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Resources in Rainwater Harvesting Systems

ANNEX B14

**Transaction Costs in the management of Common Pool Resources
in Rainwater Harvesting Systems in
Western Pare lowlands and Maswa District, Tanzania**

Soil-Water Management Research Group

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Summary

Wide adoption of RWH in Tanzania is leading to changes in tenure, access and management of runoff and related Common Pool Resources (CPR). Management of RWH system entails transaction costs. When transaction costs become high or are perceived to be high, they limit participation of some socio-economic groups in the management of the system and hence limit them from accessing the resource. The overall objective of the research was to assess transaction costs in the management of RWH systems and their effects on the poor.

The research was conducted in two target sites, representing semi-arid areas of Tanzania. The locations were 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. Participatory methods employed included Focus Group Discussions (FGDs) and Key Informants' meetings and participatory method was questionnaire survey. Through these techniques information on transaction costs were collected. Analysis was carried out using mainly descriptive statistics and cross tabulations. Results indicated that transaction costs of managing RWH system included costs of planning for runoff use, runoff allocation, maintenance of the RWH systems, enforcement of regulations and conflict management. The highest transaction costs of managing RWH systems were in system maintenance. It was learnt that rich people put more cash in RWH system maintenance than other groups. Women's transaction costs were less in planning for runoff use and allocation indicating that they are not normally involved in those transaction costs activities. The general trend indicated that women spent more time than cash. The poor farmers spent more time in conflict management than any other group, indicating their vulnerability and therefore squeezed in resource sharing.

Abbreviations

WPLL	Western Pare Lowland
RWH	Rainwater Harvesting
FGD	Focus Group Discussions
CPR	Common Pool Resources
BCR	Benefit to Cost Ratio

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1. Introduction

Rainwater harvesting (RWH) technologies are widely practiced in semi-arid Tanzania. The major aim is to improve availability of water for different purposes. RWH techniques range from *in-situ* methods to macro-catchment techniques and they involve diverting and storing flows from ephemeral streams and gullies (Hatibu *et al.*, 2000). Macro-catchment RWH connects not only pieces of land but also different socio economic groups undertaking different economic activities like farming and livestock keeping. Within each group there exist differences along gender, age and wealth dimensions. Some institutions (formal and informal) have evolved over time to govern these RWH systems. Institutions are contractual arrangements that regulate social behaviour agreed by all members of society (North, 1981; 1990). Institutions encompass a set of constraints on behaviour in form of rules and regulations, procedures and finally a way in which rules and regulations are specified and enforced. According to North (1981, 1990) framework is based on three economic assumptions, which are:

- i). Individualistic behavioural assumptions
- ii). Specifying and enforcing rules underlying contract is costly and
- iii). Ideology modifies maximizing behaviour.

As was observed by North (1981, 1990), the management of RWH systems just like other CPR, have a lot of transaction costs. Transaction costs in RWH system include the costs of time spent in meetings, monitoring of resource use and improvement (Barrett *et al.*, 2001; Buchy and Race 2001; Easty and Mendalohn 1998; Gibson and Becker 2000; Gibson *et al.*, 2000; Thomson *et al.*, 1992 and Sick, 2002). Other transaction costs include labour and the time individuals spend in collective management activities. Since RWH systems are run through collective actions, ideally all beneficiaries should share transaction costs and benefits accruing from the system. The management of RWH systems may break if transaction costs exceed benefits and may lead to the free riding phenomenon (Ostrom, 1999, Lovett *et al.*; 2001, Adhikari 2002). 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 society such as, gender, age, enterprise or occupation, ethnicity and ideological orientations. These groups are often engaged in a struggle for resources and power (Sick, 2002)

High transaction costs may limit participation of the marginal groups in a community such as women, youth and the poor in the collective management of CPR (Sick, 2002; Lovett *et al.*,

2001). Consequently, this limits access to resources by the poor and posing unfair community resource distribution. Livelihoods of the poor and politically weak groups are likely to be severely affected as their dependence on CPR are relatively high. One way of coping with effects of transaction costs on differential access to CPR is to have various arrangements that can accommodate individual group's needs in resource management activities (Varughese, 2000). For instance while some individuals may contribute time, others may make cash contributions in collective resource management.

Although much has been done worldwide in terms of research on the management of CPR, little attention has been devoted to study transaction costs in CPR management. Few studies have been conducted in Tanzania to address the phenomenon of transaction costs in CPR management (Lovett *et al*, 2001; Shivji, 2002). Levit *et al*. (2002) reported that transaction costs are set backs in CPR management in the semi-arid areas of Tanzania. Shivji (2002) analysed issues of village governance and CPR in Tanzania. None of the two authors have estimated transaction costs and their effects on access to the CPR. This study analyses the transaction costs in the management of RWH systems with CPR nature. Some pertinent questions to be addressed include: What kind of transaction costs do farmers incur in collective management of RWH systems? Is transaction costs limiting access to runoff by different social groups?

2. Methodology of data gathering and analyses

Participatory Rural Appraisal techniques were used during initial stages of primary data collection. This stage was set to acquire background information about village and farming households. The PRA team included village extension officers, village leaders, members of village committees and selected key informants representing different socio-economic groups in the village. The PRA tools used were Focus Group Discussion (FGD) and Key Informant meetings. Information collected included livelihoods options in the village, access to production resources mainly land and water, RWH practices, equity issues in access and use of run off, management of RWH systems, institutions responsible for management of RWH systems and their performance and the transaction costs in RWH system management. Information from PRA formed a base for household questionnaire design. The exercise also created mutual understanding between the research team and the local community, which made subsequent stages of data collection easy and successful.

2.1. Questionnaire survey

In order to investigate types and amount of transaction costs in management of RWH systems questionnaires (annex B3 and B4) were developed. The first questionnaire was for gathering information about RWH systems and degree and reasons for non-compliances to joint action activities related to RWH system management. The second questionnaire covered basic information of respondents, CPR use and management, access to CPR, transaction costs related to decision making, RWH system management, regulation enforcement and conflict resolution. The questionnaires targeted households. Data collected included actual monetary costs and time that households incurred in the management of RWH systems and related CPR for 2002/2003-production season. Reasons for not participating in CPR management in case of non-compliance was also important information gathered through the questionnaire survey. The first round questionnaire survey covered 1196 respondents, 600 from Maswa and 596 in WPLL. The second round survey, which mainly concentrated in quantification of transaction costs, involved 379 respondents in Makanya catchment, WPLL.

2.2. Data analysis

Type of transaction costs were ranked using pair wise ranking matrix according to their importance in limiting access to CPR. Computer programmes (M/S Excel and SPSS) were used to process the data gathered through questionnaire. Descriptive statistics and cross tabulations were mainly used.

Calculating transaction costs

Transaction costs was split into costs for planning CPR use, resource distribution, common RWH infrastructure maintenance, compliance to regulation and conflict management. Transaction costs of each component were estimated by considering direct fiscal costs and time (man-hours) that respondent spent to pursue specific transaction activity. Time was monetised using opportunity costs of time in WPLL, which was Tshs 1,500 per day, the amount paid by the private company. Magnitude of total transaction was the sum of transaction costs of every transaction cost components.

3. Results and Discussions

3.1. Transaction costs in RWH management from focus group discussion in WPLL.

Participants in the focus group discussions identified various kinds of transaction costs in the management and distribution of runoff. They then ranked the transaction costs in their order of importance as shown in Box 1.

Box 1: Transaction costs in RWH management systems

- Time spent in meetings
- Time spent in overseeing collective maintenance works
- Time spent to distribute water
- Cost of buying working gears (tools and garments)
- Accidents
- Stationery
- Time spent to collect fines from those who default
- Time spent for conflict management
- Time spent to inspect the canals during the rainy season

Opportunity costs of time spent in various RWH management activities were reported to be high by the participants. Farmers spend time for decision making meetings, attending collective action activities for maintaining RWH systems, water distribution, collecting fines from defaulters and conflicts. RWH systems leaders spend extra costs in inspecting canals after every rainfall event. The time spent for RWH activities would otherwise be put into other productive activities such as working in farms, looking after livestock and working in petty business. However, as food security is of primary importance among many farmers in semi-arid areas, participation in decision-making meetings is important because they guarantee access to runoff. Due to low level of financial capital assets that smallholder farmers own, crop production for household consumption is regarded crucial.

Accidents

Sometimes it rains during night time. As water is very crucial resource in the semi-arid, there is no options to forego it. People have to go and attend their field thus exposing themselves to accidents like snakebites. There are also minor accidents that may involve damage to clothings. Costs of repairing or replacing the tattered clothes were regarded to be high and important among participants during focus group discussions.

Costs of buying clothes and stationery

Costs of buying working gears during rain storms were mentioned as the important transaction costs of managing RWH systems. Canal leaders are the one who affected by this aspect of transaction costs. Normally leaders depend on their own cash to buy working gears like raincoats and gumboots. There are no arrangements for such facilities to be bought by runoff user groups. In some cases, stationary costs are also incurred by canal leaders if no cash from members.

3.2. Transaction costs in RWH management from questionnaire survey in WPLL

Survey results indicated that farmers incur transaction costs in both fiscal and time dimensions. Transaction costs incurred by farmers in the management of RWH systems are presented in Box 2.

Box 2: Transaction Costs in the management of RWH system

- Planning for resource use
- Resource allocation,
- RWH system maintenance,
- Policing/ enforcement of regulations and
- Conflicts management

3.2.1. Planning for resource use

Planning for runoff use involves allocation and scheduling. Normally this occurs soon before the onset of the rainy season and continue throughout the cropping season. For RWH system with storage structure 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 the rainfall events particularly in the highlands. Normally farms located in the lowlands depend on rainfall events in uplands for runoff. However, weekly meetings are normally 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, food and cash contribution for buying stationeries.

3.2.2. *Runoff allocation*

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

3.2.3. *RWH system maintenance*

Maintenance of RWH infrastructures is an important component of transaction costs in managing RWH systems. This involves costs of repairing the canals and the storage structures (*ndiva*). Repairing of canals is normally done during the dry months between August and October. In Makanya, the village government assign a specific canal to hamlet leaders who mobilise fellow residents in repairing the structures. The canal leaders provide technical input during supervision of the repair 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 the communal work, which is locally known as *Msaragambo*. Main canal from which, all secondary canals originate is cleaned by all households with farms served by the canal in terms of transaction costs, fiscal costs are incurred for purchasing working tools, transport and upkeep (food).

3.2.4. *Policing, enforcement of regulation 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 households fail to comply, they are punished as per the regulations that guide management of the system. This practice bears some costs of enforcing the rules and conflict management. A team of 2-5 people is formed to collect cash or materials for those who default. Materials may include furniture, utensils chicken or crop. The defaulters are given an opportunity to appear before a committee to present reasons for not participating in communal activities. If the reasons given are genuine they recover their cash or materials. Otherwise the items are sold. This process involves transaction costs both in time and fiscal dimensions. The fiscal costs are associated with transport, time to track defaulters and self-upkeep during meetings.

3.3. Amount of Transaction and Typology of farmers

Survey results showed that the amount of transaction costs of managing RWH systems varied with farmers' characteristics. The characteristics considered were age, sex and wealth. Table 1 shows differential amount of transaction costs between youths and elder farmers. Overall, the amount of transaction costs incurred by elder farmers were higher than those incurred by the youths in both time and fiscal dimensions. This can be explained by the fact that elder farmers have more access to areas receiving runoff than the youths. Or there is an inequity in allocating runoff. Therefore youths are discouraged to attend communal works of maintaining RWH systems. Comparison of transaction costs in monetary value (Table 2) showed that transaction costs related to law and regulation enforcement was higher ($p=0.01$) for elders than youth and total transaction per annum was statistically different ($p=0.1$) between youths and elders.

Table 1. Amount of transaction costs by age in RWH System management in WPLL

Transaction costs Activities	Amount of transaction costs			
	Fiscal (TShs)		Time (Person-days)	
	Youth	Elder	Youth	Elders
Planning	1320.5	1204.3	4	5
Allocation	1045.8	941.6	3	4
Maintenance	1196.4	1240.5	7	8
Enforcement	1100.4	1434	1	3
Conflict resolution	1063.6	1020	1	2
Overall	5727	5840	17	22

Source: Survey 2002/03

Table 2: Monetary value of transaction costs by age in RWH System management in WPLL

	Youth		Elder		T test for equality of means	
	Mean	SE	Mean	SE	t- value	Significance level
Planning	7145	1115	7875	1162	-0.428	0.335
Allocation	5082	659	6399	1074	-1.107	0.135
Maintenance	1058	1083	11925	1742	-0.716	0.235
Enforcement	2487	325	4542	881	-2.47	0.007
Conflict resolution	2312	365	3747	1254	-1.179	0.121
Overall	19579	1712	24352	2790	-1.543	0.062

Source: Survey 2002/03

Transaction costs of Managing RWH by Sex

Table 3 and Table 4 show transaction costs by sex in WPLL. Men and women incurred different amounts of transaction costs in managing RWH systems. Results from this study indicate that men incur higher fiscal transaction costs than women while women incur more time costs than men. Furthermore, the results show that men spend more cash and time than women in planning and runoff allocation. This implies that normally women participate less in planning and runoff allocation activities. This was supported by the traditional taboos where for example, women are not allowed to operate the water gates in storage structures (*ndiva*). However, transaction costs incurred by men and women were not proved to be significantly different (Table 4).

Table 3. Transaction costs based on sex

Transaction costs activities	Amount of transaction costs			
	Fiscal (TShs)		Time (Person days)	
	Men	Women	Men	Women
Planning	1553	1032	5	4
Allocation	1226	845	4	3
Maintenance	1560	982	7	8
Enforcement	1480	1056	2	4
Conflict resolution	1150	959	1	2
Overall	6969	4874	18	22

Source: Survey 2002/03

Table 4. Comparisons of values of transaction costs based on sex

	Men		Women		T test for equality of means	
	Mean	SE	Mean	SE	t	Significance level
Planning	8177	1357	6676	944	0.913	0.181
Allocation	6028	798	5128	827	0.783	0.217
Maintenance	9973	1230	12129	1402	-1.16	0.123
Enforcement	2894	350	3757	748	-1.037	0.151
Conflict resolution	2081	277	3924	1217	-1.527	0.131
Overall	20721	1783	21918	2411	-0.4	0.345

Transaction costs of managing RWH based on wealth

Table 5 and Table 6 show transaction costs incurred by rich, medium rich and poor groups in maintaining RWH systems. Fiscal transaction costs were higher for rich, followed by medium rich and least for the poor. However, transaction costs in time dimension were highest in the case of medium rich groups followed by the poor and least to the rich group. Maintenance was the most expensive transaction cost activity for all the groups. The rich wealth group incurred the highest amount of fiscal transaction costs while the poor incurred the least. Based on time dimension, the medium rich group incurred the highest amount of time followed by the poor. This is explained by the arrangements where people can contribute cash for buying working tools (spades and hand hoes) rather than physically attending the communal work. Rich people normally, are flexible and can switch to either attending communal works or contributing cash. Due to lack of cash other groups have limited flexibility and therefore, they physically attend the communal works instead of contributing cash. There is marked difference in amount of time spent in conflicts management between the three groups. The poor incurred much time than the other two groups. This is explained by the fact that poor are the most vulnerable and their farms are allocated at the tail ends where they access runoff with difficulty. There are sometimes, deliberate defaults by the rich and those at the upstream to retain water for longer time than the allocated making water unavailable to the poor. Actually poor are more involved in conflict management meetings to defend their interests. Results of t-test for equality of means 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

Table 5. Transaction costs by wealth in RWH system management

Transaction costs Activities	Amount of Transaction costs					
	Fiscal (Tshs)			Time (person days)		
	Rich	Medium rich	Poor	Rich	Medium rich	Poor
Planning	1100	1410	1096	4	6	4
Allocation	1462	923	952	3	4	3
Maintenance	1700	1330	946	4	8	7
Enforcement	900	1242	1315	2	2	2
Conflict resolution	1300	970	1060	2	1	2
Overall	6462	5875	5369	14	20	18

Table 6: Comparisons of values of transaction costs based by wealth status

Transaction costs	Group	Means		Comparison of means		
		Mean	SE mean		t	Significance
Runoff use Planning	Rich	5467	1780	Rich vs medium	-0.982	0.164
	Middle	8848	1336	Rich vs poor	-0.100	0.461
	Poor	5658	846	Medium vs poor	1.770	0.039
Runoff allocation	Rich	4985	1795	Rich vs medium	-0.502	0.308
	Middle	6078	804	Rich vs poor	0.083	0.462
	Poor	4821	896	Medium vs poor	0.994	0.162
RWH system maintenance	Rich	6268	1734	Rich vs medium	-1.524	0.065
	Middle	11719	1243	Rich vs poor	-1.270	0.010
	Poor	10818	1650	Medium vs poor	0.435	0.332
Regulation enforcement	Rich	2759	1019	Rich vs medium	-0.426	0.380
	Middle	3398	607	Rich vs poor	-0.444	0.330
	Poor	3384	665	Medium vs poor	0.016	0.494
Conflict resolution	Rich	2900	829	Rich vs medium	0.827	0.406
	Middle	2236	340	Rich vs poor	-0.392	0.343
	Poor	3985	1539	Medium vs poor	-1.271	0.104
Annual RWH system management	Rich	16717	4330	Rich vs medium	-1.125	0.162
	Middle	23192	2045	Rich vs poor	-0.457	0.325
	Poor	19259	2455	Medium vs poor	1.211	0.113

Cost benefit analysis including transaction costs

Inclusion of transaction costs in a farm budget decreased benefits from the RWH system and consequently the benefit to costs ratio. Benefit to cost ratio varied with farmers socio-economic groups as summarised in Table 7. Comparison of benefit to cost ratio by sex

indicated that women realised significantly ($p= 0. 05$) less benefit than men. Women realised net benefit of TShs 759,167 for 2002/03 compared to men who earned TShs 1,041,063 from maize production under RWH system in the same year. Benefit to cost ratio analysis indicated that women incurred significantly higher ($p=0.1$) costs in relation to benefits than men. Similar comparison was made to compare net benefit and benefit to cost ratio between youths and elders. Results showed that youths gained less benefits from RWH systems than elders. The difference in net benefits between youths and elders was found to be significant at $p=0.01$. Benefit to cost ratio between the two categories of farmers was also significant at $p=0.05$.

Comparison between net benefit and benefit to cost ratio between poor and rich showed no significant differences. This implies that determinant of access to runoff and hence benefits from the RWH are highly affected by sex and age than wealth status of an individual. As pointed out earlier, this is associated to land tenure system prevailing at the moment that do not guarantee equal opportunity to good land (with access to runoff) between men and women and between elders and youths.

Table 7: Costs benefit analysis of maize production in WPLL

Comparison by sex		Mean	SE mean	t	Significance
Benefits in Tshs	Men	1041063	100241.1	2.479638	0.013
	Women	759167	41995.59		
Benefit to Costs ratio	Men	1.500317	0.033367	1.355571	0.088
	Women	1.432193	0.037845		
Comparison by age					
benefits in Tshs	Youths	800047.9	61974.79	-2.42605	0.008
	Elders	1083152	109408		
Benefit to costs ratio	Youths	1.435351	0.033177	-1.66825	0.05
	Elders	1.521269	0.037708		
Comparison by wealth					
Benefits in Tshs	Rich	933344.4	86113.52	0.550765	0.3
	Poor	868420.9	53092.06		
Benefit to costs ratio	Rich	1.448872	0.031874	-0.9934	0.16
	Poor	1.500295	0.040761		

3.4. Effects of Transaction Cost on Attendance to Decision Making Meetings

As pointed in the previous sections, attending decision-making meetings and communal works is an indication that the person incurred transaction costs. Attending meetings and communal works is therefore an indicator of willingness to incur transaction costs in RWH systems management. Those who regarded the transaction costs to be higher than opportunity costs of their time are regarded unwilling to incur transaction costs. Attendance level in meetings and communal works organised by village government varied from those organised by runoff management committees. Level of attendance to decision-making meetings and communal works related to the management of RWH is presented in the following sections for both WPLL and Maswa.

3.4.1. Attendance to decision-making meetings organised by village governments in WPLL

The level of attendance in village general meetings in WPLL is presented in Table 8, 9 and 10 for Makanya, Mwembe and Tae villages respectively. Attendance levels varied slightly between villages and social economic groups. With the exception of Makanya village, men

attended more meetings than women. In Makanya village, slightly more than 50% of both males and females attended more than 75% of all meetings that were convened in 2002. On the other hand, less than 50% of both men and women attended general meetings in Tae, while about two third of all respondents attended village assembly meetings in Mwembe.

More elders (65%) attended meetings than youths (49%) in Makanya while the level of attendance was almost the same between elders and youths in Mwembe and Tae villages. Rich people attended few meetings in Makanya and Mwembe compared to the poor. However, the situation is opposite in Tae village where 62% of the poor group attended more meetings than the rich group.

Table 8. Attendance in meetings organised by village government in Makanya

Groups	Attendance level of called meetings (%)			
	Up to 30%	31 to 50%	51 to 75%	Over 75%
Gender:				
Male	14	19	8	59
Female	21	11	11	56
Age:				
Elder	17	10	8	65
Youth	17	22	12	49
Wealth group:				
Rich	25	0	25	50
Middle	20	13	9	58
Poor	11	23	6	60
Enterprise:				

Source: Survey 2002/03

Table 9. Attendance in meetings organised by village government in Mwembe

Groups	Attendance level of called meetings (%)			
	Up to 30%	31 to 50%	51 to 75%	Over 75%
Gender:				
Male	3	14	19	64
Female	12	12	8	68
Age:				
Elder	14	14	8	66
Youth	2	12	20	66
Wealth group:				
Rich	29	29	0	42
Middle	4	8	11	77
Poor	7	14	17	62
Enterprise:				

Source: Survey 2002/03

Table 10. Attendance in meetings organised by village government in Tae

Groups	Attendance level of called meetings (%)			
	Up to 30%	31 to 50%	51 to 75%	Over 75%
Gender:				
Male	10	10	23	57
Female	23	14	14	49
Age:				
Elders	20	10	23	47
Youths	14	14	14	48
Wealth group:				
Rich	0	17	0	83
Middle	21	12	21	40
Poor	12	12	0	57

Source: Survey 2002/03

3.4.2. Attendance to decision-making meetings organised by village governments in Maswa

Transaction costs affected attendance in village general meetings by different socio economic groups in Maswa District. Generally, attendance to the meetings for CPR management organised by village was low. Occasionally, a small proportion of individuals attended over 75% of the meetings. Except in Njiapanda village, women, and youths attended few general meetings than men and elders respectively. In Bukangilija and Njiapanda the poor attended fewer meetings than the rich. This gives indications that opportunity costs of time of attending meetings were higher for the marginal and weak groups than for the powerful groups in these villages. On the contrary, in Isulilo village the poor attended many CPR management meetings organised by village government than the rich. Tables 11,12, and 13 depict these results.

Table 11. Attendance in the general meeting called last year in Bukangilija village (Maswa) in 2002/2003

Groups	Attendance level of called meetings (%)			
	Up to 30%	31 to 50%	51 to 75%	Over 75%
Gender:				
Male	11	25	26	38
Female	17	33	21	29
Age:				
Elders	13	23	24	40
Youths	4	50	29	17
Wealth group:				
Rich	0	50	8	42
Middle	15	26	20	39
Poor	11	25	30	34

Source: Survey 2002/03

Table 12. Attendance in the general meeting called last year in Njiapanda village (Maswa) in 2002/2003

Groups	Attendance level of called meetings (%)			
	Up to 30%	31 to 50%	51 to 75%	Over 75%
Gender:				
Male	17	26	29	28
Female	26	14	30	30
Age:				
Elders	18	27	27	28
Youths	10	16	42	32
Wealth group:				
Rich	12	25	25	38
Middle	16	24	30	30
Poor	22	28	28	22

Source: Survey 2002/03

Table 13 Attendance in the general meeting in Isulilo village (Maswa) in 2002/2003

Groups	Attendance level of called meetings (%)			
	Up to 30%	31 to 50%	51 to 75%	Over 75%
Gender:				
Male	10	29	22	39
Female	10	20	35	35
Age:				
Elders	9	28	23	40
Youths	23	31	31	15
Wealth group:				
Rich	0	100	0	0
Middle	11	33	19	36
Poor	10	25	25	40

Source: Survey 2002/03

3.4.3. Attendance in meetings on organised by water user groups in WPLL

The level of attendance in meetings called by water user groups in WPLL for the year 2002/2003 is shown in Tables 14, 115and 16. About half of men, women, elders and young

farmers attended over 75% of all meetings called by water user groups in Makanya. Variation in attendance along gender and age was little. In Mwembe village, the level of attendance to meetings organised by water user groups did not vary with age and wealth status. Above 70% of farmers in the two groups attended over 75% of meetings. Results from Tae village show a different picture where 10% of youths attended over 75% of all meetings convened in 2002/2003 season.

Table 14. Attendance in the meetings organized by water user groups in 2002/2003 Makanya village (WPLL)

Groups	Attendance level of called meetings (%)			
	Up to 30%	31 to 50%	51 to 75%	Over 75%
Gender:				
Male	19	12	18	51
Female	29	9	12	50
Age:				
Elders	28	14	9	49
Youths	19	8	21	52
Wealth group:				
Rich	40	10	20	30
Middle	23	6	19	52
Poor	22	18	8	52

Source: Survey 2002/03

Table 15. Attendance in the meetings Organised by water groups in Mwembe village (WPLL) in 2002/2003

Groups	Attendance level of called meetings (%)			
	Up to 30%	31 to 50%	51 to 75%	Over 75%
Gender:				
Male	18	4	0	78
Female	20	6	2	72
Age:				
Elders	34	5	2	59
Youths	9	5	0	86
Wealth group:				
Rich	20	10	0	70

Middle	14	5	3	78
Poor	23	3	0	74

Source: Survey 2002/03

Table 16. Level of attendance in the meetings called by water groups/committees last year in Tae village (WPLL)

Groups	Attendance level of called meetings (%)			
	Up to 30%	31 to 50%	51 to 75%	Over 75%
Gender:				
Male	10	7	7	76
Female	20	15	15	50
Age:				
Elders	23	6	12	59
Youths	9	12	9	10
Wealth group:				
Rich	50	50	0	0
Middle	15	9	9	67
Poor	7	7	14	72

Source: Survey 2002/03

3.4.4. Attendance to Meetings on organised by water user groups in Maswa District

In Maswa District only Bukangilija village had a water user group. Attendance in the meetings called by the water user group is shown in Table 17. Only 47% of men attended more than 75% of meetings called by water user group. This was low compared to 100% of women who attended more than 75% of the meeting called in 2002/2003 seasons. This level is higher than attendances in the village general meetings. This gives an impression that people prefer attending meetings with immediate rewards and those called by institutions close to them. Likewise all rich individuals attended more than 75% of the meetings called by water user group compared by 43% of poor people. This indicated that the poor sometimes attach high value to time that they would spend in attending decision-makings meetings called by water user group. There was an argument that some of poor people have lost their irrigable land to rich people in Maswa thus find it not important to attend the meetings convened by water user groups.

Table 17. Level of attendance in the meetings called by water groups last year in Bukangilija village (Maswa)

Groups	Attendance level of called meetings (%)			
	Up to 30%	31 to 50%	51 to 75%	Over 75%
Gender:				
Male	21	11	21	47
Female	0	0	0	100
Age:				
Elders	21	11	21	47
Youths	0	0	0	100
Wealth group:				
Rich	0	0	0	100
Middle	34	8	8	50
Poor	13	13	31	43

Source: Survey 2002/03

4. Conclusions

Transaction costs of managing RWH systems included costs of planning for runoff use, runoff allocation, RWH system maintenance, enforcement of regulation and conflict management. Amount of transaction costs of managing RWH system were higher in system maintenance than in other transaction costs activities. It was learnt that rich people put more cash in RWH than other groups. Women's transaction costs were less in planning for runoff use and allocation indicating that they are not normally involved in those transaction costs activities. The general trend indicated that women incurred much time than cash. The poor spent more time in conflict management than any other group, indicating their vulnerability and therefore squeezed in runoff sharing.

Results from benefit (BCR) indicated the weaker groups in the society ie women, youths, and the poor realised less benefit from RWH system management than their counterparts. However, comparison of BCR between, rich and poor farmers did not yield expected results. Although the BCR for poor was lower than that of the rich farmers, the difference was insignificant.

Transaction costs affected attendances in village general meetings more than in water user groups meetings. Farmers seem to respond to calls that would provide them with immediate reward than long term benefits that would be sought through resolutions of village general meetings. However, some individuals neglect attending village general meetings because of their personal difference with village leaders and poor credibility some of the village leaders have to the community. Also it seems that local level institutions for water distributions are close and more respected by the community than village level institutions. Whether transaction costs were actually high or perceived to be high, individuals would not like to miss in the meeting called by water committees, as they were associated with immediate rewards.

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