estate and 171 ha from conserved area to maize cultivation (Figure 7).



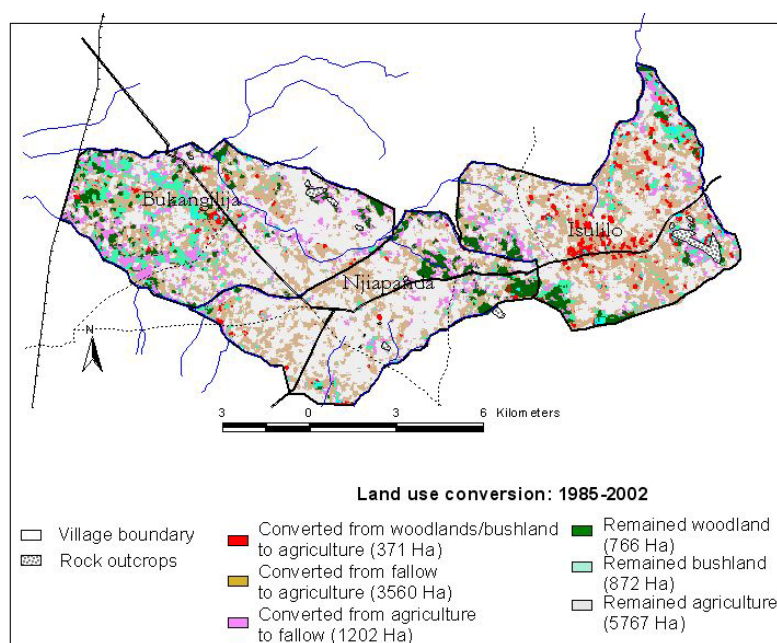
**Figure 7:** Land use conversion between 1980s and 2000s in Mwembe village

It was also revealed that as a result of the encroachment of grazing area, temporal movements of livestock during dry season have increased. A number of factors were identified to be drivers for the expansion of agricultural area in the village. The main factors included: population growth, lack of village land use plan, lack of institutions to manage resources at catchment level, non-compliance to existing by-laws and weak village leadership. The by-laws are supposed to restrict encroachment of the conserved areas including water sources. Contrary to Tae and Mwembe village, in Makanya village (lowland) the area under cultivation has decreased (Figure 8). Land use change analysis indicated that 340 ha (58%) of agricultural land has been converted to either fallow or grazing land as a result of decreased amount and frequency of runoff. However, in some seasons, when there is exceptionally high rainfall, for example the El Nino of 1997/98, the converted land is cultivated.



**Figure 8:** Land use conversion between 1980s and 2000s in Makanya village

In Maswa District there was no such trend between land use conversion and toposequence. However, results from focus group discussions and analysis of temporal Landsat TM images (1985 and 2002), i.e. change detection analysis, indicated that agricultural land has expanded in all the three study villages along the toposequence. Overall, 371 ha (3%) of woodlands and 3560 ha (28%) of fallow has been converted to agriculture (Figure 9).



**Figure 9:** Land use conversion between 1980s and 2000s in Ndala River catchment

Focus group discussions revealed a conversion from cultivating drought resistant crops, e.g. sorghum, to paddy production as a result of wider adoption of RWH. Population growth was mentioned to be the major factor for the observed expansion of agricultural land.

The results from change detection analysis emphasised a need for catchment level institutions for CPR management. In the study villages the planning unit has been a village. Catchment level institutions are necessary, particularly, for runoff management because it is a CPR to both upstream and downstream communities. The actions of one local community located upstream affect the availability of runoff for local communities downstream. The results also suggest that the representation in the institutions should encompass all groups of key stakeholders in the catchment, including livestock keepers, who seemed to be the most disadvantaged group.

### 3.4 Aspects of Institutional and Regulatory Systems for Equitable Access to CPR

#### 3.4.1 Key Features of the Existing Institutional and Regulatory Mechanisms

Features of existing institutional and regulatory mechanisms for CPR management were studied. The detailed results presented in Annex B5 and summarised hereunder.

#### *Institutions for managing CPR*

Institutions for managing CPR at village level comprised of village government committees and resource user groups. In some villages (Mwembe, Makanya and Tae), there were specific committees for management of CPR like land and water resources, whereas for other villages (Bukangilija, Njiapanda and Isulilo) CPRs are managed by social welfare committees, which are one of the three primary committees of village governments in Tanzania. Other indispensable committees in the village government settings are security and finance. However, there is provision for forming new committees according to the needs of the village. Of recent (Village land Act No 5, 1999) states that it is mandatory for villages to have independent village land committees whose tasks are to care for village land and manage land conflicts.

Normally the CPR management committees are lead by men and elders. This is based on tradition where women occupy low profile in the community and households decision making process, especially those related to resources management. For resource user groups that are formal and legally registered, the proportion of women is slightly higher but their participation in resource decision-making is still questionable (Annex B5). For example, all people who are operating water gates (“wagawa maji”) in ndiva are men. There is cultural belief behind such experience. Traditionally, it was believed that if women would enter the ndiva or touch the water gate (*kishamwa*), the ndiva wouldn’t be able to store water for long time. Although such beliefs are diminishing with time their effects are still vivid in some communities today.

In some villages, management of CPR is frustrated by bad relationships between village governments and committees for resource management. For example, in Makanya village the canal management committee and beneficiaries feel that village leaders interfere with the functions of the committee. The canal committee felt the need to be autonomous rather than the prevailing situation where it is working as an agent of the village government. This makes implementation of deliberations difficult, particularly, when dealing with non-compliances. A similar situation exists in the management of rangelands where the pastoralists committee feels that its operations are affected by rulings made by village government leaders. Village leaders have, in some occasions, reallocated grazing lands to other uses without prior consultation with primary stakeholders (pastoralists).

Runoff management committees in neighbouring villages within a catchment operate within their village boundaries and no formal communication between them exists. Lack of catchment level committees makes the management of ‘fugitive’ resources like runoff challenging and difficult. Before abolishing chiefdoms in Tanzania in the 1960s, administrative boundary was such that chiefdom run from uplands to lowlands, therefore, management of water and other CPR was a bit easier than today. Normally, chiefdom headquarter was situated in the lowlands. Currently, this facilitated presence of verbal but binding agreements for sharing of runoff between highlanders and lowlanders, leading to equitable sharing of the runoff across the toposequence. This demands development of institutions that address catchments issues. Although such catchment institutions are lacking, there is no legal restriction to the establishment of such institutions. Local government Act no 6 of 1999 gives District councils power to establish organs that deal with cross boundary resources.

### ***Plans and regulatory mechanisms for managing CPR***

Good management of CPR requires comprehensive management plans and by-laws that would take into account the nature of resources and users’ demands. However, the results from WPLL indicated:

- Weak emphasis on runoff and land resource management in village and ward development plans,
- No clear operational plans and transparency in the village and Ward Development Committees. For example, villagers do not participate in formulating the agenda for WDC meetings. In some extreme cases, village and ward development plans are not prepared at all, and
- There is Limited community participation in preparation of plans.

There are also indications that bad relationships between organs responsible for managing CPRs exists. This was observed in Makanya village, WPLL where there was misunderstanding between village government and primary courts. People who were found

guilty and fined for resource abuse by village government later appealed to the primary court and the ruling was reversed. This makes management of CPR difficult.

Tanzania Agricultural and Livestock Policy and Agricultural Sector Development Strategy (ASDS) requires that DADPs should integrate land, water and environmental management plans, as they are collaborating sectors and have a direct link to one another. However, the results showed that there is weak integration of sectoral development plans. For example agriculture and other sectoral (forestry, water, and land) development plans are not well integrated in the DADP. This is caused by lack of a planning forum at the district level (Annex B12) and lack of funding.

### ***By-laws for CPR management***

It was observed that by-laws from different organs have contradictory elements (Annex B12). For example, in Mwembe village there is a regulation restricting livestock loitering in the village. Whoever is found guilty under this by-law is fined TShs. 1000 per head of cattle and TShs. 500 per head of a shoat. Should it happen that the loitering stock damage crops, the owner is also required to pay for damaged crops. In the same village there is a water user group owning a *ndiva* and has a by-law that govern the conduct of the group members. In the group by-laws, punishment for livestock grazing in a crop field is set at TShs. 5000 per head of cattle and TShs. 2500 per head of shoat in addition to compensating for damaged crops and infrastructures. The offender should be sent to the ward tribunal if one fails to comply with the requirement of this by-law. Since village government by-law is above the group by-law in hierarchy, implementation of the latter is difficult because it has a high penalty rates compared to the former. Therefore, offenders prefer their cases to be heard and ruled by the village governments rather than the water user groups. Under this environment of regulatory pluralism it is difficult to enforce any of the by-laws and have all parties satisfied with the judgments.

A similar case was observed at Wigelekelo village in Maswa District where a water user group owning a pond has set regulation for protecting water resources. Fines for encroaching vary between Tsh. 5000 - 20000. District by-laws set a fine of TShs 5000 only for such misconducts. This gives a room for non-compliances. Cases to be handled at community level fail, as offenders would like their cases to be handled elsewhere as they would pay a lower fine.

### ***3.4.2 Current Institutional and Regulatory Mechanisms***

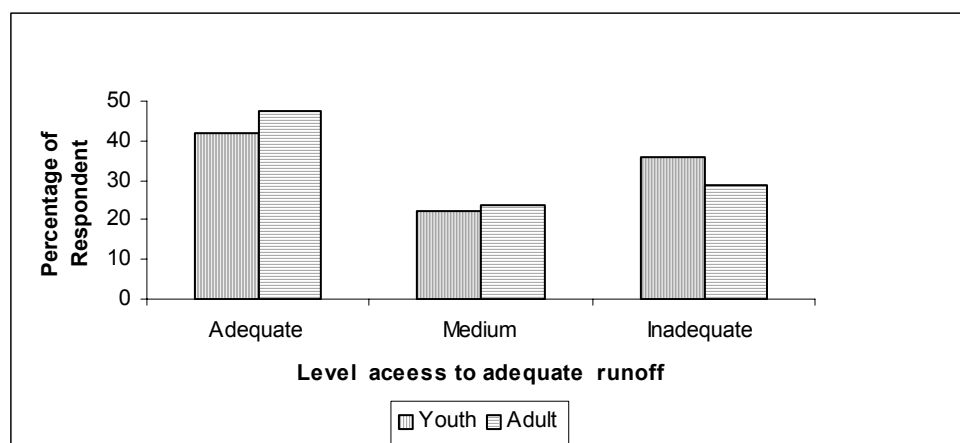
Current institutional and regulatory mechanisms limit access to CPR. For example, in Maswa the rich have more access to runoff compared to the poor, and in WPLL the disadvantaged (youth, women and poor) have less access to runoff compared to the powerful groups (elders, men and rich). Baseline levels of 2002 showed a high level of gender inequality in the composition of different CPR institutions. For example, in Tae (WPLL) and Bukangilija (Maswa) villages, women in CPR management committees constituted 23%, and 15% respectively. The national target was to have a composition of 25% women in year 2000.

### ***Access to runoff by Different Socio-economic Groups***

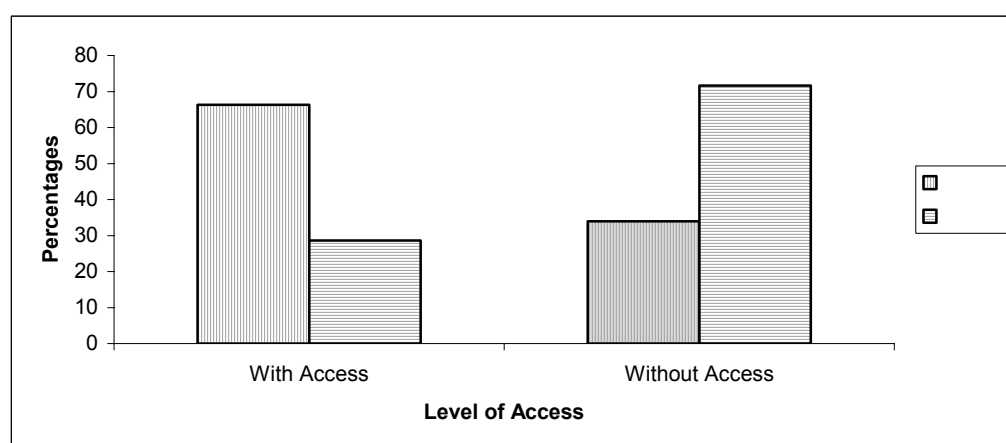
Differential access to runoff was noted across different socio-economic groups. Generally distribution favours more elders, men, and rich while marginalizing youths, women and the poor. The access levels were rated as adequate (adequate access above 67%), medium (adequate access between 33 and 67%) and inadequate (adequate access below 33%). Such results are indicating a general trend that weak groups get little benefits from RWH systems although the differences were not significant (figure 10-15).

### *Access to Runoff by Age*

Results revealed that in WPLL and Maswa elder farmer had better access to runoff than youth. In WPLL 45% of elder farmers had adequate access to runoff compared to 42% of youths while in Maswa 66% of elder had access to runoff compared to 29% of youths (Figures 10 and 11). In both sites, access to runoff is related to land tenure. Elder farmers occupy areas close to water while youth have their farms located at marginal areas with difficult access to runoff. However, there was no significant difference between level of access to runoff between youths and elderly farmers.



**Figure 10:** Access to runoff in RWH systems by age in WPLL



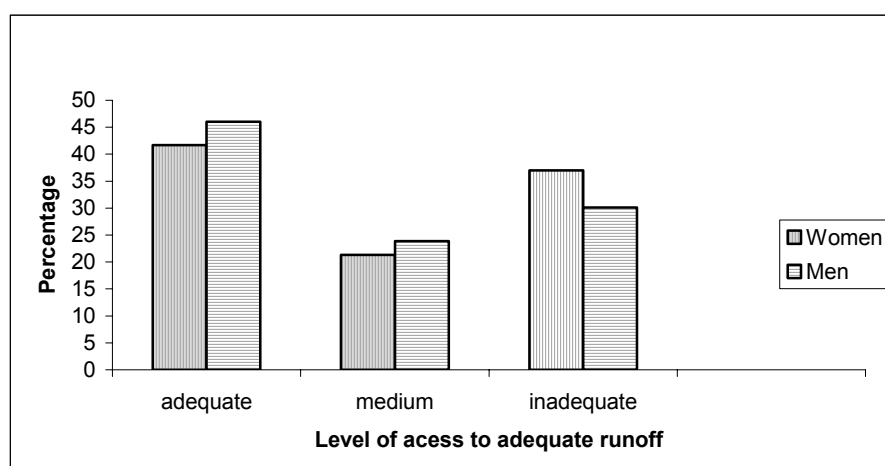
**Figure 11:** Access to runoff in RWH systems by age in Maswa

### *Access to runoff by Sex*

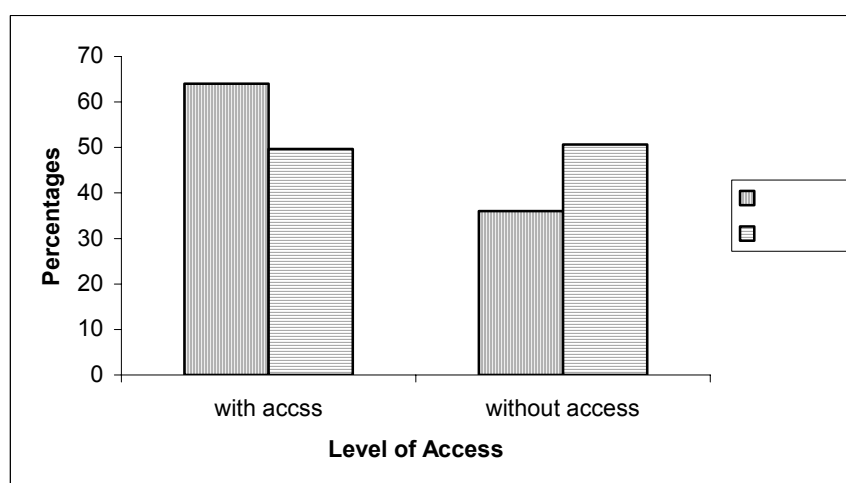
Men had better access to runoff than women in both WPLL and Maswa (Figures 12 and 13). In WPLL, 46% of men had access to adequate runoff compared to 41% of women while in Maswa 64% of men compared to 50% of women, had access to runoff. However, there was no statistical significant difference between level of access to runoff between male and female farmers. The differential accesses depicted here are backed by traditions. In both sites, traditional system gives men more access to land than women. Women are not normally inherited from their parents. Women can acquire land with access to runoff through purchase. This involves women with special skills like handcraft and tradition healers, through which they can generate incomes. Other, reason for differential access to runoff that is men dominate institutions for runoff management and women participation in decision making for runoff management is relatively poor. As it is shown in section 3.2.2, women normally put more time in the maintenance of RWH system and put less time in



planning for runoff use and allocation as compared to men.



**Figure 12: Access to runoff in RWH systems by sex in WPLL**

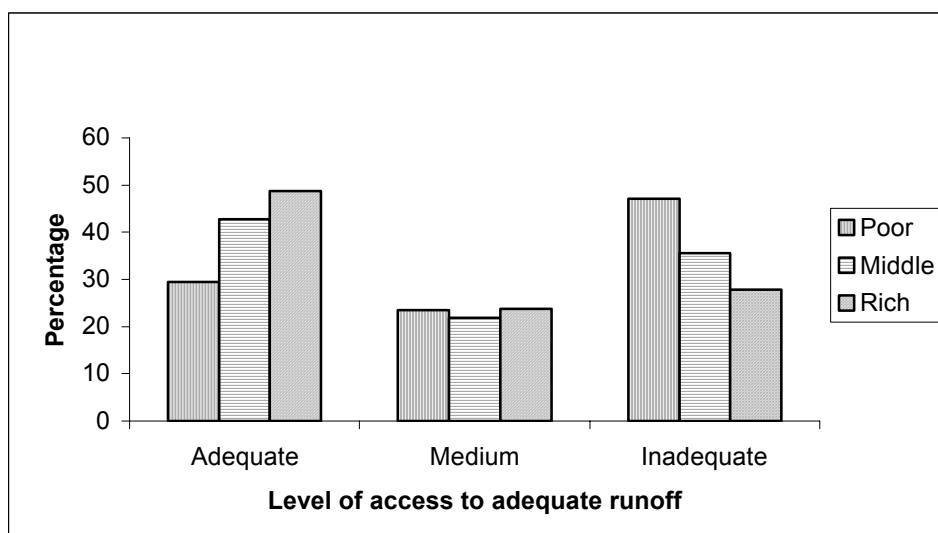


**Figure 13: Access to runoff in RWH systems by Sex in Maswa District**

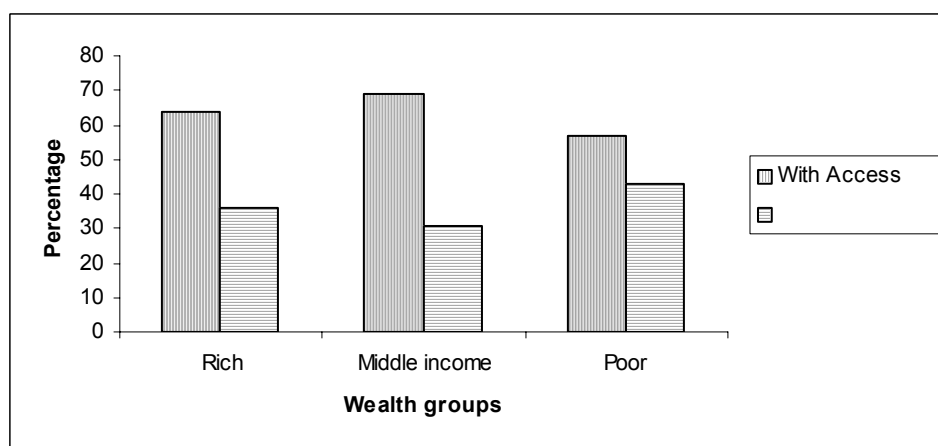
### ***Access to runoff by Wealth***

Results depicted in figures 14 and 15 indicate that there was differential access to runoff between farmers of different wealth categories in both WPLL and Maswa. Although the difference in level of access between poor and rich farmers was not statistically significant, the pattern is so distinct in WPLL than in Maswa. In WPLL the rich group had good access to runoff followed by medium and lastly the poor. In Maswa, having farm plot located at the area close to runoff source assures one an access to runoff as there is no clear pattern of runoff distribution regime. RWH is practiced for rice production using excavated bunded basins. In that system, runoff is harnessed and stored in a basin. There is no rich vs poor struggle for runoff during allocation.

In WPLL, RWH system is such that runoff is first collected in communal ponds and then distributed to farmers using a known allocation regime. There are cases where runoff is directly allocated to farmers without going through storage structures. In WPLL having farm plot close to sources of increases chances of accessing runoff but compliances to allocation regimes is also vital therefore, rich vs poor struggles for runoff vivid.



**Figure 14:** Access to runoff in RWH systems by wealth in WPLL



**Figure 15:** Access to runoff in RWH systems by wealth in Maswa District

### ***3.4.3 Proposed Improvements in Institutional and Regulatory Systems***

Through participatory workshops, improvements on institutional and regulatory systems were proposed. These aimed at facilitating equitable access to runoff and related CPR and re discussed below.

#### ***Formation of autonomous village land committees.***

Villagers proposed changes in land management committees. This entails formation of an autonomous committee for village land management. The proposal is aimed at replacing the current set up where land management issues are held under social welfare committees which also deals with health, water, and education development matters in the village. The current set up does not give enough respect to land matters. The proposed land committee would have sub committees for residential land development, agriculture land management and grazing land management.

***Coordination between primary court and village government should be improved.***

Organs dealing with CPR management conflicts include, primary courts, village government and resources user groups. Primary courts are however superior to all others. So when compromise is not reached at lower levels, cases are sent to courts. In practice rulings by village governments are often reversed by the court, which use national laws. This implies that there is lack of harmonisation of tools (laws and by-laws) used by these two organs and hence a need for coordination.

***Preparation of Land use plans to demarcate grazing and agricultural land.***

All the target villages lacked proper land use plans. This led to inequitable access to land by different users. Often this causes conflicts among village members especially between agriculturalists and pastoralists and even among pastoralists themselves. This proposal is aimed at addressing this weakness and improving the management of CPR (land).

***Harmonization of contradictory by-laws, regulations, traditions and customs.***

Weaknesses noted in both study sites included, setting different fines for similar offences by different by laws, traditions and norms. Dealing with non-compliances in such an environment becomes difficult. The above proposal was made by villagers to address this problem.

***More representation of youths and women in leadership.***

It was observed that participation of women and youth in CPR management was low and this was associated with having little representation in decision-making organs. This has impact on their access to resources and subsequently in their livelihoods. Their representation should be improved in leadership at all levels of administration so as to attract groups in participating fully in all activities related to management of CPR. Such improvement should be coupled with empowerment by sensitising the community to discard the traditions and norms that keep women away from active participation (including land ownership) and training for confidence building.

In addition, the following aspects could be considered to improve the current institutional and regulatory systems:

- establishment of an appropriate planning forum in the districts and wards that would convene representatives from the various sectors engaged in CPR management
- establishment of catchment water committees where necessary
- facilitation of resources-user groups (e.g. water-user groups) to register as CBO or association to give them legal recognition.
- development of low cost, effective and efficient technologies to minimize transaction costs of managing RWH systems.

It has, however, been observed that most of the decision makers do not respect rules agreed by local institutions. This includes court not respecting village by-laws, village leaders not respecting agreements by local institutions, e.g. committee for distributing runoff and individuals not abiding to village by-laws. To make sure that the proposed improvements are respected by the decision makers the following is proposed:

- Since court is the highly respected institution in the communities, all by-law should be recognised by the judicial system to make them effective

- Establishment of liaison judicially post at community level to create awareness and to advice the community during establishment of by-laws so as to remove possible contradiction with national laws

### **3.5 Tenure and Management Approaches for Equitable Access to CPR**

#### ***3.5.1 Current Approaches to Tenure and Management of CPR***

There were no major differences in the forms and distribution of land tenure systems in both study sites. Agricultural land could be acquired mainly through inheritance. Other forms of land tenure, such as purchasing and renting, exist at a minimum level (Annex B6). Contrary to WPLL, in Maswa District no agricultural land could be acquired through village government. This is because most of the land was found already under customary ownership long before the statutory land act which gives mandate to village to allocate land was enacted. Village government is there only to witness and document the agreement between land seeker and landowner. Spatial distribution of land tenure systems revealed that most of the suitable agricultural land (located close to water sources) is inherited. This has resulted into only few people along certain clan lines to access suitable land while the majority occupy marginal land. As opposed to WPLL, in Maswa District all grazing land is privately owned. There is no common grazing land. The agropastoral community usually graze their livestock on fallow land (the practice commonly referred to as “ngitiri”) and on privately owned non-agricultural land. The village government as an administrative organ is responsible for overseeing CPR management activities in the village.). Some of the weaknesses in the current tenure and management approaches are as itemized as follows:

- i) Acquisition of land through inheritance has confined access to suitable agricultural land to few people. In Tae village, for example, arable land could be left fallow for a long period simply because it belongs to someone by inheritance. People are not willing to rent out their land to others because of lack of trust. A number of cases have been reported to the village government on land conflicts because of failure by one part to honour verbal agreements.
- ii) Existing tradition and customs do not give room for the women to own land. This is because in most cases, inheritance is mainly patrilineal in character. The participants also revealed that some people in the villages hoard a lot of land for grazing livestock while others have no access to land for agriculture. There are no village land use plans.
- iii) Lack of land use plans

#### ***3.5.2 Proposed improvements in Approaches to Tenure and Management of CPR***

The proposals for improvement of current tenure and management of CPR varied among the study villages. Most of farmers in Maswa District had the opinion that the existing land tenure system has no problems since it has been practiced comfortably over the years. However, in Makanya village (WPLL), farmers said that any change would be possible if water is made available even in the periphery. On the contrary, farmers in Tae and Mwembe villages (WPLL) proposed changes in the current land tenure system. They proposed that the village government should look for ways of redistributing suitable arable land to the majority. However, after a long debate the following approaches to tenure and management of CPR were agreed:

- i) Simplified procedure for acquiring land leases to farmers.
- ii) Water allocation should consider spatial and seasonal aspects, and
- iii) Capacity building of local leadership and communities on land policy and laws.

All this is provided in the Land Acts but it has not diffused down to grass root institutions. This shows that there is a gap between national level and grass root practices in aspects of land management. The major reasons could be due to the fact that the Land Acts are very few and in English language, which is not known to the majority of the local communities. To

raise communities' awareness on the existing policies and laws it is therefore proposed that the policies and laws should be translated into Swahili and distributed widely.

### **3.6 Guidelines for making CPR management plans**

The process of developing guideline for CPR management involved collecting information and data for planning, an understanding of features of existing plans and communication and negotiation mechanism. Initial draft guideline was produced, piloted and refined. The results are briefly discussed in the following sub-sections.

#### ***3.6.1 Information and data for CPR management planning***

Through discussion with farmers, the following minimum requirements of information and data for planning in relation to CPR management at community level were established and the extent and constraints of meeting these requirements assessed:

Information and data:

- Amount of runoff generated from the catchment,
- Amount of lands that can be supported by available water,
- Alternative enterprises in which the available water can be used,
- Water needs of up stream and down stream stakeholders,
- Infield water management techniques,
- Existing CPR management institutions and their capacity,
- Technical knowledge on designing of RWH infrastructures, and
- Where to locate reserve pasture land ("Mlimbiko").

#### ***3.6.2 Key Features of Plans at Community to District Level***

The findings for key features of plans at community to district level and how they are linked and influenced by national level policies and strategies are presented in Annex B12. In summary, the findings showed that:

- i) There are no clear operational plans and transparency in the Ward Development Committee.
- ii) There is no organ responsible for managing CPR shared by more than one village.
- iii) There is little integration between sectoral plans at different administrative levels.
- iv) The DADPs have not shown strong linkage with other sectoral development plans

#### ***3.6.3 Communication and negotiation mechanisms***

Through a case study in WPLL involving the siting of a water reservoir for crop production, domestic and livestock water supply, the following was observed:

- i) Communication between different stakeholders is difficult. Makanya and Mgwasi representatives failed to reach a compromise on where to locate a water reservoir. Mgwasi village leadership rejected the location proposed by Makanya leadership because they would lose much of their land for agriculture and settlement.
- ii) Use of a non-biased external party, as dialogue mediator, can be essential for ensuring common understanding among the stakeholders. After failure of having fruitful communication with Mgwasi leaderships, Makanya consulted SWMRG to become a mediator to rescue the dialogue from collapsing.
- iii) Negotiation mechanism is a forward and backward process. For example, it was previously agreed in joint village government meeting on June 2004 that suitable sites for reservoir projects were Kavengere and Sisamo because both Makanya and Mgwasi

villages would benefit from the project. Later, sub village meetings and village assembly in Makanya refused the proposal.

- iv) There is a limit to both participatory and technical approaches. Whereas technical approach will be biased towards top-down approach, participatory methods assist in exposing the conflicts of interest without necessarily providing concrete answers to the problems. Use of the two approaches is thus useful and necessary

### ***3.6.4 Development, Piloting and Refining Planning Guidelines***

The development and refining of the planning guidelines was a continuous process, which entailed several steps. It started with deskwork from which an initial draft guideline, referred to as a planning matrix, was produced (Appendix 1).

The key feature of the matrix is community participation. Testing of the planning matrix showed that modification were required in the following areas:

- Community participation: It was previously thought that feedback be sought from village assembly meetings. After piloting the guidelines it was noted that active community participation would be improved by soliciting feedback from sub village level.
- Inclusion of scientific information is necessary for negotiating parties to have basis for making sound decisions.

In developing the guidelines, some key issues were observed:

- Participatory planning should start at low level of administrative units for wide and active participation,
- Negotiation between stakeholders needs a third party for mediation,
- Technical input is important in participatory planning,
- Participatory planning is time consuming and entails transaction costs, and
- Financial constraint (to do technical studies) can hinder or delay participatory planning.

### **3.7 Enhancing Capacity of stakeholders in CPR management**

Enhancing the capacity of stakeholders in CPR management entailed the following: i) identification of training needs, ii) development of communication products and iii) facilitation of training and awareness rising. The results are presented in the following sub-sections.

#### ***3.7.1 Training Needs***

Training and information needs for comprehensive planning for CPR management were identified and are presented in Annex B7. Results indicated that planners and policy makers at District level need training in approaches for linking their plans and programmes with the requirements of national policies, strategies and legislations. Such policies and strategies include:

- National Agriculture and Livestock Policy (1997),
- National Land Policy (1995)
- Cooperatives Development Policy (1998),
- Village Land Act No. 5 (1999)
- Agriculture Sector Development Strategy (ASDS 2003), and
- Agriculture Sector Development Programme (ASDP 2004).

Furthermore, the stakeholders identified training in the participatory analysis and formulation of legal and regulatory mechanisms for managing runoff and related CPRs. At community level the most burning issues were:

- Equitable access to runoff and related CPR,
- Prevention and management of conflicts, and
- Approaches for reducing and mitigating the effects of conflicts arising from the use of runoff and other related CPR.

### ***3.7.2 Communication Products***

In order to meet the identified training needs, the following communication products were developed and produced.

#### ***Planning Guide***

A leaflet on planning guide for development of small scale RWH project at catchment level was developed. The leaflet (Annex B15) introduces six steps (project identification, participatory project planning, initial feasibility study of the project, preparation of comprehensive plan, implementation and project monitoring and evaluation) to participatory planning. The leaflet is based on the experience from the process of developing a runoff reservoir project in Makanya River catchment (Annex B8). The process of developing the training materials is described fully in Annexes B9. The process was participatory and the most important outcomes have been the views of target users, on what aspects they would like to see contained in the guideline. A total of 16 feedback meetings were held and 663 people were consulted.

#### ***Maps (in a form of posters)***

Three posters were produced and disseminated to all study villages and Districts. The posters depict information on agricultural land suitability, tenure systems and land use conversion (Annex B16)

#### ***RWH technologies in a form of cassettes, CDs and Radio Programmes (Gathering in the rain: communicating RWH in Tanzania and beyond)***

The series "Gathering in the Rain" contains 4 programmes: Living in a dry place, harvesting the rain, communicating and succeeding and spreading the message. This was made by BBC in collaboration with Sokoine University of Agriculture (SUA), the Natural Resources Systems Programme (NRSP) and the Natural Resources Institute of the University of Greenwich.

### ***3.7.3 Training and awareness raising***

A total of three trainings covering topics on assessment of spatial and temporal distribution of CPR: use of remote sensing and GIS and farm budget were implemented concurrently with participatory workshops. The first training was conducted between 3rd and 5th June 2003 in Maswa District and involved 63 participants. The participants included District extension officers, local councillors, District Agricultural and Livestock Development Officer (DALDO) from Maswa, Subject Matter Specialist (irrigation, livestock, crops, natural resources and land use) and staff from Participatory Irrigation Development Project (PIDP). The workshop made several recommendations some of which include the following:

- Training should be given to people and various organizations through seminars, brochures, and workshops,
- Districts should work out and put in place participatory investment in RWH projects,



- There should be plans and policies that assure the availability of market and better price for agricultural crops and other agricultural/Livestock goods,
- There should be officially recognized institution(s)/organization to manage CPR at catchment level,
- There should be enforcement of by-laws and regulations that govern the management of CPR,
- There should be strategies for mitigating conflicts at all levels,
- The districts should launch an agricultural development trust fund,
- Information on water availability and the fertility status of soils should be made available and if possible geo-referenced.

The second training was conducted between 22<sup>nd</sup> and 25<sup>th</sup> September 2003 in Same District and involved 40 participants. The participants included District and village extension officers, local councillors, Ward Executive Officers, District Agricultural and Livestock Development Officer (DALDO) from Maswa, Subject Matter Specialist (irrigation, livestock, crops, natural resources and land use) and farmers. The workshop made several recommendations some of which include the following:

- Crop growers, livestock keepers and extension agents should be trained on simple and appropriate RWH technology,
- District councils should budget for RWH activities, ensure availability of inputs and consider subsidies in order to improve agriculture and livestock.,
- There should be in place, a strategy that will enable agricultural extension agents to reach farmers,
- Wards and villages development plans should include strategies for conservation of environment,
- There should be strategies for sustainable protection and conservation of water sources, environment and rainwater/irrigation structures,
- Laws meant for management of common pool resources (water, land etc.) have to be amended to suit current situation,
- Build capacities of farmers on seeking markets for different crops
- Information has to be made available to farmers via radio, newspapers, leaflets, public meetings, seminars, workshops, and study tours for farmers, leaders and experts
- Groups of farmers, community development department and non-governmental organizations be trained on participatory approach in planning.

The third training was conducted between 23<sup>rd</sup> to 24<sup>th</sup> October 2004 in Same District and involved 42 participants. The participants included District and village extension officers, local councillors, Ward Executive Officers, District Agricultural and Livestock Development Officer (DALDO) from Maswa, Subject Matter Specialist (irrigation, livestock, crops, natural resources and land use) and farmers. The most important issues discussed in the workshop include the following:

- Tenure and management approaches to CPR management: the participants proposed the following approaches to tenure and management:
  - o Simplified procedure for acquiring land leases to farmers,
  - o Water allocation should consider spatial and seasonal aspects, and
  - o Capacity building to local leadership and communities on land policy and laws.
- Institutional and regulatory mechanism: the participants proposed the following institutional and regulatory systems:

- o Formation of autonomous committees for land management in villages with sub committees for residential land development, agriculture land management and grazing land management,
- o Coordination between primary court and village government be improved,
- o Land use plans to demarcate grazing and agricultural land be prepared to reduce farmer vs pastoralists conflicts,
- o Contradictory by-laws, regulations, traditions and customs should be harmonised, and
- o More representation of youth and women in leadership at all levels of administration.

### **3.8 Strengthening Community Capacity to Manage CPR: A Broader Context**

Experience from this project indicates some similarities with other CPR studies. Lily et., al (2002) argued that local community have alliance with institutions fostering irrigation (CPR) systems development. Local people need to have irrigation systems built, rehabilitated or improved and left work under users control meaning that the community should assume resource allocation, infrastructure maintenance, conflict resolutions and establish norms to regulate and conducts all irrigation related activities. However, there are many noted failures in attempts to establish fully community management and society system. This is due to lack of attention to water rights, lack of compatibility among the introduced technologies, user management capacities and inadequate orientation in how this capacities have to be strengthened. The later is associated with assumptions that official regulation to water control is sufficient and adequate to induce necessary capacity to manage the water/ irrigation / RWH systems. This has lead the conclusion that many institutions assisting in irrigation /RWH systems lack proper methodologies and concepts to be able to work in and with the normative framework of the system their involved in.

Experience from this project indicate that conflict over use of CPR (RWH) is a common phenomenon, conflict come when one segment of the community feels that their interest might be threatened during planning and eventually implementing the RWH project. Conflicting ideas on where to locate a dam in Makanya watershed (SWMRG, 2005) is a typical case. Initial idea was to locate the dam near the boundary of two villages (one upstream and there other down stream) in a location where the upstream would provide land for the dam construction without benefiting from runoff. That plan was denied by the upsteam villages and proposed to revise the plan and locate the dam where both of the two villages would benefit from the project. The downstream villagers also were against the project unless they were guaranteed the same amount of runoff as they used to have before project. Gerben & Paul (2002) report similar conflict in the construction of Lake Totorá, in Bolivia. The Totorá was extension of shallow lake that supported livelihoods of some communities. The community that was used to benefit from the shallow lake were afraid to loose control over its water and operation of the dam. The project committed before hand that it would guarantee the local communities the same amount of water as the former capacity of the reservoir and that ended their opposition. However, construction of lake Totorá caused conflict between two territories Tiraque (up where dam had to be located) and Punata downstream territory. The conflict arose on the distribution of additional water from lake Totorá. The project was of the opinion that additional water after the project allocated to Punata communities as much of the areas to benefit from the project in Tiraque had already received runoff from the river and other sources. Tiraque communities argued that they had priority right to water as the lake was located in their territory and only excess water could

flow down stream to Punata. However, after lengthy discussions the two parties reached a consensus and used the project conception to obtain access to the additional water.

Rutgerd et al. (2002) reported similar experience in Andean countries, lack of watershed and basin-level management of water resources for multiple, integrated usage. This was cited as a major source of conflicts in the Andean countries. Situation in European countries depicted a different picture in the water resources management. In Spain there is Hydrographic Basin Confederation, in Netherlands there is Multi- sectoral water Boards and in France there is river basins that regulate water use,

#### 4 Conclusions

The management of CPR is a multi-sectoral activity that requires an effective collaboration and coordination mechanisms among different stakeholders at different levels. This calls for institutional, tenure, management and regulatory systems to facilitate equitable access to CPR by socio-economic groups whose livelihoods depend on CPR. To facilitate this, guidelines for making management plans that protect the interest of the poor and sidelined sectors while ensuring optimum and sustainable benefits to the communities are vital. Since integrated CPR management is a complex phenomenon, capacity of stakeholders to plan, negotiate and implement institutional, regulatory and management systems for CPR need to be enhanced.

The study has identified key issues for CPR management and grouped them into institutional aspects, tenure and management of resources and capacity building needed for improved CPR management. On institutional aspects research results have shown that:

- i). There are variation, in terms of number and nature, of organs for CPR management from village to village.
- ii). A high level of inequity exists as far as gender representation in the organs responsible for CPR management is concerned. In all the surveyed villages, composition of membership of organs is skewed towards men. Women are less represented partly because of cultural barriers.
- iii). Although there is a link between the DADPs and ASDS, the DADPs have not shown strong linkage with other sector development plans. For example, the link with departments of land, water and forestry is not well articulated in the plans. There is a lack of appropriate planning forum in the district.
- iv). In most target villages there are no specific organs that are responsible for management of village land although village land act of 1999 allows for it.
- v). In both areas there are also no catchment water committees and hence the absence water management plans.
- vi). The existing Ward tribunals are responsible for managing all conflicts occurring in the community but they lack competence on hydrological matters.
- vii). To a large extent local level plans and institutional and regulatory mechanisms have poor linkage with the national policies, strategies and legislation.

Weaknesses on the current land and runoff tenure system have been observed. The tenure system that is largely guided by existing tradition and customs does not give equitable opportunities between men and women; elders and youth; and old and new residents to own land. Moreover, some villagers hoard a lot of land (*milimbiko*) for grazing and also local political leaders allocate village land for residence and agriculture without mandate to do so. Besides, in all targeted villages there are no village land use plans. Also, land conflicts brought before the primary courts take too long to reach judgments. Regarding RWH management, only a few people have full control. Furthermore, there are conflicts between

council by-laws and those of village and resource user groups and there are CPR management organs that are not registered therefore they face a number of constraints.

Management of RWH systems involves transactions costs incurred in both fiscal and time dimensions. The poor and politically weak groups incurred higher transaction costs than powerful groups. However, distribution of benefits from RWH systems favoured more powerful groups.

## 5 References

- Adhikari, B. (2001) Literature Review on the Economics of common Property Resources. Report Prepared for NRSP Project R7857
- Falconer, K. (2000) Farm-Level Constraints on Agri-Environmental Scheme Participation: A Transactional Perspective. *Journal of Rural Studies*, :379-394)
- Gerben G. and Paul H. (2002) Materializing: Hydraulic Property in the Extension and Rehabilitation of two Irrigation Systems in Bolivia. In *Water rights and Empowerment* (edited by Rutgerd Boelens and Paul Hoogendam). Van Gorcum, Assen, The Netherlands, pp 36-50.
- Hatibu, N., H.F Mahoo, E.A. Lazaro, F. B. Rwehumbiza, P. Okbal and M. Makumbi (2000) The Contribution of Soil and Water Conservation to Sustainable Livelihoods in sub-Saharan Africa. AgRen Network Paper No. 102
- Huggins, C. (2000) Rural Water Tenure in East Africa: A comparative Study of Legal Regimes and Community Responses to Changing Tenure Patterns in Tanzania and Kenya. Land Tenure Center, University of Wisconsin, Madison
- Knox, A. and Gupta, S. (2000) CAPRI Technical Workshop on Watershed Management Institutions: A Summary Paper. CAPRI Working Paper no. 08. International Food Policy Research Institute, Washington, DC
- Lerise (1997) Planning at the End of the River: Land and Water Use Management in Chekereni Moshi District Tanzania. Ph.D Dissertation, Institute of Town and Landscape Planning, School of Architecture. The Royal Danish Academy-Copenhagen
- Lily B., Rutgerd, B., and Paul H. (2002). Water rights and Collective Actions in Community Irrigation. In *Water rights and Empowerment* (edited by Rutgerd Boelens and Paul Hoogendam). Van Gorcum, Assen, The Netherlands, pp 1-19.
- Lovett J., H. Kiwasila, S Stevenson, N. Pallangyo, C. Muganga, and C. Quinn (2001) Review of Common Resources in Tanzania. Draft Final Technical Report Prepared for NRSP Project R7857. Centre for Ecology, Law and Policy, University of York.
- National Bureau of Statistics (NBS) (2001) District Integrated Agricultural Survey: Kilimanjaro Report, Dar es Salaam, Tanzania
- Rutgerd B., Axel D., Alfredo D., Paul H. (2002). Water rights and Watersheds. Managing multiple uses and Strengthening Stakeholder Platform. In *Water rights and Empowerment* (edited by Rutgerd Boelens and Paul Hoogendam). Van Gorcum, Assen, The Netherlands, pp 110 -142.
- Rutherford, Stuart (2000). *The Poor and Their Money*. New Delhi, Oxford University Press,
- Scott, C.A. and Silva-Ochoa, P. (2001) Collective Action for Water Harvesting Irrigation in the Lerma-Chapala Basin, Mexico. CAPRI Working Paper no. 20. International Food Policy Research Institute, Washington, DC
- Shinyanga Region (1998) Shinyanga Human Development Report, Shinyanga Regional Commissioner, Shinyanga, Tanzania
- Sick, D. 2002. Managing Environmental Process Across Boundaries: A Review of Literature on Institutions and Resource Management. Minga Program Initiative International Development Research Council, Ottawa.
- Soil Water Management Research Group (2005). Catchment Level Participatory Planning: a case study of Runoff Reservoir Project in Makanya Catchment, Western Pare Lowlands, Tanzania. Annex B\_8 of Final Technical Report of NRSP project R8116 Improving Management of Common Pool Resources in RWH Systems.
- SWMRG (2001) Assessment of Rainwater Harvesting and Demand Efficacy. Draft Final Technical Report. Annex D: Consultation on Training Needs and Materials for Promotion of RWH. SWMRG, Morogoro, Tanzania.

- United Republic of Tanzania (URT) (1999) Village Land Act No. 5 of 1999. Government Gazette, Dar-es-Salaam.
- United Republic of Tanzania (URT) (2001a) Water Policy. Dar-es-Salaam.
- United Republic of Tanzania (URT) (2001b) Rural Development Strategy. Dar-es-Salaam.
- United Republic of Tanzania (URT) (2001c) Agricultural Sector Development Strategy. Dar-es-Salaam. Ministry of Agriculture, Dar-es-Salaam.
- William T.O (1998). Multiple uses of CPR in Semi Arid West Africa: A survey of Existing practices and options for Sustainable Resource Management. ODI Natural resource Perspectives Paper no. 38. <http://www.odi.org.uk/nrp/38.html>