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Gender Relations and Management of Multiple Water Use System in Adidaero Watershed, Tigray Region in Northern Ethiopia

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Multiple Water Use System (MUS) is a combination of facilities for both productive and domestic water use to meet the multiple needs of water in the community. Operation and maintenance of such facilities require a collective action by the users of irrigation facilities, water points, cattle trough or washing basins. One of the conditions to create an enabling environment for collective action is a common understanding of a particular issue between individuals. Differences in values and interests held between them often challenge the process of developing such an understanding. MUS, intending to cater for diverse needs, challenges the assumption of collective action by involving different users' groups with varying levels of interests and needs in water use.

Gender relations, although being a critical factor in understanding the mechanism of collective action, are embedded in a society and often invisible. They can be overlooked in the process of organizing collective action. This paper examined how the gender relations affected the management of irrigation, water point and irrigation with multi-purpose facilities in Adidaero Watershed in Tigray Region, northern Ethiopia and analyzed by using the Gender Performance Indicator for Irrigation.

Keywords: gender, Multiple Water Use System (MUS), institution, water management

1. INTRODUCTION

Securing water for both domestic and productive uses is an important and critical issue in many of the arid and semi-arid area in the world. Tigray Region is located in northern Ethiopia having 3,797,000 inhabitants, 82% of which is rural inhabitant (Central Statistical Authority, 2000). The region is known as a drought prone area and suffers from recurring food shortage. About 57.9% of the region's population is categorized below absolute poverty line, which is the highest in the nation (Tigray Regional Office of Population, 2002). The average per capita income in the region is estimated as 926 Birr in 1999 or 106 US Dollars[1] using the current conversion rate (Tigray Regional Office of Population, 2002). The population having access to clean drinking water was limited to 34% and the average primary enrolment rate remained 58.4% in the region (Tigray Regional Office of Population, 2002).

This study was carried out in five sub-villages (*got*[2]) in the Southern Zone of Tigray between July and August 2005. The study area has lacked many of the social infrastructures such as primary school, health centre and adequate clean water supply until the Adigrat Diocesan Catholic Secretariat Mekelle Branch (ADCS) has launched its development interventions. In 2004, ADCS constructed three water points with hand pumps, one irrigation scheme with multi-purpose facilities such as washing basins and cattle trough and rehabilitated an existing irrigation scheme with the funds from Catholic Relief Services Ethiopia (CRS/ ET). These facilities are located within Adidaero watershed in Tigray and intended to maximize the water use within the watershed by installing different types of facilities as well as to cater for the diverse water users by the village households.

Multiple Water Use (MUS) facilities are the combination of the facilities to cater for both domestic and productive water needs in the locality. Such facilities could bring out multiple benefits such as improved health, better economic conditions, increased opportunities for education, increased food security and better nutrition

[1] 1 US dollar = 8.7 Ethiopian Birr (16 September, 2005)

[2] Administrative unit under regional administration is followed by zone, district (*woreda*), sub-district (*tabia*), village (*kushet*) and sub-village (*got*).

(Moriarity and others, 2004). However, having combination of facilities serving different water needs means involving multiple interest groups (i.e. women and men users, productive and domestic water users) and actors of different levels (i.e. national, local/ regional and external/ donor/ project implementer) (ibid, 2004). In other words, to manage these diverse users and actors would be the key to the sustainable management of facilities and maximize benefits. How could this be possible? In this paper, the focus will be the grassroots level institutional arrangement of management of MUS and how gender relations affect the process.

2. METHODS

Fieldwork was structured in two stages. First stage was aiming at understanding the general social condition, and use and management of the water pumps and irrigation facilities. Key informant interviews, focus group discussions using gender analysis, participant observations and secondary data collection from relevant offices were carried out. In the second stage, questionnaire survey was conducted in the 51 benchmark households. The questionnaire was composed of two sections. Section I was directed to the heads of households to understand the general livelihood conditions while Section II was conducted with the female partners in the male-headed households and women heads of households to understand the domestic water use and household decision making. The interviews were carried out separately with husband and wife in the case of male-headed households when possible.

Benchmark households were selected purposively to include the male- and female- headed households of different welfare categories. The sampling was carried out in multiple stages. Firstly, the list of households provided by the local administration containing 474 households in 5 sub-villages, 103 households were selected randomly which were categorized according to the welfare status of the household by men and women representatives from each village.

There were three welfare categories defined by the representatives. Almost all the village representatives defined the population into three strata: "wealthy", "vulnerable" and "most vulnerable". The "wealthy" was defined as the households having more than one or two oxen and have sufficient family labor for both cultivation and to earn income through temporary employment. 'Vulnerable' households have no ox but have young family members who can work on the farm land or can work as casual labor to earn income. The 'most vulnerable' households have no youth in the household or an elderly who have no means of earning income and who live alone[3].

After the welfare categorization was completed, each stratum was divided into male- and female-headed households. From each stratum, male- and female-headed households were selected proportionately randomly. No female-headed households were found among the wealthy category[4].

Table 1 – Number of selected benchmark households

	MHH	FHH	Total
Most vulnerable	4	5	9
Vulnerable	21	10	31
Wealthy	11	0	11

[3] The definition of welfare category seemed to have reflected the serious food shortage during the past year. A woman representative from one of the sub-villages commented on the type of household categorized under 'vulnerable': 'People in this category are not always poor. But just the last year's drought affected them badly'. This hints the definition of poverty has seasonality or situational. Furthermore, 'having young household member to work' was critical in survival especially during the drought as they needed to buy food.

[4] The results of the wealth ranking also suggested that the layer of 'wealthy' strata contains more number of households in the villages closer to the main road. The village closest to the main road was located 40 minutes on foot. Along the main road, young male could earn income by stone mining or some could also reach the nearby capital of the Region, Mekelle, to be employed as casual labor or the trading in the market. These opportunities added income to the households nearby the main road.

Total	36	15	51

There are two categories of female-headed households found among 15 female-headed households. One is *de facto* and the other is *de jure* female-headed household. The former is defined as 'households in which the male partner is temporarily absent' and the latter is the households where 'the male partner is permanently absent due to separation or death, and the women are legally single, divorced or widowed' (Moser 1993, 17). Among 51 benchmark households, only one *de facto* household was found. The remaining 14 female-headed households were under the category of *de jure* woman-headed households. For the analysis *de facto* woman headed household is categorized as female-headed household.

3. FRAMEWORK FOR ANALYSIS

Water management related facilities such as water pumps and irrigation schemes require collective action organized by users. It could take the form of decision making or adaptation of the schedule to use the facilities by the users or implementing maintenance work by the users. One of the key elements to enable such collective actions is the shared vision or interests (Meinzen-Dick and others, 2004). In the case of this study, the question is whether the users share the understanding of their benefit through the use of facilities and water resources and interests in water management. If such shared view does not exist, the basis for the collective action is challenged.

Gender relations could often lead to differences in opinions and interests as well as the capacity to act. Moser (1993) stated that gender relations are 'socially constructed'. Moser (1993) further argued that "[m]en and women play different roles in society, with their gender differences shaped by ideological, historical, religious, ethnic, economic and cultural determinants"(Whitehead 1979 cited in Moser 1993, p3). In other words, the understanding of gender relations requires one to unpack various elements of livelihoods. In this paper, welfare category was taken as one of the elements shaping the gender relations in the study area. Particular reference was made when analyzing the gender division in farming activities and the intra-household decision making data.

Furthermore, this paper adopted the Gender Performance Indicator for Irrigation (GPII) (van Koppen 2002) to analyze gender relations in management institutions of facilities constructed in the water shed. GPII suggests the analysis to be carried out in the following aspects: 1) access to water and obligations at the farm level 2) participation in groups for water management, and 3) gender representation among the leaders and their capacity to act responsively. Although facilities studied in this paper include water points, the latter 2 points are relevant to analyze management institutions for water points. Thus, the paper adopts GPII with slight modification as analytical framework for all types of facilities.

4. LIVELIHOODS IN THE ADIDAERO WATERSHED

GENERAL

The population in the study area is religiously Orthodox and ethnically Tigre. Each of five sub-villages (*got*) is composed of one extended family based on the paternal lineage. The marriage is only allowed to take place outside of the lineages. It is still common for girls of the age between 12 and 15 to get married while men tend to marry at the older age. From the household data of this study indicated the average age difference between the husband and wife is 11 years with the median of 10 years among the benchmark households.

25% of the male heads of the households had some level of primary education and only 1 respondent who completed the primary level. The 61.1% of the male heads of households had no schooling. On the other hand, 93.3% (14 heads of households) of the woman heads of households had no formal schooling.

Table 2 – Educational background of head of households

	Primary incomplete	Primary complete	No formal schooling	Religious education
MHH* (n = 36)	9 (25.0%)	1 (2.8%)	22 (61.1%)	4 (11.1%)
FHH** (n = 15)	0 (0.0%)	1 (6.7%)	14 (93.3%)	0 (0.0%)

*MHH: Male headed households; **FHH: Female headed households

A married couple will establish an independent household provided they receive a piece of land for their homestead and farming from the *Tabia* (sub-district) administration. When the land is not given in this way, they will establish their household where the land is available through other means. If the wife has been allocated a piece of land before marriage, the husband will join her. If the parents of the husband or wife, most likely the father, could give them a plot, they will move to the area. However, this seems to be a less preferred option by the villagers for two reasons. One reason is that dividing land means smaller plot for the parents themselves. The yield of their food crop is likely to decrease by doing so and may risk their own food security. The other reason is that the complications caused by the relationship between the in-laws.

In the study area, women's role is regarded to keeping the house and family in good condition while men's responsibilities were plowing and building house in addition to attending community gatherings. Men were also expected to provide food for their families. During pregnancy, women's work was alleviated by female members of the household or neighbors. A male key informant explained that it would be ideal that the mother of the wife come and help with the housework. If not, the mother-in-law should help but this was less preferred. He then continued that "I do not know how to do things in the household like cooking and have other work in the farm. So I do not help with the housework".

LIVELIHOODS

The livelihoods in the area largely depend on food crop production with supplementary income from casual labor. There is limited scale livestock production. The average annual precipitation in the area is estimated to be 555 mm (Enderta Woreda Office of Agriculture, Tigray Region, unpublished data). The erratic rainfall pattern has led to crop failures and recurring food shortages. In 2004, the drought has severely affected the population of the study area. The yield was not sufficient for most of the village households to survive. For instance, 20 households out of 51 benchmark households indicated that they had not sufficient food for the whole year in 2004. When water is not sufficient for cultivation, 86.27% of the male-heads and 93.33% of women-heads of household responded that they do nothing to cope with such situation. Not knowing the effective strategies to cope with drought, both men and women farmers remain vulnerable to the drought.

One of the households responded that he uses water from the pond during the water shortage. Pond construction has been promoted by the local government. There is no women-headed household having ponds. 13 out of 14 ponds are located in the vulnerable and wealthy male-headed households.

Table 3 – Do you have ponds?

Household category	Welfare category	Have pond	Do not have pond
MHH (N = 36)	Most vulnerable (n = 4)	1	3
	Vulnerable (n = 21)	9	12
	Wealthy (n = 11)	4	7
FHH (n = 15)	Most vulnerable (n = 4)	0	5
	Vulnerable (n = 10)	0	10

LAND

Land in Ethiopia is state property. The plots held by farmers had been allotted between 1974 and 1991 from the government to farm households, which was often male headed, depending on the size of the household (Tadesse, 2003). The allottees have the usufructs. In this study, "owned" land should be taken as a piece of land which an individual holds the user rights granted by the government.

The average land holding in the study area is 0.82 ha for upland and 0.03 ha for irrigated land. The Table 6 shows the difference between the land holding size between the male- and female-headed households. The average size of the upland held by women-headed households is 0.57 ha which only accounts for 61% of that of male-headed households. There were 24 households (18 male-headed and 6 female-headed households) having plots under irrigation.

Table 4 – Land holding (ha)

Tenure type	Land category (ha)	MHH	FHH	Total
Own land total	Upland	0.93	0.57	0.82
	Irrigated land	0.03	0.02	0.03
Own land renting out	Upland	0.06	0.32	0.13
	Irrigated land	0.00	0.00	0.00
Renting in	Upland	0.15	0.00	0.15
	Irrigated land	0.05	0.00	0.03

Table 5 shows the land type and registration. The land is mostly registered under the name of the heads of household while 13.3% of the women-headed households indicated the upland is registered under their husbands' name. There is only one household responded that husband and wife own the plots registered under their own names. This household belongs to 'wealthy' category of the welfare strata.

Table 5 – Land registration

Land use	Household category	Husband	Others*	Female-heads of household	Do not know
Homestead	MHH (n = 36)	31 (86.1%)	2 (5.6%)	0 (0.0%)	3 (8.3%)
	FHH (n = 15)	2 (13.3%)	0 (0.0%)	9 (60.0%)	4 (26.7%)
Upland	MHH (n = 36)	32 (88.9%)	3 (8.3%)	0 (0.0%)	1 (2.8%)
	FHH (n = 15)	2 (13.3%)	1 (6.7%)	11 (73.3%)	1 (6.7%)
Irrigated land	MHH (n = 18)	17 (94.4%)	1 (5.6%)	0 (0.0%)	
	FHH (n = 6)	1 (16.7%)	1 (16.7%)	3 (50%)	

*Others include holding by father or mother of informant and separate ownership of husband and wife.

GENDER ASPECTS IN FARMING

Figure 1 shows the gender division of labor in upland cultivation. Plowing, sowing, harvesting, transporting from the store or to the market and selling of the produces are predominately male activities in male-headed households. Weeding is the work of both men and women family members. Milling is mostly carried out by women in the majority of the households.

In female-headed households, plowing is done by the male member of the family like sons. If it is not possible, the land will be rented out and thus the tenant will plow the land. The land holder will receive commonly 1/3 of the yield from the tenant in return. Plowing in Ethiopia in general is the work of men. Whether it is culturally prohibited in the study area or women do not have skills to plow did not become clear. However, a few women farmers claimed that they would help and take part in plowing if they have an ox. Among the benchmark household, a woman-headed household bought an ox with credit and made an arrangement that her neighbor could use the ox and in return plows her land. This could be an example that the asset, the ox, gives an opportunity and capacity for the women to plow.

INCOME GENERATING ACTIVITIES

Income generating activities other than farming included stone mining, selling of produces, selling *swa* (local beer made of leaf of a tree called *gesho* and sorghum) and weeding on other people's plot for a wage. Selling *swa* is a way of earning income by women-headed households. Eggs, vegetables and staple food can also be sold to earn income although its contribution is small compared to the male earning through employment.

DECISION MAKING OVER DISPOSAL OF HOUSEHOLD ASSETS

Having experienced previous years' drought, selling or exchanging food crops with other items were not very popular in the study area. Vegetable production is still small and rather consumed at home at the time of the field work. Further, selling of cattle is a last resort for the family survival and thus selling of cattle was not very common. However, some general conclusion can be drawn from the villagers' previous experience.

Food crops

Although discussions on disposing of the household assets and produce involve discussion between family members, there is always a person who is more influential than others and makes the final decision. In general, among male heads of the households have more influential position in the decision making on selling of produce and spending of earning while women had more influential position in how much to be kept for domestic consumption. However, there is a difference by the welfare category. The joint decision making outnumbers the number of responses indicating husband being a sole decision maker among the vulnerable and wealthy strata. Wife could also become a decision maker when the husband becomes old. On the other hand, women have an influential position over how much to be kept home for consumption in all wealth strata.

Table 6 – Decision maker—Sales and domestic consumption

	Household category	Household Head	Wife	Both	Other family members*	No response
Sales	MHH (n = 36)	11 (30.6%)	2 (5.6%)	9 (25.0%)	0 (0.0%)	14 (38.9%)
	FHH (n = 15)	8 (53.3%)	0 (0.0%)	0 (0.0%)	2 (13.3%)	5 (33.3%)
Domestic consumption	MHH (n = 36)	3 (8.3%)	13 (36.1%)	4 (11.1%)	0 (0.0%)	16 (44.4%)
	FHH (n = 15)	9 (60.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	5 (33.3%)

*Other family members include in-laws and male member of family.

Livestock

Decision to sell livestock is mostly made by the husband. Among the vulnerable and wealthy strata, such decision can be made jointly. For chicken, wives can sell eggs without consulting their husbands while whether to sell the chicken itself has to be consulted with their husbands. For the case of de-facto female-headed household, the wife should consult the husband over the phone and her mother-in-law before selling the ox. After both of them were consulted, the ox was taken to the market by her brother-in-law.

Spending

The decision on how to spend the earnings is mostly made by the head of households of both genders. The joint decision is made in 26% of the male-headed households. In case of de-facto woman-headed household, the husband is still consulted on how to spend the earnings.

Table 7 – Decision maker—spending

	Household category	Husband	Female-heads of households	Wife	Both	Male member of the family	No response
Spending	MHH (n = 36)	15 (41.7%)	0 (0.0%)	3 (8.3%)	4 (11.1%)	0 (0.0%)	14 (38.9%)
	FHH (n = 15)	1 (6.7%)	8 (53.3%)	0 (0.0%)	0 (0.0%)	1 (6.7%)	5 (33.3%)

5. WOMEN'S PARTICIPATION IN COMMUNITY ORGANIZATION

Though mentioned earlier that it is the men's role to attend community gatherings, women do participate in the meetings of women's association or *Tsebel-Tsebel* (religious gathering) where a village family, which is chosen by the meeting of sub-village men and rotates, offers local beer and bread to other villagers visiting the family.

Women's Association is the only formal organization organized by women. 44% of the spouses of male-headed households and 50% of women heads of households (Table 8).

Table 8 – Membership to Women's Association

	Member	Non member
Spouse of MHH (n = 36)	16 (44.4%)	20 (55.6%)
Female household (n = 15)	5 (33.3%)	10 (66.7%)

In the study area, most women above 18 years old are entitled to the membership of Women's Association. It mobilizes the funds for the *Woreda* (district) Women's Association. The observation suggests that the women's participation is mostly passive not pro-active. Women in the study area would participate in the group activities by the mobilization of government or other external initiatives. Some village women said that they do not see the benefit of becoming a member.

Women's being passive in organizing themselves is partly due to how the implementation process of the development interventions is arranged. Women's association chairperson indicated that the association is not considered as an actor in the development interventions which are mostly implemented through the male dominant local administration or Peasant Association by the external organizations. The chairperson of the Women's Association thus made an effort to discuss this issue with the peasant association but they did not

reach any conclusion. She also referred to the low level of education among women as hindrance for being able to act as an organization.

A question emerges: do they have no reasons to work together to solve their problems? The questionnaire survey captured some of the common issues shared by the women in the study area. The most frequently mentioned "women's common issue" is "overwhelming workload during pregnancy" (Table 9). In the future, hopefully some of these issues are addressed at the Women's Association and beyond.

Table 9 – Common problems among women in Adidaero Watershed

	Number of Respondents	
	Spouses of MHH	Female heads of households
Workload during pregnancy is overwhelming	14	4
Women work all the time	2	0
Shortage of food	2	2
Lack of money	4	5
Too many children/always pregnant	2	0
No problem	2	0
No answer/do not know	10	4

6. USES OF FACILITIES

WATER POINTS

Three water points were constructed mostly to provide the drinking water by the ADCS. Each of the three water points has a guard to keep the gate and water point area clean and to guard the facilities from thieves. The guard is a male or a female villager and his/ her family members who were selected by the villagers. They receive small amount of payment for guarding the water points out of the water charges paid by the users. The gate is open for 3–4 hours in the morning and in the evening.

In order to identify the amount of water and how they were used, seven households in total were selected for observation and interview. In the questionnaire, how many *jerricans*[5] of water was collected by whom in the family for how many times a day was asked. Table 10 summarizes the volume of water consumed per household. The average[6] water consumption per household is estimated at 39.6 liter per day. This makes 7.9 liter of water consumption/person per day which only accounts for the half of the 15 liter per person/ day water requirement for whole domestic activities (Reed, no date). The maximum water use of 80 liters per day was marked by a female-headed household who sells *swa* (local beer) to earn income.

Table 10 – Daily water consumption per household

Average consumption/household (liter)	39.6
Daily water consumption/person (liter)	7.9
Maximum water consumption (liter)	80

According to households visited, the most water consuming activities in the household is making *injera* (thin flat bread made of fermented dough) and bread followed by washing body parts. Two wives of male-headed

[5] A jerrican is a plastic container used to fetch water. 10, 20 and 25 liters jerricans are normally used to carry water. In the questionnaire, the informants were asked to specify which size of jerrican they used for the purpose.
[6] The average was calculated excluding the maximum water use of 80 liters per day.

households responded that they water vegetables with the water from the water point. All the women who have chicken at home give water from the water point.

Fetching water is predominantly women's task. As Table 11 indicates, women member of the households who fetch water for the domestic use accounts for 88.2% of the total benchmark households. The household where son fetches water is limited to 3.9%.

Table 11 – Who fetches water for domestic use?

Member of the households	No of responses (n = 51)
Female member of the family	45 (88.2%)
Both male and female member of the family	3 (5.9%)
Son	2 (3.9%)
Neighbors	1 (2.0%)
Total	51

Some women also used donkey to carry water. Table 12 shows the percentage of women who use donkey to carry water. In this case, they use the donkey owned by the household and thus no cost is involved. 72.7% of women who use donkey were found among the wealthy strata (Table 12). There was no household among the most vulnerable households using donkey to carry water.

Table 12 – Use of donkey for carrying water

Welfare category	Yes	No
Most vulnerable (n = 9)	0 (0%)	9 (100%)
Vulnerable (n = 31)	11 (35.5%)	20(64.5%)
Wealthy (n = 11)	8 (72.7%)	3 (27.3%)
Total (n = 51)	19 (37.3%)	32 (62.7%)

Prior to the construction of the water pumps, all the families used river water for domestic purposes. When they walked to the river for 1–1.5 hours to get water from the river, they used to consume less water (i.e. 25 liters for 2 days per household). On the other hand, once the water pumps were installed within nearer distance from the homesteads, they fetch water from the pump and return there if more water is needed. Many of the women said that they spend less time to get clean water. Now they can prepare meals when needed, can sleep longer and clean the house more often.

REHABILITATED/ EXTENDED IRRIGATION

Rehabilitated/ extended irrigation scheme has been managed by the villagers since 1983. This facility is already in use and can be used for dry season irrigation as well as supplementary irrigation for the rainy season. In this scheme, there are 140 recognized plot holders by the committee[7]. The number of women plot holders was not confirmed during the fieldwork. The land holding size of each farmer and the total irrigated area are not known by the committee[8]. Land was said to be allocated by the local administration according to family size. The cropping calendar drew by one of the two irrigation committee members shows that the plots are used for dry season cultivation between January and May. Most of the farming activities in irrigated land is carried out by male member of the family while weeding and harvesting are helped by female members of the family. In the case of female headed households, they tend to rent out the land since they cannot plow and maintain the canal. In general, the plot size in this scheme is very small and users consider that the irrigated agriculture is not

[7] During the interview in May 2005, the same informant indicated that the number of users is 200 including 25 women headed households.

[8] During the interview in May 2005, the same informant indicated that the size of the irrigated pot is 10 ha for the existing area and 1.5 ha for the extension area.

profitable compared to upland. Crops planted include *gesho* for local beer making, onion and green chili. Before the rehabilitation of the headwork, the diversion structure was flushed away by the flood during the rainy season and had to be restored before the irrigation season.

IRRIGATION SCHEME WITH MULTI-PURPOSE FACILITIES

This scheme combines facility to irrigate plots of 19 farm households, and water point, washing basin and cattle trough which intends to cater for the 130 households.

For drinking water, many villagers seem to prefer water point which water source is ground water. Majority felt that the river water is not suitable for drinking even after filtration[9]. Key informants said that this is because river is where the livestock drink water and women wash their clothes. Table 13 shows the preferences of the facilities. 44.4% of the male heads of households and 52.8% of their spouses preferred multi-purpose facilities. 46.7 % of the female heads of the household preferred the multi-purpose facilities. The reason for preference for multi-purpose facilities is that it can be used for different purposes. The dominant reasons for preferring separate locations for water point and irrigation facilities are that the water point provides pure water.

Table 13 – Preference of facilities

Respondents category	Prefers multi-purpose facilities	Prefers separate facilities for different purpose	Do not know
MHH (n = 36)	16 (44.4%)	19 (52.8%)	1 (2.8%)
Spouse (n=36)	19 (52.8%)	15 (41.7%)	2 (5.6%)
FHH (n = 15)	7 (46.7%)	6 (40.0%)	1 (6.7%)

One incident was reported that children blocked the inlet of the washing basin with stones and thus the water did not flow into the basin. Under such circumstances, women washed clothes in the river while the irrigation was in operation. This has created conflict of interest between women and irrigators of both genders. The irrigators were afraid that the water would be contaminated by washing clothes and the crops will dry up. They wanted the women to stop washing clothes while the land is irrigated.

Cattle trough was not in use since livestock water was available in ponds and river. Once it is in use, livestock should come to the trough at 12:00 midday. The irrigation committee is also in charge of management of the trough.

7. MANAGEMENT COMMITTEES

Management committees were organized for each facility. For the water points and irrigation scheme with multi-purpose facilities, ADCS has facilitated the process of committee member selection by the villagers.

WATER COMMITTEE

There were three men and women members in each water committee. Both men and women committee members in all the three committees were well aware of benefits of having water points: “drinking pure water” and “good for health”. In all the committees, there is no women chair or vice chairpersons. One woman committee member said that men are better in dealing with conflicts and making decisions. Some water committee members overlapped with the local leaders. For instance, in water committee in one of the sub-villages, a woman member of the committee is a chair person of village women’s association. A male village chairperson was also among the committee members. The members were selected by the heads of households

[9] The water point in the multi purpose facilities have been equipped with filtration system which ADCS has been using in other locations. ADCS also plans to monitor the water quality.

within the beneficiary area. A key informant said that "it is difficult to find a woman who can read and write and who is capable of negotiating with villagers from other village who could act as a chairperson of the committee". Both men and women committee members were trained by ADCS in operation and maintenance activities of water points.

FATHERS OF THE RIVER

This is a committee for the rehabilitated/extended irrigation facilities. It is organized by two male villagers who select the crops to be planted in the scheme, organize maintenance activities, inform irrigation schedule to plot owners and mitigate conflicts. According to one of the two committee members stated that there has been a case that the water was pumped up from the river and caused shortage in irrigation water. In this case, the committee members resolved the problem by talking to the person who did so.

COMMITTEES FOR IRRIGATION FACILITY WITH MULTI-PURPOSE FACILITIES

Two committees were organized for managing the system. One was organized for irrigation scheme which was composed of three men. One male irrigation committee member was in charge of the cattle trough. Another committee was for water point located within the system which members included three men and three women headed by a male chairperson. One of the women committee members was given the task to clean the water point area.

8. USERS PARTICIPATION IN MANAGEMENT ACTIVITIES

There are different ways of users' participation in management activities. This section focuses on three types of users' participation; payment of users' fees, attending meetings and taking part in the maintenance activities.

FINANCIAL CONTRIBUTION

All the water committees and irrigation committees collected small charges of users' fees for guard and savings for the future maintenance. The fee was paid by the one who earns and controls the spending. It was largely paid by both male and female heads of the household or sons who earns and controls the financial resources of the households (Table 14).

Table 14 – Who pays fees?

	Head of households	Other family members*	No answer
Water point			
MHH (n = 36)	32 (88.9%)	3 (8.36%)	1 (2.8%)
FHH (n = 15)	9 (60.0%)	2(13.3%)	4(26.7%)**
Irrigation			
MHH (n = 18)	11 (61.1%)	4 (22.2%)	3 (16.7%)
FHH (n = 6)	1 (16.7%)	2 (33.3%)	3 (50.0%)

* Other family members include sons, daughters and father of informants.
** One response indicating "do not know"is included.

PARTICIPATION IN USERS' MEETING

Users' meetings have been organized mostly for collecting fees and inform users of maintenance activities. Participants to these meetings are mostly men and women heads of households (Table 15). Spouses represent only in the absence of their husbands. Irrigation committee meetings were attended by male heads of households or other male members of the family except for female-headed households.

Table 15 – Who goes to the meeting?

	Head of households	Wife	Male member of the family	No one
Water Committee				
MHH (n = 36)	31 (86.1%)	1 (2.8%)	1 (2.8%)	3 (8.3%)
FHH (n = 15)	12 (80.0%)	0 (0.0%)	2 (13.3%)	1 (6.7%)
Irrigation Committee				
MHH (n = 18)	11 (61.1%)	0 (0.0%)	1 (5.6%)	4 (22.2%)
FHH (n = 6)	2 (33.3%)	0 (0.0%)	0 (0.0%)	1 (16.7%)

MAINTENANCE

Out of three water committees for water pumps, only one committee has already carried out the maintenance activities by the users. Committee members who carried out the maintenance activities indicated that the maintenance work has been shared by male and female villagers. Male villagers carried out the heavy materials while women washed the facilities. In the case of rehabilitated/extended irrigation, maintenance activities included removing silt and digging canals prior to irrigation season. These activities were carried out only by the male villagers. Women plot holders would find a male family member to do the work for her plot or pay some charge for a hired labor. It seemed that maintenance of irrigation was considered to be a male work.

9. ROLE OF PROJECT IMPLEMENTER

The above described facilities are constructed by ADCS. Prior to the construction of the facilities they have informed both male and female heads of households about the facilities and construction works. After the construction, they have facilitated the process of organizing management committees for each scheme and allocated equal number of committee members to be selected by the villagers to ensure the fair representation of women. Training on operation and maintenance of the facilities was given to both men and women committee members. On the other hand, such consideration has not been incorporated into the irrigation committees. Irrigation committee of the rehabilitated/extended scheme and irrigation with multi-purpose facilities did not have women user representatives.

10. CONCLUSION

In this paper, how the gender relations affect the management of water point, irrigation and irrigation with multi-purpose facilities were looked into. It started with examining the gender division of labor, differences in control over livelihood assets and decision making to set the context for analyzing management institutions of the facilities. In the latter half of the paper, rights and obligation of men and women users in management, participation of men and women in the committee and capacity of leaders were assessed.

In the study area, social responsibilities of men and women were clearly defined: men earn living and control household assets while women take responsibility of carrying out domestic activities. Men within a household were in an influential position in deciding what to sell and how to spend earnings from produce. They were also the ones who earn income through temporary employment outside the village. On the other hand, women were in an influential position in deciding the amount of food crops to be kept in the household. With regard to the community management role, men dealt with conflicts and community affairs while women were considered to be less capable of acting on behalf of men in such occasions.

Such gender differences in household and community roles were reflected upon how the management of facilities was arranged. Firstly, for water points, maintenance works were shared between men and women.

Women carried out the cleaning and lighter work in maintenance while men carried out the heavy lifting work, decision making and dealt with conflicts. This seemed to have worked well in management of water points so far. An enabling factor is that men and women users share the common interest of "drinking pure water". On the other hand, the management of rehabilitated/extended irrigation scheme was carried out by male committee members despite that there were several women plot holders. Irrigation with multi-purpose facilities is managed by two separate committees; water committee and irrigation committee. The former committee had a fair representation of men and women within the committee while the latter was composed by only men. The latter had difficulties in mitigating conflict between man and woman irrigators, and women wash basin/river water users over the timing of uses.

Women's water use and participation MUS management institutions is summarized making reference to GPII as shows in Table 16. The table examines the women's entitlement and actual practice over 1) rights over land, 2) rights to use facilities/ water, 3) obligation in the operation and maintenance activities, and 4) membership to the committee. (+) in the column indicates where women were entitled or actually exercised their rights or have participated in activities while (-) indicates the low or no participation of women in these regards. Water committee is gender balanced in all categories. On the other hand, irrigation committees for rehabilitated/ extended and multi purpose have not acquired fair representation of women.

Table 16 – Assessment of women's water use and participation in MUS management institutions

Performer / Indicators	Water committee	Fathers of the River (Rehabilitated/ Extended irrigation committee)	Irrigation with multi-purpose facilities	
			Irrigation committee	Water committee
1) Rights over land				
Entitled	N.A.*	+**	+	N.A.
Actual	N.A.	+***	+	N.A.
2) Rights to use facilities/ water				
Entitled	+	+	+	+
Actual	+	+	+	+
3) Obligation in the operation and maintenance activities				
Entitled	+	UKN***	+	N.A.
Actual	+	-	-	N.A.
4) Membership to the committee				
Entitled	+	UKN	UKN	+
Actual	+	-	-	+

* N.A.: Not Applicable; ** +: women exercised the rights/ participated in activities; *** -: women's entitlement was not observed/ women did not participate. ; ****UKN: Unknown

It is possible to draw a conclusion that the fair representation and shared interest between both genders would facilitate the management process of the water points for drinking water. On the other hand, the implication of having irrigation committees without fair representation of men and women is not yet known. For multi purpose facilities, the question still remains to be answered whether management committees shall be organized separately for the irrigation and water point.

However, the question is how we create an environment to achieve equity in participation of both men and women in MUS management. One way is to develop the capacity of men and women to take part in certain actions. Bebbington (1999) referred to Sen (1997) and stated that "the possession of human capital not only means people produce more, and more efficiently; it also gives them the capability to engage more fruitfully and meaningfully with the world, and most importantly the capability to change the world" (p2022). This demands us to continue investing in the development of human capital both men and women to create an enabling environment for sustainable management and maximized benefit of MUS.

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