

CASE STUDY ON 3 MULTIPLE WATER USE SYSTEMS UNDER GWI-GHANA PROJECT



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Executive Summary

In 2009, the Global Water Initiative (GWI) implemented projects dubbed “Multiple Water Use System (MUS)” in three communities within two districts. These communities are Mantari and Meguo in the Nadowli District and Venne in the Lawra District of the Upper West Region. According to Van Koppen et al. (2006) Multiple use water services, or “mus” in short, is a participatory, integrated and poverty-reduction focused approach in poor rural and peri-urban areas, which takes people’s multiple water needs as a starting point for providing integrated services, moving beyond the conventional sectoral barriers of the domestic and productive sectors. The overall goal of the MUS as implemented by GWI in the communities is to reduce poverty through the provision of water for varied uses. The Global Water Initiative (GWI) - Ghana program is being implemented by a consortium of CRS, CARE and IUCN with PRONET North as a local partner.

It has been observed by GWI that single use planning and design approach to water services delivery has shortcomings. Systems that were designed for single use either for domestic or irrigation were finally transformed into de facto multiple-use by community members. This implies that rural people need water for various functions. This calls for the need to provide water for both domestic and productive purposes. Hence, the GWI adopted the multiple water use system approach in the development of water systems for three communities

Since 2009, the systems have been operating with community members actively engaged in gardening. Three years after providing the facilities to the three beneficiary communities, the project commissioned this study to determine the long term viability/sustainability of the 3 Multiple Water Use Systems, the successes and failures of the systems to inform future works as well as promote learning about the systems. The outcome of this study is expected to inform future investments of similar nature. The Team adopted a multifaceted approach characterised by gender sensitivity, community participation and effective networking with stakeholders for the conduct of the study. The main tools used in the study include; desk study, focus group discussion, household questionnaire, observation and photography as well as institutional checklist. In all the communities, 30 household heads or their knowledgeable representatives (comprising 60% women and 40% men) were interviewed from the three communities. The focus group discussions were recorded and transcribed while the household questionnaires were analysed using Statistical Package for Social Scientists (SPSS, V16).

Findings

Access to Water in the Communities: Prior to the provision of the facilities, only 43.3% of the respondents indicated that they travelled less than 500meters (the maximum distance to travel to access water) to access water. In Venne the households travelled over 2km to access water from the Black Volta (their main source of drinking water then). With the establishment of the

facilities, 70% of the respondents travelled less than 500 meters to access water. The facilities have also reduced the time spent to draw water.

Community Participation in Service Delivery and Utilisation: The members of the communities participated in various aspects of the project implementation. During construction, they contributed labour and at times accommodated the artisans. The study also established that the community members selected the Water and Sanitation Committee, deciding on the days and hours of operation of the facility, pump levies and mode of payment. In terms of utilising the facility, the community members in Mantari and Meguo unanimously agreed that women should take up gardening whereas in Venne only men use the facility for gardening.

Gender Dimension: In Mantari and Venne, females constitute 37.5% and 33.3% of the management body of the systems. This is below the minimum of 40% female composition of the WATSAN committee. On the other hand, 43% of the WATSAN committee members in Meguo are females. The gender dimension of garden utilisation in Venne is different from Mantari and Meguo. In Venne, the women are not involved in gardening. The decision to exclude women from gardening was taken by men though women have expressed interest in gardening.

Performance of WATSAN Committees: The committees were assessed ranging from their composition to the execution of their functions. Based on the assessment, Meguo has been rated very good while Mantari and Venne good in the execution of their functions. The assessment shows that all the committees need to improve upon their performance for the sustenance of the facilities.

Financing and Financial Management: According to GWI the capital cost of the facilities in Mantari/Meguo and Venne were GH¢ 48,319.03 and GH¢ 25,890.55 respectively. The study estimated the financial value of the labour provided by the communities as GH¢ 1,750.00, GH¢ 2,100.00 and GH¢ 896.00 for Mantari, Meguo and Venne respectively. Currently the communities contribute money monthly towards operation and maintenance of the facilities. In Mantari and Meguo, the levy per head is GH¢1.00 while in Venne, the levy is GH¢ 0.50. As at April 2012, Mantari, Meguo and Venne had raised GH¢ 410, GH 244 and GH¢ 51 respectively through their monthly contribution. The community members agreed that the amount they contribute is not enough for the sustenance of the facilities.

Socio-Economic Impact of the Facilities: The study established the real earnings of households from the gardens. This is based on the sales from vegetables and cost savings as result of the gardens. Thus the real values of vegetables in Mantari, Meguo and Venne were GH¢ 15, 468.00, GH¢ 12, 752.30 and GH¢ 2, 302.30 respectively. This implies that in the next two seasons, the returns from the gardens can recover the capital cost of the facilities. Other economic activities

such as small scale industrial activities have also improved with the establishment of the facilities. These changes have contributed to improve food security in the communities. Besides these economic gains, there is improved unity and communal spirit in the communities. The establishment of the facilities has attracted people to the communities and in Venne in particular, out-migrants have planned to return. In terms of education, the facility has improved teacher-pupil contact hours as pupil spend less time in search of water.

Gardeners Contribution to the Facility Management: In Mantari and Meguo, though gardeners make monthly contribution, there is no special agreement for them to make any commitment to pay a proportion of their contribution into the accounts of the WATSAN for facility management. In Venne, the gardeners rather pay additional money into the account of the WATSAN committee as part of their contribution towards the facility.

Challenges: The study identified some challenges with the management and usage of the facility. These include limited access to gardening tools, limited knowledge in gardening practices, competing uses for the water, marginalisation of women in Venne and weak financial base of the committees towards the management of the facilities.

Recommendations: Based on the above challenges, it is recommended that the Ministry of Food and Agriculture through the Agriculture Extension Officers train gardeners on agronomic practices. To sustain the facilities, committees need to devise alternative ways of raising funds for operation and maintenance. Therefore the committees need training in revenue mobilisation and management. In the mean time, the gardeners should be made to contribute additional funds towards operation and maintenance of the facilities. Community members should also be sensitised on the need to increase levy and contribution should also be done in kind. To ensure equitable distribution of the benefits of the facility, women in Venne who are interested in gardening should be given the chance to establish and operate gardens. The men, especially in Mantari and Meguo should be encouraged to establish tree nursery and grow trees. They can embark on a “Mango Village Project”.

The study established that the concept and practice of multiple water use system as initiated by GWI is good especially rural savannah areas where the main economic activity is seasonal farming. It has often been the practice of rural people to migrate during the off farming season in search of greener pastures. The establishment of the facilities has reduced this practice and out-migrants are ready to return. Besides reducing the income gap of the rural poor, the gardening also provides opportunity for communities to raise funds to sustain the facility. The MUS thus achieves the dual goal of reducing poverty in rural areas and providing funds for sustenance of the facility.

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List of Abbreviations

CARE	Cooperative for Assistance and Relief Everywhere
CRS	Catholic Relief Services
CWSA	Community Water and Sanitation Agency
FGD	Focus Group Discussion
FMP	Facility Management Plan
GWI	Global Water Initiative
IWRM	Integrated Water Resource Management
MOFA	Ministry of Food and Agriculture
MUS	Multiple Water Use System
WATSAN	Water and Sanitation

SECTION ONE: BACKGROUND OF THE STUDY

1.1 Introduction

In April, 2012, the Global Water Initiative (GWI), signed a Contract Agreement with Nicholas Fielmua (HEREIN Referred to as **Consultant**) of the Centre for Continuing Education and Interdisciplinary Research (CCEIR) of the University for Development Studies to evaluate its Multiple Water Use System (MUS). This system was implemented in three communities within two districts. These communities are Mantari and Meguo in the Nadowli District and Venne in the Lawra District of the Upper West Region. *The overall goal of the MUS is to reduce poverty through the provision of water for varied uses.* After successfully implementing the MUS in the two districts, this study is to assess the successes and failures of the systems to inform future works as well as promote learning. Consequently, a Research Team, led by Nicholas Fielmua conducted the study in the three communities.

This report presents the findings of the study. The report has been divided into four sections. The first section provides the background of the study. It details out the purpose of the study, the methodology employed and a brief description of the study area. The second section gives an overview of Multiple Water Use System as an approach to water supply while the third section presents the findings in the three communities. The fourth section gives a summary of the findings, recommendations and conclusion.

1.2 An Overview of GWI Ghana Programme

The Global Water Initiative (GWI) - Ghana program is being implemented by a consortium of CRS, CARE and IUCN with PRONET North as a local partner. It is being implemented in 32 communities in the Nadowli and Lawra Districts with aim the “to ensure that vulnerable populations in the Upper West Region have reliable access to water and sanitation in a way that will preserve their dignity, rights, culture, livelihoods and natural environment”. It is implementing a programme that links water and sanitation delivery with longer-term processes of policy change, building water constituencies, and thus facilitating a larger scale change in the

water and sanitation sector. A key characteristic of the GWI is its desire to support innovative work that builds on and adds-value to other on-going water initiatives at local, national and regional levels.

Objectives: Through complementary strategies, the consortium in the last of the three years seeks to achieve the following four strategic objectives;

- i. Improved and functional water governance and partnership mechanisms for IWRM
- ii. Increased access to appropriate and sustainable potable water delivery and sanitation systems for communities.
- iii. Sustainable management and equitable use of water for productive purposes
- iv. Sustainable management of water resources through environmental protection and adaptation to climate change.

1.3 Background of the Study

Single use planning and design approach to water services delivery has shortcomings. Most concern arose as a result of the literally universal observation that externally facilitated schemes that were originally planned and designed for a single use, either a ‘domestic’ or ‘irrigation’ scheme are invariably transformed into de facto multiple-use schemes by the users immediately after construction is finalized (Koppen, Moriarty and Boelee, 2006). Single-use approaches to water development and management have not been reflecting the realities of poor people’s water use. When and wherever possible, people in rural areas will use water for domestic activities, like drinking, cooking, washing and cleaning, as well as for productive activities such as backyard gardening, irrigation, livestock keeping, processing of agricultural products and small-scale industrial activities, like beer brewing and brick making.

The justification for providing rural households with water supplies for both domestic and productive purposes lies behind the twin desires of reducing poverty and developing and managing water resources to maximize the sustainable economic and social value gained per unit value. Multiple-use water services (MUS) describe a participatory, integrated, and poverty-reduction focused approach that takes a community's diverse water needs as the starting point for providing services. Multiple-use water services move beyond the conventional sectoral barriers of the domestic and productive sectors and provide for all water needs in a community. Hence, the GWI adopted the multiple water use system approach in the development of water systems for three communities to maximize the health benefits and productive potential of the available water supplies leading to increased incomes, improved health and reduced workloads for women. The systems have been constructed to provide water to support women in dry season gardening, animal watering, and domestic and small scale local industrial activities.

Three years after providing the facilities to the three beneficiary communities (Meguo and Mantari in the Nadowli District, and Venne in the Lawra District), the project commissioned this study to determine the long term viability/sustainability of the 3 Multiple Water Use Systems, the successes and failures of the systems to inform future works as well as promote learning about the systems. The outcome of this study is expected to inform future investments of similar nature. It would also enable the project and its beneficiaries to fashion-out mechanisms to ensure sustainability.

1.4 Objective of the Study

The main objective of the study was to document the successes and failures of the multiple water use systems provided by the project to inform future works as well as promote learning. Specific objectives are to;

- i. Assess the impact of the water systems on the socio-economic lives of the people
- ii. Examine the dynamics of decision making process with regards to use and management of the water system
- iii. Assess the role of users especially gardeners in the management of water systems.

- iv. Review the capital and running costs of the systems and determine whether the benefits of multiple water use services outweigh or otherwise the costs that they bring along
- v. Examine the management system in place and recommend appropriate measures to ensure sustainability
- vi. Examine the revenue generation systems in place and recommend appropriate and acceptable payment systems
- vii. Identify the challenges community members face in the operation and maintenance of the water systems

1.5 Study Methodology

The Team adopted a multifaceted approach characterised by gender sensitivity, community participation and effective networking with stakeholders for the conduct of the study. This was to ensure a holistic aggregation of data inputs by all stakeholders linked directly or indirectly to the MUS to adequately reflect the perception and experience of the beneficiaries and other stakeholders. The methodology of the study was put into a number of phases. The first phase comprised a pre-field discussion with the GWI team to abreast the research team with the key tenets of the MUS and a review of literature (Desk study) including documents on GWI MUS in the three communities. Key variables to be measured and data needs were identified at this stage. The team undertook a reconnaissance survey of the three communities. This laid a good foundation for the design of the research tools and sampling. This was followed by the actual field survey which utilized tools such as focus group discussions, institutional survey, key informant interview and household survey.

1.5.1 Data Collection Methods

Data was collected through focus group discussion, observations, photography, institutional surveys and household survey. The details of the above tools are discussed in seriatim.

Focus Group Discussions: Focus group discussion was a major tool used during the study. In all the three communities, FGD were held with the Water and Sanitation Committees. In Venne it

was observed that only men use the garden and as such a FGD was held with the gardeners (men) and another separate FGD with women. As all the women in the community are non-gardeners, the FGD was to ascertain the reasons for non-involvement of women in the gardening. Paradoxically, in Mantari and Meguo, only women are involved in gardening. As such FGDs were held with women who are apparently the gardeners. In these two communities, school children are also engaged in gardening outside the fenced area. FGDs were held with these children as well.

Observation and photography: These were very important means of gathering data in the study area. Observation was carefully employed by the research team to complement, consolidate, confirm and triangulate data provided by respondents and also to assist the team probe into some issues for in-depth information. Photography was used to translate some data which are creatures of the mind into real images that present a quick visual impression of observed phenomena.

Institutional Survey: Interviews were held with institutions that have a link with MUS. Thus interviews were conducted with the Community Water and Sanitation Agency (CWSA) and the District Directorate of the Ministry of Food and Agriculture (MOFA). This was to establish their thoughts and perception on the MUS that have been provided for the three communities.

Sampling for Household Survey: Rural communities are more homogeneous in their ways of living and tend to have similar interest and aspirations as compared to their urban counterparts. The sampling of households in this study was informed by the United Nations description of a community as a “basic harmony of interest and aspiration” (Conyers, 1981 as cited by Fielmua, 2011). This is particularly important to planners because it means that the members of a community are likely to have similar views of current and future development in their area. One member of a household (head or spouse) in the communities was interviewed.

In Venne, there were only five houses and incidentally five households and as at the time of the survey, four of the houses were occupied and the fifth house tenants had migrated seasonally. All

the four houses were covered in the survey. In Mantari and Meguo, there were 19 houses and 16 houses respectively. In Mantari 16 houses were sampled whilst 10 houses were interviewed in Meguo.

1.5.2 Data Analysis

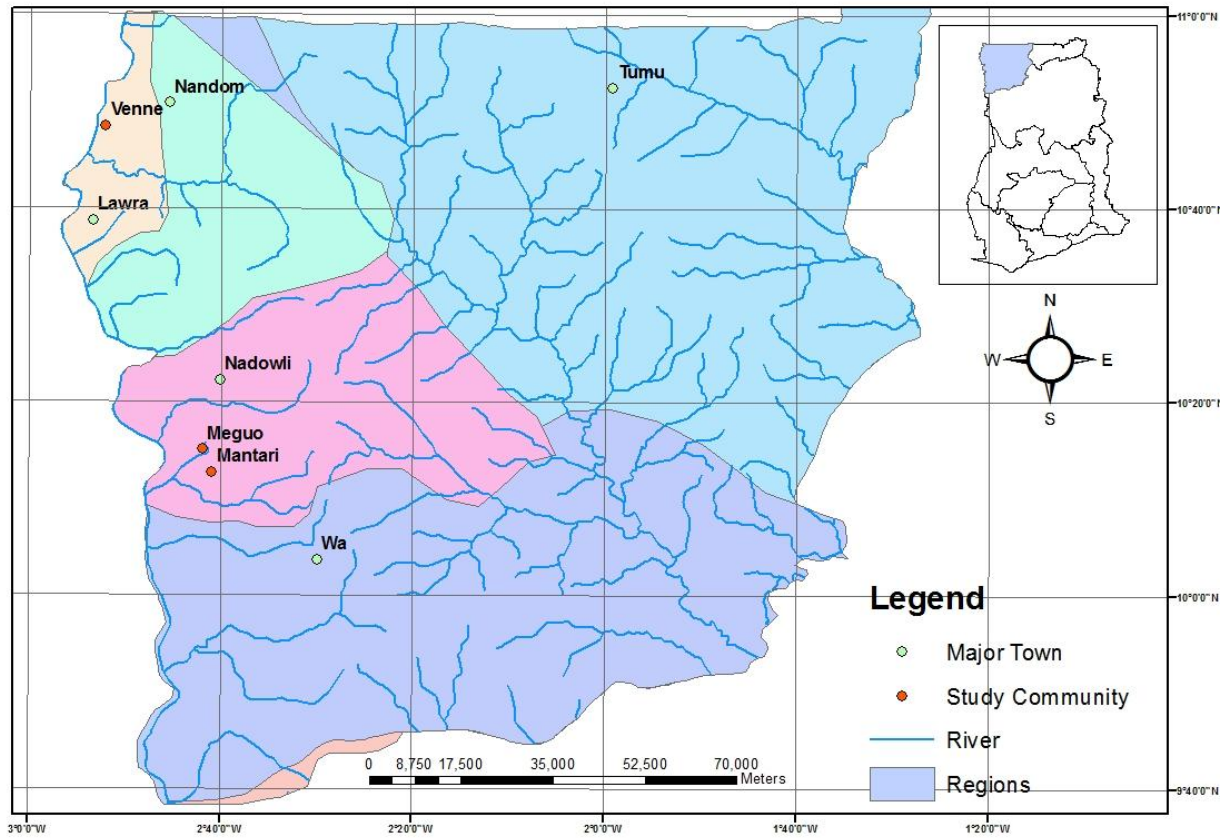
The FGDs were recorded using digital recorders and later transcribed. The household questionnaires were analysed using Statistical Package for Social Scientists (SPSS, V16). The outputs have been presented in Tables and Figures while some of the focus group discussions have been presented as case stories.

1.6 Brief of the Study Area

This study was conducted in the Upper West Region of Ghana. The study communities are Venne in the Lawra District, and Mantari and Meguo in the Nadowli District. Venne is a neighbour community to Gengenke and part of the Gengenke chiefdom in the Baseble Area Council and about 22 km from Lawra the District Capital. Mantari and Meguo share boundaries and are within the Takpo Area Council located about 24 km west of Takpo. Figures 1 and 2 below show the location of the study areas. These communities are rural and depend on agriculture as their major source of livelihood. Other economic activities engaged in by the people are sheabutter and dawadawa production, and pito (local beer) brewing. The three communities are fringe communities of the Black Volta River approximately 3km away.

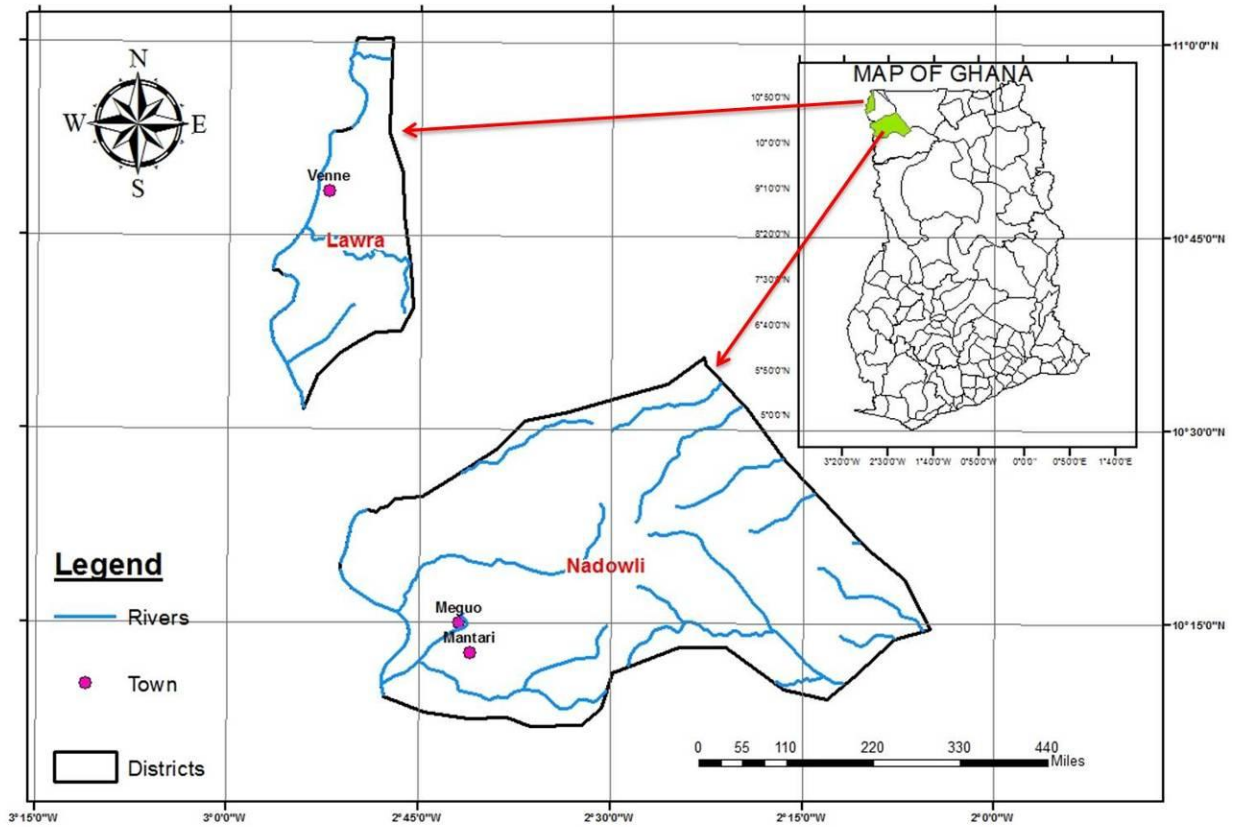
The people of the study area are Dagaaba and they speak Dagaare. Venne has a population of 154 (majority are seasonal migrants), made up of 104 females and 50 males. At the time of the study however, 24 (16% of the population) people, comprising 9 females and 15 males were present. The population of Meguo is 193, comprising 107 females and 86 males. Mantari has a population of 174 made up of 91 males and 83 females.

Figure 1: Regional Map indicating the Study Areas



Source: DERS, UDS – Wa, 2012

Figure 2: District Map indicating the study areas



Source: DERS, UDS – Wa, 2012

SECTION TWO: THE CONCEPT OF MULTIPLE WATER USE SYSTEM

2.1 Introduction

This section presents an overview of Multiple Water Use System. It explains the concept of MUS, highlights the benefits of this approach to water service delivery.

2.2 Definition of Multiple Water Use System (MUS)

According to Van Koppen et al. (2006) MUS Multiple use water services, or “mus” in short, is a participatory, integrated and poverty-reduction focused approach in poor rural and peri-urban areas, which takes people’s multiple water needs as a starting point for providing integrated services, moving beyond the conventional sectoral barriers of the domestic and productive sectors. In rural and peri-urban areas, households demand water for multifarious uses. They use water concurrently for domestic purposes, cropping, gardening, livestock, fisheries and aquaculture, tree growing, food processing (beer making, coffee processing, butchery), brick making, market places, weaving, handicrafts and other small businesses and ceremonial and cultural purposes (Van Koppen et al. 2006).

Van Koppen et al. (2006) classify MUS designs into three broad categories in increasing order of cost and sophistication as;

- Single access point systems.
- Systems with distribution networks to common standpipes.
- Systems with distribution networks to individual homesteads.

Each of these categories can be further classified into sub-categories, depending on the extent to which storage and distribution infrastructure for domestic and productive water uses are separated. These different design sub-categories may arise from differences in the water source, quality of the water source, homestead settlement patterns, type of productive uses intended,

system cost, and user ability to pay. The MUS facilities in the study area fit into the single access point category.

2.3 The Basis of the Multiple Water Use System

The single most important reason why planning and design of water services on the basis of multiple water needs are still not the norm, in spite of water services providers' genuine and intensive efforts to improve users' well-being, is that people's integrated need for and use of water do not match the ways in which the water sector itself is organized.

The UN in 2000 established the Millennium Development Goals (MDGs). Three of them are significant to the water sector: - to eradicate extreme poverty and hunger; to promote gender equality and empower women; and to ensure environmental sustainability (UN 2006). In 2002, at the Johannesburg Declaration on Sustainable Development, participant countries agreed to speedily increase access to basic requirements including among others, clean water, sanitation, food security and protection of biodiversity (UN, 2002). This was undoubtedly a good move towards achieving the MDGs.

Now, access to water for poor people is an important issue on the international agenda. After the Johannesburg Declaration, the concept of Multiple Uses of Water Systems (MUS) emerged as a strategy to introduce water access that responds to the full range of people's needs: both domestic and productive, contributing to poverty alleviation and equity (MUS group, n.d.). In Colombia, dialogue between academics and water sector professionals began around the topic in 2003 at the International Conference: —Multiple uses of water for life and development (Peña et al., 2006) and later in 2004 through the E – Conference on Multiple Uses of Water (IRC & Cinara, 2005). These spaces gave visibility to the issue of productive use of water, especially for rural water supply systems.

Throughout history, people have used water for many different purposes in their livelihoods: drinking, washing, cooking, irrigating, manufacturing, worshipping. Sometimes, they allocate specific sources to specific purposes; more often, they use the same source or sources for multiple uses. Patrick, Butterworth, and Koppen (2004) identified that productive use of water at the household level by poor people reduces poverty. They raised a number of issues including the following to support their statement;

Sustainable livelihoods can be built on access to water that goes beyond current approaches to meeting both domestic needs (drinking, cooking, and washing) and irrigation needs. The water needs of the poor always extend beyond the domestic.

Productive uses of water at the household level include a range of small-scale activities that enable people to grow food, earn income and save expenditure: fruit and vegetable production, keeping livestock, brick making and building, and a wide range of informal micro-enterprises.

Without access to sufficient and reliable water for productive uses in and around the household, people are excluded from a range of options that would allow them to diversify and secure their sources of food and income. At the most basic level, poverty is a lack of opportunity. Access to productive water supplies provides opportunities.

We believe that productive uses of water in and around the household are the most socially and economically effective uses of water after ‘traditional’ domestic uses, and that providing water for these uses offers one of the most effective ways to use water to tackle poverty in its multiple-dimensions.

A response to de facto multiple uses of single use planned schemes that aims to better contribute to people’s well-being and to enhance scheme sustainability is the anticipation of and catering for “additional” uses by designing infrastructural add-ons, while maintaining the sector’s single-use as the starting point.

SECTION THREE: ANALYSIS OF THE 3 MULTIPLE WATER USE SYSTEMS

3.1 Introduction

This section presents the analysis of data on the performance of the MUS in the 3 GWI communities. The analysis is based on the various communities. This is to highlight the differences and similarities in the performance of the facilities. As much as possible, the analysis is based on the community experience prior to the facility and after the facility has been provided. The main areas presented in this section include access to water, uses of the facility, financing and management of funds, socio-economic benefits of the facilities, management system in place in the various communities and sustainability measures put in place by communities.

3.2 Background of the Respondents

3.2.1 Sex and Age Distribution of Respondents

In the household survey, 30 household heads or their knowledgeable representatives were interviewed from the three communities. 60 percent of these respondents were females. Table 1 presents the details of the sex distribution of respondents in the three communities.

Table 1: Sex Distribution of Respondents in the Communities

Community	Male		Female		Total	
	No.	%	No.	%	No.	%
Venne	3	10	1	3	4	13
Mantari	8	27	8	27	16	54
Meguo	1	3	9	30	10	33
Total	12	40	18	60	30	100

Source: Field Survey, April 2012

In Venne, there were four houses with occupants at the time of the study. Thus each house had a respondent. Out of the four houses, one was headed by a woman (Widow) at the time of the study. In Mantari, there were 19 houses and 16 houses covered in the household survey. Similarly, in Meguo there were 12 houses and the household interviews covered 10. All the respondents were 20 years old and above, and 36.7% of them were over 50 years old and the least proportion (6.7%) falling in the age brackets of 31 and 40. 23.3 % of respondents aged from 20 to 30 years whilst 33.3 % were from 31 to 40 years of age.

3.2.2 Household Size and Marital Status

Of the 30 respondents, 86.7 % were married whilst 6.7% were single/widow. Generally, household sizes in the study area were very large. According to the Ghana Statistical Service (2005), a one member household is single household, household size of 2 – 5 is small, 6 – 8 is large and a household of 9 or more members is considered very large. Based on these definitions, 43% of the households are very large while 37% of them are large. Further, 17% of the households are small and 3% are single.

3.3 An Overview of the Features of the Multiple Water Use System

Though there are three communities, there are two main systems located in Venne and Mantari. The system in Mantari has been extended to serve the same purpose in Meguo. Due to lack of electricity in all the three communities and the high cost of using diesel powered generators, GWI used solar to pump the water from boreholes for the various uses. In Venne, there are six solar panels whilst in Mantari the panels are 10. This is to enable Mantari supply water to Meguo.

In the three communities, the tanks have the same capacity. Each water tank (reservoir) is Rambo 1000 (50 drums of water). Each of the facilities has three main collection points for different purposes. These points are; domestic collection point (where people draw water for

domestic uses), collection points within the garden and collection point for watering animals. See Appendix B for photographs. Within each fenced garden, there are two collection points.

There was an extension by an Agricultural Extension Agent (AEA) in Venne. The eastern view of the garden has been collapsed and rebuilt to give more space for cultivation by the AEA. The extension area is about 14 by 17 meters. This area is solely cultivated by the AEA. The picture shows the nature of the facility in Venne. At the left of the picture shows the extension (mud wall).



3.4 Access to Water in the Communities

Access to water is measured by the three main parameters; the number of people using the facility, the distance covered to draw water and the time spent to draw water. Prior to the new facility, community members obtained water from various sources. The main source of water for Mantari was a single borehole. The people of Meguo relied on two hand dug wells fitted with pumps. There was inadequate water in these wells in the dry season, compelling the people to move to Mantari to draw water. This created congestion at the borehole at Mantari especially in the dry season resulting in delay in accessing water. As shown in Table 2, 90% of the respondents spent over 90 minutes to draw water. This often resulted in waste of productive hours in search of water.

In Venne, some people went to Gengenkpe, a nearby community to draw water. In all three communities, the Black Volta was another source of water for household consumption and other uses. However the use of the Black Volta as a source of domestic water was more pronounced in Venne prior to the provision of the facility. During the period before the new facility, a greater proportion 56.7% of the people walked over 500 meters to obtain water. This is above the

maximum walking distance as recommended by the Community Water and Sanitation Act, Act 564 of 1998. Only 16% made less than 250 meters to draw water. After the facility was provided, situation reversed. Calculations from Table 2 indicate that 70% of the community members travelled less than 500 meters to access water. Table 2 shows the detail of the distance covered and the time spent by community members to access water in the dry season before and after the facility was provided.

Table 2: Distance Covered and Time Spent to Access Water in the Dry season

Distance covered	Prior to New Facility	New Facility	Time Spent (in Minutes)	Prior to New Facility	New Facility
Less than 250 m	16.6%	43.3%	Less than 30 min	10.0%	70.0%
250 – 500 m	26.7%	26.7%	31 – 60 min	0.0%	23.3%
500 – 750 m	20.0%	23.3%	61 – 90 min	0.0%	6.7%
Over 750 m	36.7%	2.6%	Over 90 min	90.0%	0.0%
Total	100.0	100.0	Total	100.0	100.0

Source: Field Survey, April 2012

A lot of time savings is made today with the new facility. As shown in Table 2, no one spends more than 90 minutes to obtain water. Contrary to the period before the facility, 70% of the people now spend less than 30 minutes to get this basic need of life. In the rainy season, there was no much problem obtaining water compared to the dry season, as some people, particularly in Meguo, got back to their hand dug wells, and others resorted to rain water harvesting. However, half of the people spent more than 90 minutes in search of water before the facilities. With the new facility, a greater proportion (76.6%) of the people get water in less than 30 minutes, and no one spends over one hour to obtain water. One person (from Venne) said that his household cannot access water from the facility in the rainy season because the route to the

facility is muddy and gets flooded at the peak of the season. Therefore at the peak of the rainy season, his household draws water from dug-outs.

Giving reasons for the difference in time spent to draw water before and after the new facility, 56.7% of the respondents said the crowd that used to characterize major water points has dissolved with the provision of the new facility. Also, 40% of the respondents said their main water source is now closer to them compared to the period before the facility. This accounts for less time spent to obtain water. This is clear by the fact that 37% of the people who spent more than 90 minutes to obtain water in the dry season for instance, had to travel over 750meters. Kandeme Akua, an elderly woman from Mantari commented on the water facility when she shared her experience in accessing water with the research team in the following words:

We had serious difficulties getting potable water for household use. The only borehole we had was always crowded and we spent so much time waiting for our turn. Some people were compelled to fetch water from other unwholesome sources. Now we have adequate potable water to drink and use for other purposes.

The provision of the facility has also improved attendance in school. The discussion with the pupils in both Mantari and Meguo showed that with the provision of the facility, pupils report to school early as they spend less time in search of water. Sharing her experience, Janet Naah, an 18 year old Junior High School girl in Meguo had this to say:

Before this facility was put in place, I mostly went to school late as it was always difficult to get water in the morning to prepare for school. The water points, including that at Mantari were always crowded. Any time I went to school late, I was punished. After school, I had to spend a lot of time to draw water sometimes at Mantari. By the time I got enough water for the house and assisted my mother to prepare supper, it was late and I felt so tired that I could not study in the evening. Today, with the new water facility in place, I get water to bath and by 6am, I am in school. I now have time to study and my performance in school has improved.

The provision of the facilities which has considerably reduced the waiting time at the water collection points had ripple effects. According to respondents of focus group discussion with the women and the WATSAN Committees, the elimination of long distance and congestion at water points for women in particular, has given them enough time for farm work and other household chores.

Collectors of Water: In all the communities, women and children are involved in drawing water for household and other uses. Aside drinking and bathing and building construction, much of the activities that involve the use of water – cooking, washing, ‘pito’ brewing, shea butter extraction, dawadawa processing among others are women activities. The women are the major drawers of water for all activities at the household and community level (See picture).



From the Table 3, 90% of respondents said the women were the drawers of water before the facility. This proportion dropped to 83% after the provision of the facility. Thus, more children are now involved in drawing water. The study established that 90% of the respondents indicated that there is change in water collectors because the closeness of the water source and the absence of crowds at the facility make it easier for children to collect water.

Table 3: Collectors of Water and Frequency of Collection

Collectors	Prior to the Facility	After Facility		Number of times	Prior to the Facility	From Facility
Wife	90.0	83.3		2	26.7	3.3
Children	6.7	13.3		3	43.3	6.7
Self (Single)	3.3	3.3		4	3.3	20.0
				5	26.7	13.3
				More than five times	0.0	56.7
Total	100	100		Total	100	100

Source: Field Survey, April 2012

Before the facility, women spent so much time searching for water. As such, many could not get enough water for the use of their households before the end of the day as they also needed to apportion their time for other activities. From Table 3, 43.3% of households could draw water three times in a day. With the new facility, 56.7% said they draw water more than five times in a day. Some indicated that they fetch as many times as they want now. Quantity of water required by households depends on several factors including water-use-related activities and household size. A household may draw water just two times in a day, and it is sufficient. This notwithstanding, a drop from 43% of households before the facility to almost 7% of households drawing water three times in a day indicates that households were water-starved before the provision of the facility. The communities now have adequate potable water for various uses because of nearness to an uncongested water source.

3.5 Community Participation in Service Delivery and Utilisation

Community participation has been espoused as a key ingredient for sustaining projects especially when external support ceases. This is to ensure that benefits are equitably shared and cost borne by all parties. As Patrick, Butterworth, and Koppen (2004: p16) put it; *“the provision of water*

services, that include water for productive uses, needs to be planned to ensure that benefits are inclusive or pro-poor. In planning, implementation and research it is important to hear and act upon the voices of the poor, women, and children, recognising that otherwise benefits may be captured by elites". In this study, community participation was assessed at two levels. The first level comprises the decision on the provision and operations of the system while the second level focuses on the decision to use the system for economic gains.

The choice of the type of technology to be provided was determined by GWI based on water needs of communities. The communities had no influence over the choice of technology type. There was however, active community participation in the following categories;

Identifying and selecting possible water sources: The community members participated in the selection of water sites. This was however led by household heads and the "Tendana". It was established that the "Tendamba" released portions of the land for the siting of the system.

Selection of WATSAN Committee Member: The WATSAN members were selected by the community members. This was done during a community meeting where all community members were present and either agreed or disagreed with the decision on the management of the system.

Deciding on the days and hours of operation: In Venne there is no regulation on the time of fetching water. At any time, one can fetch water from the system. Though this appears good, there is a high risk of the system breaking down as a result of pressure and/or negligence of users. On the contrary, in Mantari and in Meguo the community members collectively decided that there should be no usage of the system after 6.30PM. Therefore, except the security man any person found around the facility after this time becomes a suspect. This is also to avoid immorality among community members.

Deciding on Tariff: According to the community members, a meeting was convened and members collectively decided on the amount and frequency of tariff payment. In Mantari the community members were paying GH0.50 per month and this was reviewed upwards to GH1.00 per month. As at the time of the study, there has not been any review of tariff in Meguo and Venne. Community members in Meguo and Venne has since the inception of the facility been paying GH 1.00 and GH 0.50 respectively.

The second dimension of community participation looks at the utilisation of the system for economic gains. In both Mantari and Meguo the community members unanimously agreed that women should take up gardening. The reason given by communities is that women are engaged in buying ingredients and should know the types of vegetables that will be required in the house. Moreover they will know the market demand for the various vegetables and therefore determine which vegetables to grow and make profit. Bawa Mani, a man in Mantari pleasantly had this to say about women engagement in dry season gardening:

We have allowed only women to engage in gardening because they are the housekeepers. If a woman sells vegetables the proceeds will reach home for the entire house to benefits but if a man sells vegetables he will use the proceeds to drink alcohol and the wife will still be required to buy vegetables for the household.

This implies that the men have realised the crucial role of women in sustaining households especially in the rural setting. The gender dimension of garden utilisation in Venne is different from Mantari and Meguo. In Venne, the women are not involved in gardening. Two different views have been expressed on the non-involvement of women in gardening. During the FGD with the gardeners in Venne, Gervaise Hey, a male member had this story to tell about women non-involvement in the gardening:

When the facility came to this community, we agreed that it belongs to the entire community. Hence both men and women were actively engaged in gardening. That is, during the 2009/2010 gardening season (November – June), plots in the garden were allocated to every household. Within this growing season, some theft cases were recorded and the women were highly suspected because such practices are common among women. This brought about strong disagreements and dissatisfaction among community members. The following growing season (2010/2011), the disagreements were not yet resolved and thus the cultivation could not be done. By the 2011/2012 growing season, the issues were resolved with the help of elders from Gengenke. The community men decided that only they (men) be given the opportunity to cultivate the garden for the 2011/2012 growing season. They added that women and children are not allowed to go into the garden premises. This is to enable them observe any theft cases.

The above discussion indicates that women participation in decision making in the community is highly passive. It was the men who took the decision to exclude women from gardening and then conveyed the information to the women. This goes to buttress the point made by a female member of the WATSAN (Caretaker) that her role has been usurped by the secretary of the WATSAN who has decided to double as the caretaker/operator of the facility.

The team also held a discussion with only women in Venne to seek their views on the management and usage of the facility. During the discussion a woman (Madam Juliana Mwingyire) had this story to tell about the non-involvement of women in gardening:

During the inception of the facility, the donors informed the community that the purpose is to enable the community access potable water. They added that they would attach a gardening component. The gardening component is to serve a dual purpose of helping households especially women raise funds to help in the sustenance of the facility and to provide nutritious food to households. At the very beginning, every household had a plot within the gardening area. We were not very familiar with the practices of gardening. However, we planted okro, pumpkin leaves and other vegetables. When the crop were maturing, the WATSAN Committee Secretary went for a meeting and returned with some seed and convened a community meeting where we were asked to uproot all crop and plant the new seed. We did not know what seed it

was and so pleaded that we wait until the nursed seed germinates so that we find out what exactly it was. The Secretary did not agree and compelled us to uproot all crop. The new seed germinated and we detected that it was 'Ayoyo', a plant similar to some vegetable that grows in the wild known as 'f□ky□ll□' in the Dagara language. We saw this crop simply as the "white man's 'f□ky□ll□' and did not think it was worth it sacrificing our crop for it. Ehh!!!, this generated a strong misunderstanding among us. From there we planted tomatoes, pepper and other vegetables again and as I said we were not familiar with gardening and were beginning to pick up the practice and the Secretary said the women did not know much about gardening and should step aside and said he would bring people from Gengenke to take up the gardening. We told him that it is not that women do not know the practice of gardening but that the whole community, including men do not know the practice and for that matter we should both be learning. He was annoyed with our statements and later brought three people from outside the community and allocated the plots to them. Today, they are four men working in the garden, the secretary and three from Gengenke. Therefore there is unhappiness with this garden issue.

The research team probed further to establish the women perception on their non involvement in the utilisation of the garden. Various views were expressed on this matter. An elderly woman (Mrs Teng-ire) in Venne lamented about the situation. This is her view on women non involvement.

I have the view that it is because of the men that we are not involved in gardening. The men see us as people who do not come from their village. They thus decided to give the facility to their village men and left us out. Meanwhile, 'we belong to you (men), it is because of you that we are here, you brought us here, and this facility has come and you say we should not be part of it. Where do we then belong?' If the men were united, it is not right that we who are here should be left out whilst outsiders come in to use the garden. They have reaped a lot of benefits from this facility, whilst we are sitting here doing nothing. When one meets them here by chance and they wish, they may give you something small and that is all. It is because of women that this facility (garden) was brought. Te deme zin sansaraaa (we are just there), we don't know what to do.

The women believe that as these gardeners have reaped a lot of benefits from the facility, they (women) may never get the chance to be part of the gardening again. It has been established that the non-involvement of women in gardening in Venne is due to a misunderstanding that ensued

among the community members. However different versions of the cause of the misunderstanding were given.

Whereas in Mantari and Meguo both men and women at different discussions indicated that women take part in decision making on development issues and water supply and management in particular, the situation in Venne is the contrary. In Venne, the women indicated that they participate actively in decision making only when outsiders are present. In a situation where it is only the community members who are meeting to take decisions, women participation is just passive.

3.7 Management System of the Water Facilities

3.7.1 Composition of Water and Sanitation Committees

Water and Sanitation Committees (WATSAN) have been established in the communities to take charge of the facility and sanitation related issues. The composition of these committees is presented in Table 4.

Table 4: Composition of WATSAN Committees

WATSAN Position	Mantari	Meguo	Venne
	Sex	Sex	Sex
Chairman	Male	Male	Male
Vice-chair	Male	Female	-
Treasurer	Female	Male	Male
Secretary	Male	Female	Male
Caretaker/Operator	Male	Male	Male
Caretaker 2	Female	Female	Female
Organiser	Female	Male	Female
Others	Male		
Total Membership	5 Males (62.5%) 3 Females (37.5%)	4 Males (57%) 3 Females (43%)	4 Males (66.7%) 2 Females (33.3%)

Source: Field Survey, April 2012

The total membership of the committees ranges from six in Venne to eight in Mantari. Relating the membership to the minimum requirement of WATSAN Committee (at least 7 members), it is obvious that the committees' membership is good. However the quality and delivery of functions is challenged in some communities and as such some members assume dual roles. In Venne, it was observed that the secretary doubles as the caretaker. He is responsible for operating the system. However during the discussion, it was realised that there are caretakers (a male and a female). Their functions in the system as indicated by one of them (Female) remains unclear since the secretary has usurped their functions. The team observed that many functions of the committee revolve around the secretary. He appears to be performing every function except keeping funds of the committee. According to the committee in Venne, the treasurer (a blind man) was chosen because he is always in the community and chance of him using the money to drink alcohol is limited. The secretary in Meguo has previous experience in WATSAN related activities. He is the chairman of the Nadowli District WATSAN Committees association chairman. Thus he can bring his rich experience in WATSAN management to help the committee.

3.7.2 Assessment of WATSAN Committees

The performance of the committees has been categorised into three broad areas namely; Committee Organisation, Committee Finances and hygiene/sanitation. The main source of information for the assessment was through the focus group discussion, observation and interviews with the households. Table 5 shows the detail performance indicators and their respective output.

Table 5: Assessment of WATSAN Performance

Performance Measure	Indicators of Performance Measures	Assessment Basis/benchmarks	Mantari	Meguo	Venne
WATSAN Committee organisation	Membership of Committee	At least 7 members – 2 Between 4 and 6 members – 1 Less than 4 members – 0	2	2	1
	Gender composition of committee	At least 40% women membership – 2 Between 30 – 39% - 1, Less than 30% - 0	1	2	1
	Meeting of committee with the community	If committee met community at least twice a quarter – 2 Met once – 1 or else score 0.	2	2	2
	Preparation of Facility Mgt Plan	If FMP exists – 2, No FMP – 0	2	2	2
	Existence of WATSAN Constitution	If constitution exists – 2 No constitution – 0	0	2	0
Committee Finances	Existence of a bank account	If committee has opened account with passbook score 1 or else score 0	1	1	1
	Financial Management	≥ 60% of funds are in bank score 1 or else score 0	1	1	1
	Existence of financial records	If committee able to document expenditure and income, score 2 If committees do not record but able to give records score 1 Not able to recollect some transactions, score 0	1	1	1
Hygiene/ Sanitation	Cleanliness around facility	Facility surrounding not weedy/dirty score 2, if surrounding weedy or dirty score 1, if surrounding both weedy and dirty score 0	2	2	2
	Washing around the facility	No washing and drying very close to the facility score 1 or else score 0	0	1	0
	Cleanliness of Garden and animal troughs	If all 3 troughs are clean, score 1 or else score 0	0	0	0
	Household toilet facilities	If at least 70% of households have latrines score 2 Between 40%-69% score 1, if less than 40% score – 0	2	2	1
Total			14	18	12
Score	Performance Level				
≤ 16	Very Good				
12-15	Good				
10-11	Average				
≥ 9	Poor				

Source: Field Survey, April 2012

An assessment of the performance of the WATSAN committees on their functions indicates that the committee in Meguo scored 18 points out of the maximum 20 points and as such rated very good. The committees in Mantari and Venne scored 14 and 12 points respectively. Accordingly, they have been rated good. Though good, these committees still need to improve upon their performance for the sustenance of the facilities.

Notwithstanding the above assessment, the respondents from all the communities said they were satisfied with the performance of their WATSAN Committees. The reasons were based on regularity of meetings, information flow and safety and cleanliness of the facility. One-third of the respondents said the Committee keeps them informed of the state of the facility. Other reasons given by the respondents for indicating that the committees are performing are that the committee keeps the environment clean and they ensure the functioning of the facility.

3.7.3 Selection of Committee Members

Discussion with the Committee members in all the communities indicated that they were elected by their respective community members. The household survey supported this as all respondents mentioned that the committees were elected by the community members. The communities almost had the same criteria for the selection of committee members. In all communities, the following were some of the criteria used in selecting members;

- Commitment of the individual to community development which is measured by the person's previous contribution to the community and/or the level of zeal demonstrated by the individual
- Willingness of the person to be an active member of the committee
- Literacy level in the case of the secretary
- Attendance to community meetings
- Personal discipline

In the case of Venne where there are only five houses, the committee is made up of a representative or two from each house. This is to ensure a fair representation of community members on the committee.

3.7.4 Committee Knowledge of their Function

The study sought to test the committees' knowledge of their functions. The committees mentioned the following as their functions.

- Convene community meetings on the operation of the facility
- Raise funds for the maintenance of the facility
- Carry out routine checks on the system and draw the attention of the Area Mechanic or GWI to any major repair requirement
- Organise the community members to clean the surrounding of the facility and maintain personal hygiene in their houses.

3.7.5 Action Plans/Facility Management Plans

WATSAN Committees are expected to prepare Facility Management Plans (FMPs) or Action Plans to guide the operation of the facilities. As part of assessing the functionality of the committees, the study looked at the existence and content of these Actions Plans. All three communities had FMPs. Mantari and Meguo had one goal under the water sector: to increase access to safe drinking water in the community. The strategy of the communities in achieving this goal is to expand the mechanized borehole water and its activities by 2015. Activities include laying of pipelines to unreached sections of the community beginning in 2012. A second strategy under this sector is to restore forest vegetation along banks of the Black Volta River. The activities involved are; establishing tree nursery to produce seedlings, tree planting along the Volta and protection of these plants. Another strategy under the water sector is increased women involvement in water resources management. In Meguo, other strategies under the sector are provision of a borehole for the school by 2013 and construction of dug-outs by 2014, provision of water for animals and dry season gardening. Under sanitation and hygiene sector, the goal of

the three communities is to improve sanitation and hygiene practices. The strategy is to create and maintain clean and healthy sanitary environment in the communities.

3.7.6 WATSAN Committee – Community Meetings

A key function of the committees is to meet with the community members to deliberate on issues affecting the facility. The meeting times depend on the community and committee arrangement. In Mantari and Meguo, the watsan committees indicated that they meet with the community members twice a month. The second meeting in the month is the time household levies on the facility are collected. According to the household interviews, 50% of the respondents in Mantari indicated that the committee meets with the community twice a month. Similarly, in Meguo 60% of the respondents said the committee meets with the community members twice a month. In Venne the committee indicated that they meet with the community members once a month and 75% of the respondents agreed with the committee on the frequency of meeting. Interestingly all respondents have knowledge of what is being discussed at the meetings. According to 70% of the respondents, most of the times, they have knowledge of whatever is discussed at the meeting while 30% said sometimes they have knowledge of whatever is discussed at the meeting.

3.8 Financing and Financial Management

3.8.1 Capital Cost of the Facilities

In all the communities, the systems were entirely financed by the Global Water Initiative (GWI). According to GWI the capital cost of the facilities in Mantari/Meguo and Venne were GH¢ 48,319.03 and GH¢ 25,890.55 respectively. The cost difference is based on the capacity of the systems. Whereas in Mantari/Meguo the solar panels are ten, in Venne there are six panels. Similarly in Mantari/Meguo there are 2 Number Rambo 1000 water tanks (reservoirs) while in Venne there is 1 Number Rambo 1000 water reservoir.

According to the communities, they did not contribute cash towards the construction of the facilities. However, they contributed labour and in some instances provided food for external

artisans during the construction. The study estimated the financial value of the labour provided by the communities. According to communities the average wage for labour in the local economy as at the time of the construction was GH¢7.00.

Table 6: Value of Labour Contribution by communities

Measure	Mantari	Meguo	Venne
Average No. of Days	25	20	16
Average No. of Persons	10	15	8
Daily Rate of Labour	Gh7.00/day	Gh 7.00/day	Gh7.00/day
Total	1,750.00	2,100.00	896.00

Source, Field Survey, April, 2012

Figure 3: Total Value of Labour in the Communities

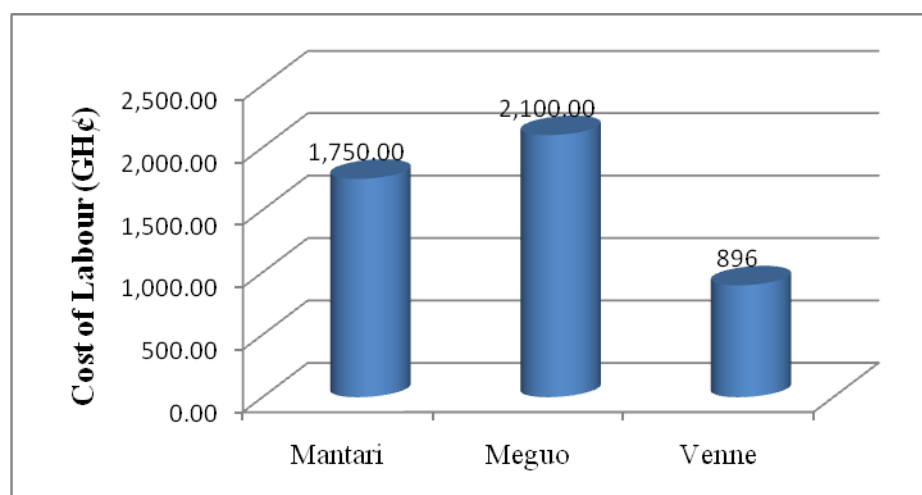


Figure 3 shows the total values of labour contributed by the communities. The real cost of the facilities is the sum of the cost incurred by GWI and the value of labour contributed by communities. Consequently the real cost of the facilities in Mantari/Meguo and Venne is GH 52,169.00 and 26,786.00 respectively.

3.8.2 Operation and Maintenance Cost Incurred

As at the time of the study, cost of operation and maintenance was borne the communities. In both Venne and Mantari major repair cost were borne by GWI. According to the WATSAN in Venne, GH 736.00 has been incurred by GWI and the community on repairs. In May 2011, GWI spent GH 700.00 to replace damaged wires of the solar pump while in October 2011, the community also spent GH 36.00 to replace distribution pipes.

3.8.3 Community Financial Resource Mobilisation and Management

In all the communities, the mode of raising funds for O&M is through monthly contribution. In Mantari and Meguo, the levy per head is GH1.00. Every member of the community (18 years and above) is required to pay the monthly levy towards the O&M of the facility. However, females who hail from the communities (daughters of the community) are exempted from paying the monthly levy. On the other hand, the gardeners in these communities also contribute GH1.00 per month. The funds from the gardeners are saved in separate accounts in banks. Though Venne has a relatively smaller population, their monthly levy is less compared to Mantari and Meguo. In Venne, adults pay GH0.50 per month while the gardeners pay GH1.00. The amount paid by the gardeners is meant to support the financing of operation and maintenance of the system.

Asked whether the monthly levy (amount) was adequate for the running of the water system, 6.6% of the respondents could not tell. Two-thirds (66.7%) of the respondents said the amount was not adequate, whilst 26.7% of respondents responded in the affirmative. Generally, 90% of the respondents showed their willingness to pay if the levy is increased by 100% (increase from Gh 1 cedis to Gh 2 cedis for Mantari and Meguo, and from Gh 50p to Gh 1 cedis for Venne). The remaining 10% said no to payment of a 100% increase in the levy. On availability of resources to pay, the majority (63.3%) of respondents gave favourable responses whilst the remaining said they did not have the resources to pay if the levy was increased. 60% of respondents who were willing to pay an increased levy, had the resources to pay. Whilst some respondents who were willing to pay additional amount for water did not have the resources to do so, some unwilling respondents had the resources. The Table 7 shows the willingness and

ability to pay an increased levy by respondents according to communities. In Mantari for instance, though all the respondents are willing to pay an increased levy, 37% said they did not have the resources to pay.

Table 7: Willingness and Ability to Pay

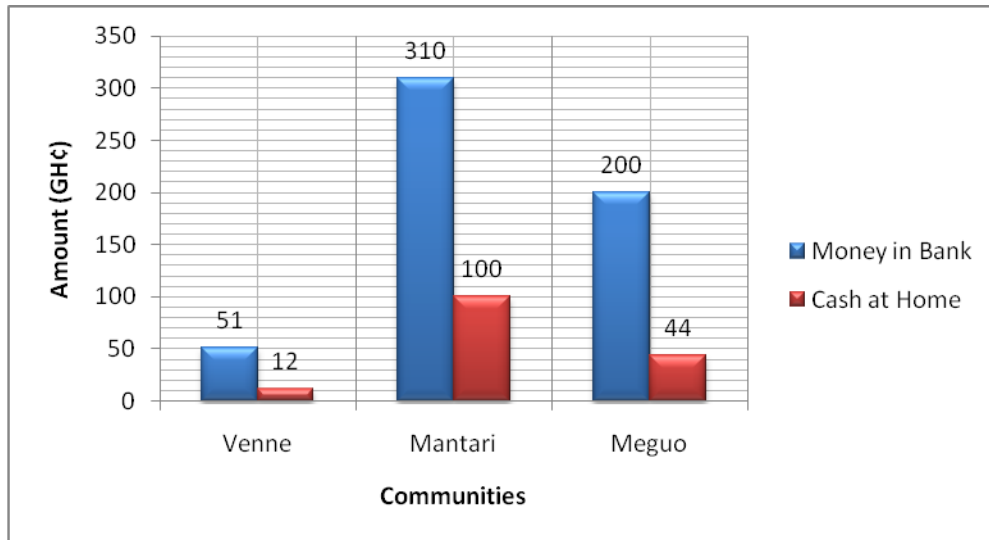
Community	Willingness to Pay Increased Levy			Availability of Resources for Payment		
	Yes (%)	No (%)	Total (%)	Yes (%)	No (%)	Total (%)
Venne	75	25	100	50	50	100
Mantari	100	0	100	63	37	100
Meguo	80	20	100	70	30	100

Source: Field Survey, April 2012

In both Mantari and Meguo the gardeners contribute GH1.00 per month. However the amount paid does not go to the general facility account but rather lodged separately and managed by the gardeners. There is therefore no guarantee that gardeners will contribute from their accounts to the maintenance of the facility. They have indicated that the purpose of contributing is to forestall future eventualities. Asked whether they will use part of their contribution for the running of the facility, the gardeners indicated that as and when the need arises, they will use part of their contribution to repair the system since the system is their source of income.

Financial Status of Communities: As at April 2012, Mantari, Meguo and Venne had raised GH 410, GH 244 and GH 51 respectively through their monthly contribution. Figure 4 shows the details of the figures raised.

Figure 4: Financial Status of WATSAN Committees



The cost of previous maintenance/repairs services carried out by both the GWI and the communities shows that the current financing strategy for operation and maintenance need to be reviewed. It is apparent that none of the communities' total savings is enough to have repaired the system. This presents a challenge to the principle of community ownership and management as practiced by rural communities nationwide.

3.9 Socio-Economic Impact of the Water Facility

The provision of the facility has had an impact on the socio-economic milieu of the people. The presence of the water facility in the study area has created further opportunities for the people; social recognition, acquisition of knowledge and practice of personal hygiene and general sanitation, community recognition of invaluable role of women in households, savings for households, access to fresh vegetables for good meals, and on the whole, healthier and happier homes. Mary Tonazie, a woman in Mantari had this to say about the facility and society's perception of the people of Mantari.

This facility makes us neat and healthy. We used not to get water to bath and wash our clothing regularly. Now we can bath as and when we need and eat good food. When we visit nearby communities for social activities, people take us for current returnee migrants from Buasi (Obuasi) because we are neat. 'No', we tell them we are in Mantari and they are surprise.

The outsider sees people from these communities as blessed and they ask questions: “how did you get this facility?”, “what arrangement did you have with the people who brought you this facility?”, “tell us what you did and how you did it”. These questions are raised because water is a very important resource for a woman and almost all the activities of women revolve around water. Its availability is thus a key factor that women, especially in the rural area, consider in moving into a community for marriage. According to the people of Mantari and Meguo, the rate at which ladies are coming into their communities for marriage is increasing. Within the last three years, ten and four new wives have come into Mantari and Meguo respectively. The FGD revealed that perhaps only four and two women would have come to Mantari and Meguo respectively if the facility had not come.

The facility has not changed the main economic activities of the households during the rainy season. The main economic activity of the community has been farming. Table 8 shows a comparison of the economic activities of the respondents which virtually represent the economic activities of the houses covered. Table 8 shows that there is no change in economic activity generally, before and after the establishment of the water facility.

Table 8: Economic Activities of Households

Major Economic Activities of Households	Before Facility		Current Situation	
	Households	Percent	Households	Percent
Crop Farming only	1	3.3	0	0.0
Crop Farming and Animal Rearing	29	96.7	30	100
Total	30	100	30	100

Source: Field Survey, April 2012

With regards to major economic activities in the dry season, there is however a change. Farming, shea butter production and ‘pito’ (local alcoholic beverage) brewing were key before the establishment of the facility. About 33.3% of the households were engaged in sheabutter and pito production (See pictures on shea butter processing and pito that has been brewed and ready for sale). After the facility was put in place, gardening became a major dry season activity (the details of the benefits of gardening are discussed in section 3.10.2). Table 9 shows the details of the dry season economic activities.



Table 9: Major Dry Season Economic Activities in the Communities

Major Dry Season Economic Activities of Households	Before Facility		Current Situation	
	Households	Percent	Households	Percent
Crop Farming and Animal Rearing	3	10.0	0	0.0
Shea butter Production only	1	3.3	0	0.0
Pito Brewing only	10	33.3	0	0.0
Shea butter and Pito	11	36.7	0	0.0
Gardening only	0	0.0	9	30.0
Pito & Gardening	0	0.0	9	30.0
Pito, Gardening & Shea butter	0	0.0	10	33.3
Nothing	5	16.7	2	6.7
Total	30	100	30	100

Source: Field Survey, April 2012

All the activities in Table 9 require the use of water. The facility has not only opened more opportunities for the people in the dry season, but has also taken away the drudgery associated with activities such as pito brewing and shea butter production. The shea butter is mostly processed for both household usage and commercial purposes. The main market for shea butter is Nanville, Takpo and Sankana. On the contrary, dawadawa is processed mainly for household consumption whilst pito is brewed for the local market. To ensure that there is less competition and to ensure ready market for the product, pito is brewed on rotational basis. This is because if many women brew pito concurrently, there would be limited market for it since the main customers are from the community.

It is not just that gardening and easy access to water for domestic use that constitute the benefits of the facility, it equally has interior benefits. According to the community members in Meguo, the facility has strengthened social relation in households. In Meguo, a woman by name Konkyiema, during the FGD had this case story to tell about the impact of the facility in their social and economic lives.

Once upon a time in this community, we had difficulty accessing potable water. Within that era, we were not giving birth. At the time that it was very suitable for lovemaking, that is, early dawn, a woman pushed the husband aside and went out in search of water for the household. Our children either did not go to school or went to school without bathing. Before this facility was given to us, we did not have good meals and were often falling sick especially, the children suffered from anaemia. Our husband's livestock used to move far in search of water and some got missed. Today, we are very blessed. We have enough water for our livestock, household and other uses. Our children go to school, we have fresh vegetables from our gardens for good meals. We no longer frequent the hospital due to ill health. We have good nights and do not have to spend our lovemaking time to draw water. We now give birth and as you can see, these are our children all over, under the tree around us. The green and fresh vegetables we eat have made us healthy and fresh. The facility has made us keep ourselves and our environment clean. In sum, this facility has reduced hunger, weakened poverty (nang baleε, i.e poverty is weak) and brought cleanliness, health, peace and love to our households. We do not need to count the benefits of the facility because they are countless.

3.10. Utilisation of the Facility

3.10.1 Community Gardening

In Mantari and Meguo the women are given the opportunity to cultivate the garden. Thus, all wives of the community are allocated plots in the garden. In Mantari and Meguo, 32 and 27 women respectively work in the garden. There are however some women who did not have plots in the garden. These are women who had come into the community (on marriage) after the plots had been allocated. In Mantari alone, ten new wives have come in within the last three years. The land under cultivation belongs to the Tendaana of the community who granted license to use year round by the women. The women work daily in the garden in the morning and evening. To ensure peace and harmony in the work, the women in each community met and agreed that all gardeners gather at the facility by 6 am and 4:30 pm before the garden door is opened and that no single person should enter the garden at any time (apart from working hours). If really necessary, a woman must ask another to accompany her. The women at Meguo further decided that, any animal found in the garden must be killed and that no one should dry clothing on the fence of the garden

Major crops cultivated are bean leaves, pumpkin, melon (niiri). These are the key crops that are sold. Other crops cultivated and limited to household consumption are; okro, pepper, tomatoes, cassava leaves, onion, egg plant, Amaranthus species (alleefu) and cocoyam (kontonmire) as shown in the picture. The initial seed for planting is obtained from the household seed store. Subsequent seed is bought from proceeds from the sales of the first crop. The crops produced are mainly for sale and a little for household consumption.



The crops from the garden are sold mostly on Nanville market days. Nanville is the biggest community close to Mantari and Meguo (see picture on marketing). It thus serves as the major trade centre for surrounding villages. The market day comes off every six days. Women pay GH¢1.00 per month for the use of the water for gardening. This contribution is made to support the maintenance of the facility when the need arises and to help themselves in times of need. There is however no legal agreement that requires that part of the money from the gardens be used to repair the facility.



In Venne, only men are cultivating the garden. These are only four and the major vegetables grown are bean leaves, pumpkin leaves, cabbage, amaranthus species and okro. Generally, the management and maintenance of the gardens is much better in Mantari and Meguo than in Venne. The Pictures here offer a visual impression about the situation. The garden in Venne (Picture A) is very weedy and due to limited watering, the soil is dry and both weeds and vegetables withered. The gardens in Mantari and Meguo are however well managed and maintained (See Picture B).



3.10.2 Earnings from the Gardens

Mantari: In Mantari the cultivation period ranges from four to six months. The frequency of harvest depends on the type of

crop. The frequency of harvest ranges from one to four times per month. The leading crops are bean leaves, pumpkin leaves, amaranthus species (alefi) and cassava leaves. The total value of vegetables in Mantari in one season is GH¢10, 156.00. This value is based on the amount of vegetables actually sold in the market. On the other hand households would have spent money to purchase vegetables for consumption if they had not grown them. Therefore the garden has cost savings. Thus the total value of vegetables in Mantari if all cultivable vegetables were to be sold in the market is GH¢ 15, 468.00.

Meguo: The cultivation period in Meguo ranges from one to six months. Similar to Mantari the leading crops in Meguo are bean leaves, pumpkin leaves, pepper and okro. Depending on a particular vegetable, the frequency of harvest ranges from once a month to four times a month. Total amount earned from the garden in Meguo in one season is GH¢ 8, 011.20. The households use part of their proceeds for household consumption. This implies that the households make

savings as a result of the garden. The real value earned by the community in a season is GH¢ 12,752.30. Discussion with the gardeners showed that they are so much interested in cultivating tomatoes and cassava leaves but there is limited fenced space. They also indicated that okro is not responding well. However, they could not tell the source of its poor performance.

Venne: There are only four men working on the garden in Venne. The leading vegetables grown are bean leaves, pumpkin leaves, cabbage, amaranthus species and okro. The value of vegetables grown in the community within the season is GH¢ 1,743.00. The total value (including savings made as a result of the cultivation of vegetables in the community) is GH¢ 2,302.30. Figure 5 shows the values of vegetables in the communities.

Figure 5: Value of Vegetables in the Communities

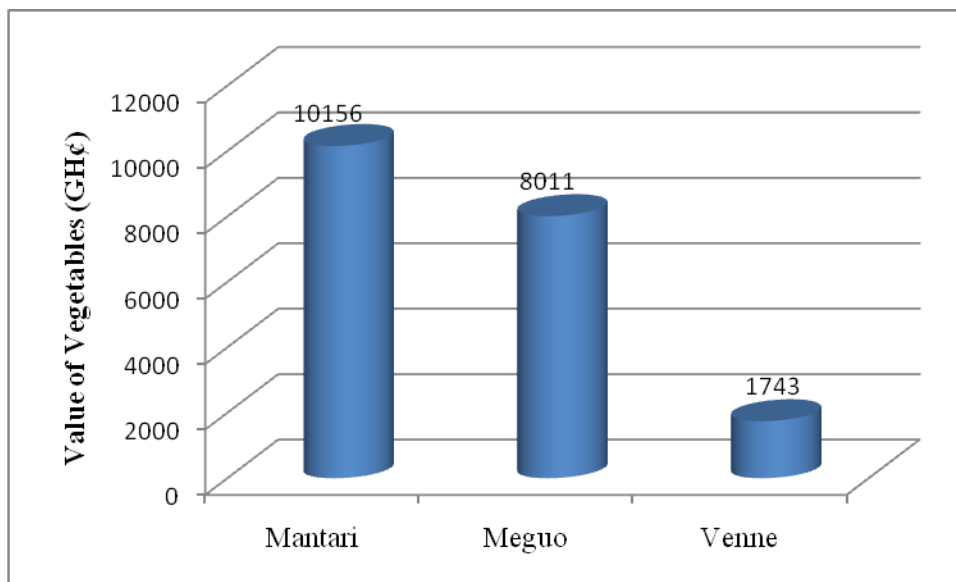


Table 10: Earnings from the Gardens in Mantari

Type of crop	No. of farmers	Frequency of Harvest per month	No. months cultivated in a season	No. of harvest per season	Actual earning/harvest	Value per gardener	Value of Crop harvested in the community	Average % consumed	Average % sold	100% Value
Beans Leaves	32	2	6	12	6.00	72.00	2,304.00	40	60	6,720
Melon 'Niiri'	32	1	6	6	3.00	18.00	576	40	60	960.00
Pumpkin Leaves	32	4	6	24	1.00	24.00	768	40	60	1,280.00
Okro	32	3	4	12	1.50	18.00	576	100	0	576
Pepper	12	3	4	16	2.00	32.00	384	100	0	384
Garden Eggs	6	3	4	16	3.00	48.00	288	100	0	288
Cassava leaves	32	4	4	16	5.00	80.00	2560	100	0	2560
Alefu	28	4	6	24	4.00	96.00	2688	100	0	2688
Cocoyam leaves (Kontomire)	6	1	4	4	0.50	2.00	12	100	0	12
Total						390	10,156.00			15,468

Source: Field Survey, April 2012

Table 11: Earnings from the Gardens in Meguo

Type of crop	No. of farmers	Frequency of Harvest per month	No. months cultivated in a season	No. of harvest per season	Average earning/harvest	Value per gardener	Value of Crop harvested in the community	Average % consumed	Average % sold	100% Value
Beans Leaves	27	2	6	12	3.00	36	972	20	80	1,215.00
Melon 'Niiri'	27	1	6	6	3.00	18	486	30	70	694.30
Pumpkin Leaves	27	4	6	24	5.00	120	3240	40	60	5,400.00
Okro	27	3	4	12	5.00	60	1620	30	70	2,314.00
Pepper	15	3	5	15	6.00	90	1350	50	50	2,700.00
Garden Eggs	7	4	4	16	3.00	48	336	20	80	420.00
Tomatoes	1	1	1	2	3.60	7.2	7.2	20	80	9.00
Total/Avg						379.20	8, 011.20	Avg 30	Avg 70	12,752.30

Source: Field Survey, April 2012

Table 12: Earnings from the Gardens in Venne

Type of crop	No. of farmers	Frequency of Harvest per month	No. months cultivated	No. of harvest per season	Actual earning/harvest	Value per gardener in a season	Total Value of Crop harvested in the community	Average % consumed	Average % sold	100% Value
Beans Leaves	4	2	6	12	4.5	150	600	25	75	800.00
Melon 'Niiri'	1	1	2	2	5	10	10	20	80	12.50
Pumpkin Leaves	4	4	5	20	2	40	160	30	70	228.60
Okro	4	3	3	9	6	54	216	25	75	288.00
Pepper	1	3	5	15	7	105	105	15	85	123.50
Cabbage	4	2	5	10	2.5	25	100	20	80	125.00
Tomatoes	4	2	3	3	6	18	72	15	85	84.70
Amaranthus species 'Alefú'	4	4	6	24	5	120	480	25	75	640.00
Total						522	1,743	20	80	2,302.30

Source: Field Survey, April 2012

3.10.3. Children in Gardening

Children and their mothers seem to have many things in common. In Mantari and Meguo, one of the activities of women that have influenced their children is gardening. Twenty nine children comprising twenty-four girls and five boys (see details of children in Table 13) established gardens around the water facility fenced with sticks (as shown in the picture). The details are presented in Table 13 below.



Table 13: Children Gardeners in Mantari and Meguo

Community	No.	Boys	Girls	Age Range	Class Range
Mantari	9	1	8	10 - 15	Primary 2 – JHS 1
Meguo	20	4	16	6 - 18	Primary 2 – JHS 2
Total	29	5	24		

Source: Field Survey, April 2012

Fundamentally, the motivation of these children for gardening is their belief that they can earn some income from the sales of crops to buy basic needs for school and also supplement household food needs.

The land that they use in Mantari and Meguo belongs respectively to the Tendaana (first settler in the Community) and Albert (WATSAN Secretary). These land owners have permitted the

children to use the land only on condition that they remove all sticks (fence material) in the rainy season to give them space to farm. The children do not pay for the land, but some voluntarily give some vegetables from their gardens to the land lords. They use the water from the trough where the animals drink to water their crops. These children are all in school and are aged between 6 and 18.

These children started the gardening in the 2010/2011 growing season beginning in November. This year is the first time some of them have cultivated the gardens. Having enjoyed the benefits in the first season, they have expanded the sizes of their gardens this year. Major crops cultivated are bean leaves, pumpkin, melon (niiri) and okro. The initial seed for planting is bought from money lent by their mothers. Subsequently children pay back after sales and use part of the money to buy more seed. The crops produced are mainly for sale and a little for household consumption. On the average, 65 percent is sold and 35 percent consumed at home.

The women take care of the gardens of their children and market their produce during school days whilst the children take charge in the evening, at weekends and during holidays. Averagely, a child in Meguo earned Gh 4.40 cedis from crop sales in this season as at April 2012 and incurred an average cost (for seed) of Gh 1.20 cedis within the same period. In Mantari, the average income per child is Gh 7.00 cedis and the cost incurred is Gh 1.30 cedis. The children usually give their money to their mothers for safe keep. The income from the garden is used to buy books, pens and pencils, mathematical sets, cooked food at school, sandals and clothing.

The children reported that the facility provides them with good food especially in the morning which gives them energy and keeps them fit for school. Before this facility was provided, many of them did not get food to eat before going to school in the morning. This unfavourably affected their health and learning. Today, the money they earn from the garden help them acquire some basic learning materials when their parents do not have enough money to acquire their needs

The children suggested that they be provided with fence materials for their gardening. This would take away some difficulties and risks associated with going to the bush to cut and carry sticks for fencing every year. The sticks do not give adequate protection as animals easily get through and destroy crops. Children would be encouraged to do gardening and the environment would also be spared of deforestation. They also ask for watering cans.

3.11 Livestock in the Communities

In all the communities, the main livestock reared are cattle, goats, sheep and pigs. In almost every household, poultry is raised. The animals are raised for economic reasons and household consumption. They also serve as insurance for the household. The household indicated that prior to the provision of the facility, they had challenges in watering animals. Consequently, animals moved long distance in search of water. There were instance where animals did not return and were suspected to be stolen.

Table 14: Livestock in Mantari Community

Livestock	Status	BEFORE THE FACILITY				AFTER THE FACILITY			
		Avg. per Household	Total in C'ty	Min	Max	Avg. per Household	Total in C'ty	Min	Max
Goat	Existing	19	350	2	55	16	288	3	42
	Lost	17	319	3	40	10	176	3	31
Sheep	Existing	12	63	2	35	11	78	1	25
	Loss	11	122	2	30	10	44	1	20
Pigs	Existing	8	129	1	23	6	114	1	16
	Lost	8	125	2	22	7	117	2	19
Poultry	Existing	48	871	3	176	28	470	3	80
	Loss	31	594	7	108	31	533	7	64

Source: Field Survey, April 2012

Figure 6: Comparison of Livestock Before and After the Facility in Mantari

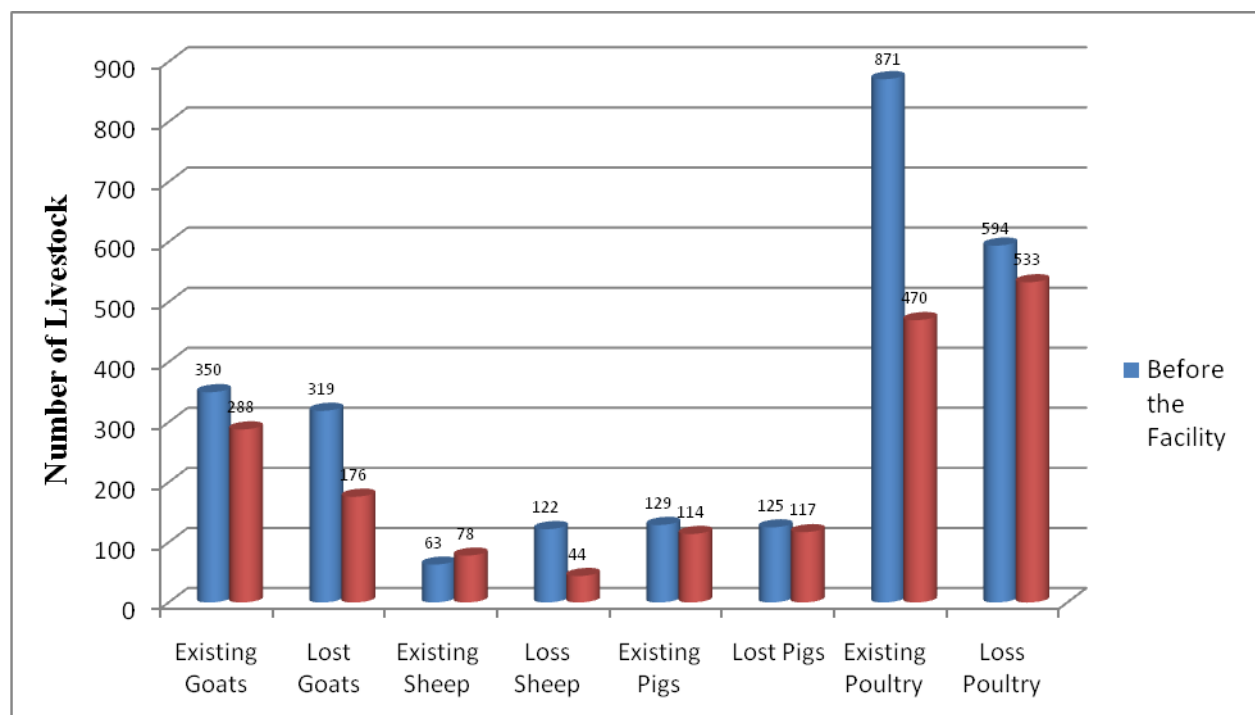
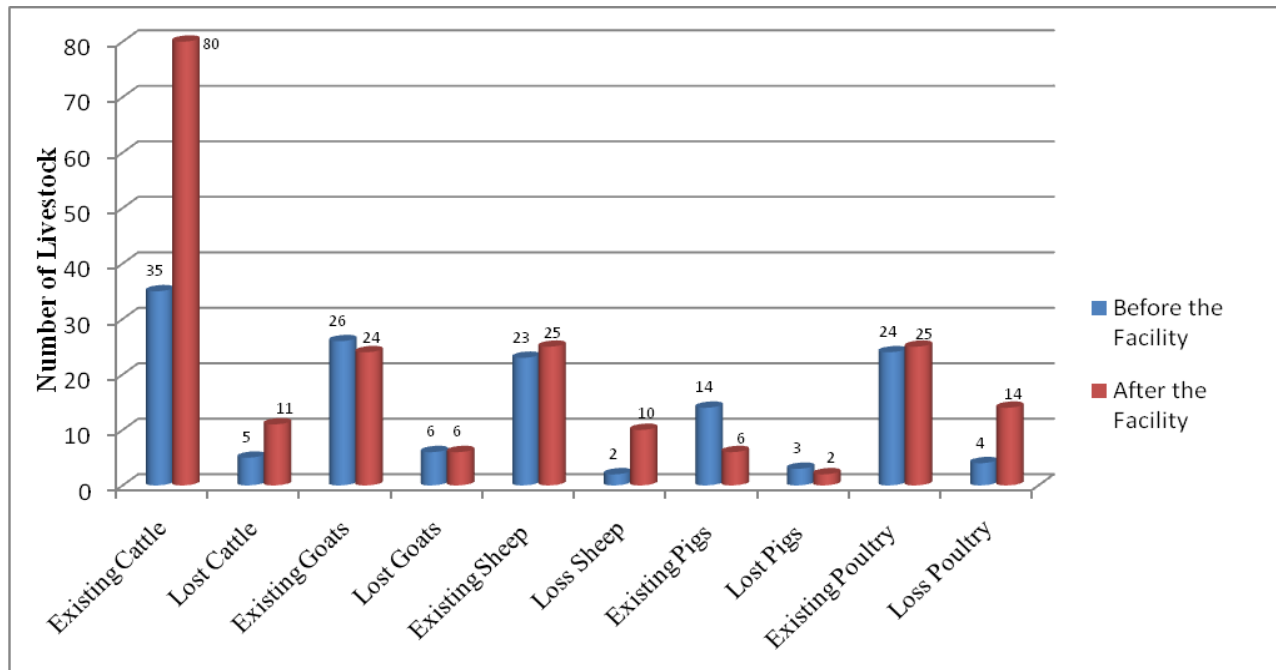


Table 15: Livestock in the Meguo Community

Livestock	Status	BEFORE THE FACILITY				AFTER THE FACILITY			
		Avg. per Household	Total in C'ty	Min	Max	Avg. per Household	Total in C'ty	Min	Max
Cattle	Existing	35	142	10	90	80	240	20	160
	Lost	5	22	2	9	11	35	2	22
Goat	Existing	26	261	7	80	24	246	7	60
	Lost	6	57	2	15	6	51	1	18
Sheep	Existing	23	141	6	80	25	154	9	75
	Loss	2	17	1	9	10	38	4	15
Pigs	Existing	14	140	2	60	6	61	1	10
	Lost	3	22	1	10	2	23	1	8
Poultry	Existing	24	245	5	60	25	223	7	90
	Loss	4	28	2	7	14	125	1	35

Source: Field Survey, April 2012

Figure 7: Comparison of Livestock Before and After the Facility in



Livestock in Venne: The situation in Venne is different from the other communities. The only livestock raised in the community is goat. A year before the facility, there were 56 goats and 35 poultry, but at the time of the study, there were 19 goats and 11 poultry. The reduction in numbers has been attributed to loss through stealing or death. According to the households, with the provision of the



facility they are beginning to raise livestock and poultry in large numbers again. Despite the fact that there is limited rearing activity in Venne, large numbers of animals, especially cattle (as shown in picture above) and sheep from nearby communities water at the facility.

3.12 Sustainability of the System

In order to maximize the use of the facility, the question of sustainability issues must be answered. With regards to this, the communities have put in some measures to ensure proper and continues functioning of the facility. These include:

- regular cleaning around the facility
- Routine visits and inspection of the facility by the WATSAN Committee,
- prohibiting children from playing around the facility,
- No preparation of sheabutter or dawadawa at the facility
- No use of sandals on the pad around the facility
- No drawing of water from the facility at night
- Contribution of money for operation and management

At Meguo, no one is allowed to wash clothing at the facility. Accordingly, pouring the dirty water in the area makes the place filthy and can result in infection. In Mantari and Venne, this rule does not exist.

The WATSAN committees and community members are doing all these to carefully guard and protect the facility so that they can continue to enjoy the multi-benefits that come with the facility.

At the institutional level, the Ministry of Food and Agriculture is interested in supporting the communities in terms of agronomic practices, linking to access improved seeds and seedlings. The Community Water and Sanitation Agency (CWSA) has facilitated the training of Area Mechanics in all Districts in the Upper West Region. From time to time, the Agency assesses the needs of these Area Mechanics and provides training to meet their appropriate needs. Also, where there is any new technology relevant to their work, training is provided. WATSAN committees rely on these Area Mechanics for major maintenance activities. According to the CWSA, the MUS concept is good but the issue of sustaining water facilities in general is a major concern in the region. The Agency believes that all stakeholders including the District Assemblies and communities must be committed to the operation and management of water resources in order to achieve sustainability. Communities should be willing to make regular contributions towards the maintenance of facilities, the WATSAN committees should link up with the Area Mechanics not only in their Districts but other nearby Districts for timely intervention when the need arises.

During interviews with the District Water and Sanitation Teams at Lawra and Nadowli, sustainability of the systems emerged as the key concern. The DWST in Lawra indicated that besides the fact that the population in Venne is too small, the system is complex for them to be able to sustain. They therefore recommended a relocation of the facility to Gengenke and fixing of a hand pump on the borehole in the Venne. Generally solar powered water facilities are relatively new in the region, hence in the two districts, there is no technician who can handle these solar related repairs.

SECTION FOUR: MAJOR FINDINGS, RECOMMENDATION AND CONCLUSION

4.1 Introduction

This section presents a summary of findings from the study. The findings have been presented in tandem with the objectives of the study to make easy referencing. Other areas contained in this section are the challenges confronting the systems, the way forward and conclusion.

4.2 Key Findings

Impact of the Systems: The systems have contributed to household income in the communities especially in Mantari and Meguo. With the establishment of the systems, there is a lot of cost savings. That is, household food items that were hitherto bought are now cultivated by the households. Though the frequency of small scale industrial activities such as pito brewing and shea butter production has not changed significantly, the patronage/demand has increased and based on the increased demand, they are able to increase production levels. Though livestock numbers have not increased in some cases, there is a reduction in the number of animals lost.

Socially the provision of the facility has re-united the communities through frequent meetings, women working together in a common place (gardens). Working in groups and meeting frequently have also increased the tolerance level in the communities. With improved social network, mobilisation of community members for future development activities becomes easy.

Dynamics of Decision Making on the Management of the Systems: In Mantari and Venne, females constitute 37.5% and 33.3% of the management body of the systems. This is below the minimum of 40% female composition of the WATSAN committee. On the other hand, 43% of the WATSAN committee members in Meguo are females. Whereas in Mantari and Meguo the

community agreed that women should use the garden, in Venne, it was the men who took the decision to exclude women from using the garden.

Use of Gardens: Gardening is done on seasonal basis. In all the communities, cultivation is from November to May every year. In the rainy season, women only use the garden to cultivate crops that are not cultivated on the farms. There is some dissatisfaction among community members in Venne on the use of the garden.

Gender Dimension of Facility Usage: In Mantari and Meguo, women are the only persons working within the fenced area of the garden. Similarly female pupils dominate in the usage of the garden. Out of 29 pupils engaged in gardening in Mantari and Meguo, 25 are females. On the contrary only men are engaged in gardening in Venne. Marginalisation of women in gardening in Venne has not been helpful to the progress of households. The fact that out of the four women in Venne, three are widows necessitates their involvement in the gardening. Children are very interested in gardening but the use of sticks as fence materials has two effects: exposure of children to danger as they go into the bush to cut sticks and also environmental degradation.

Gardeners Role in Managing the System: Some of the gardeners are members of the WATSAN committees and thus convey issues from the gardens to the WATSAN committees. For Meguo and Mantari, there is no financial bonding between gardeners and WATSAN. The contributions from the gardeners are solely for their own welfare and nothing is reserved for the WATSAN to use for maintaining the system. However in Venne the gardeners contribute money into the accounts of the WATSAN for the purpose of maintaining the system.

Capital and Running Cost of the Systems: Communities have started paying for some repair works. This is a positive sign that the facilities will be sustained after GWI exits. In all communities, there is equal payment for water usage irrespective of household size and the number of livestock owned by a household. Currently with the amount of money owned by the

WATSAN for operation and maintenance purposes vis-à-vis the cost already incurred by both GWI and the communities indicate that communities alone could not have financed it.

A challenge faced by gardeners is lack of access to garden tools. The gardeners use their household farm tools for gardening. Gardening, though form of agriculture, has its unique tools. Discussion with the gardeners showed that they were supplied with watering cans but these cans have broken down and they resort to the use of buckets and calabashes for watering of the gardens (See Picture).



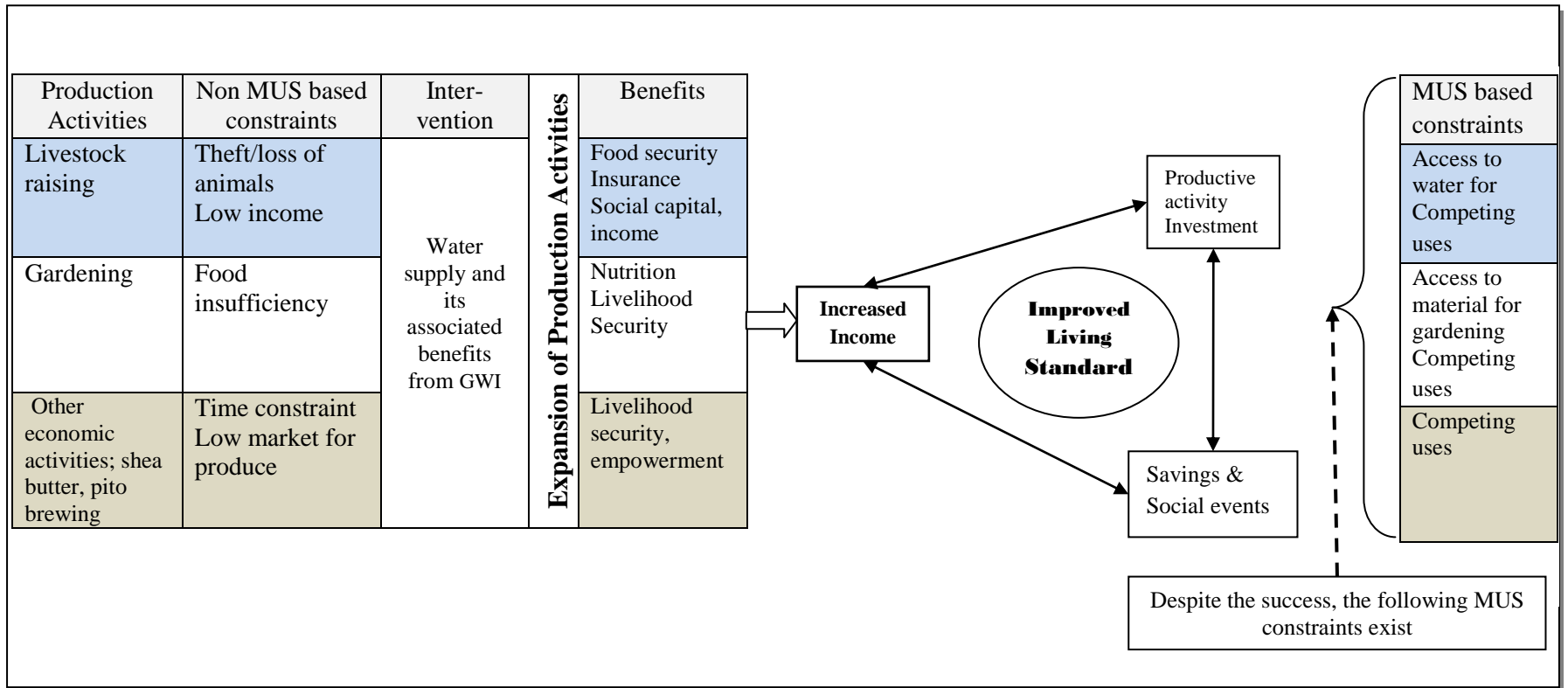
Design of the System: Troughs for animals are very close to the gardening area. The tendency is high for the facility environment and garden to be polluted with animal droppings.

The findings of the study are summarised in Figure 9. The major productive activities of the study area are; agriculture, including crop cultivation and livestock raising, and other local small scale industrial activities. These activities require the use of water. Before the provision of the facility, the communities faced some constraints. These include; loss of animals, food insufficiency, challenges of apportioning time to various activities especially by women and low market for locally produced and marketed products. This necessitated the intervention by GWI. After the provision of the facility, there was general expansion of productive activities. The benefits derived are food security, insurance, social capital, good feeding and women empowerment. These benefits have further generated a spiral of increased income, savings and investment thus resulting in improved standard of living of the people.

Despite the huge successes and thus benefits of the facility, there are few challenges in some instances as indicated in Figure 9. Accordingly, troughs within the gardens have to be filled before water can flow into the trough for the animals. This implies that where there is inadequate water for the gardening there would be obviously no water for the animals. Moreover during gardening hours (where the troughs are never filled) animals cannot be watered. Another constraint that has been identified is competing uses. That is, children using water meant for animals to water their vegetables.

Institutional Support: It was found that the Ministry of Food and Agriculture through the Agriculture Extension Agents in the two districts support gardeners on agronomic practices such as bed preparation, weed management and pest control. They also at times, supply improved seeds to the gardeners. The CWSA has also facilitated the training of Area Mechanics and continues to provide refresher training for them. These mechanics are available to handle some major repair work of water facilities. These mechanics however need training in solar technology.

Figure 8: Existing Multiple Water Use System in the three Communities



4.3 Recommendations

Based on the findings of the study, the following recommendations are made for the project sustainability.

Use of Agriculture Extension Officers: The Ministry of Food and Agriculture (MOFA) through its Agriculture Extension Agents can train gardeners on gardening practices such as use of tools, water use efficiency, preparation of garden beds as well as preparation of and use of compost to enrich soil fertility. Similarly the gardeners can be trained on the use of neem seeds and leaves to control pests and diseases instead of chemicals. This would not only reduce costs of inputs but also keep vegetables safe for consumption.

Fund raising strategies: The current monthly contribution is not very sustainable as some households find it difficult to raise funds at certain parts of the year. Therefore, different modes of raising funds for operation and maintenance should be adopted by communities. For instance, contribution can be made in kind (crop) especially during harvest. Households with large stock of animals (minimum size to be determined by the communities) should be made to contribute extra funds or kind towards operation and maintenance of the facility. Specific levy should be given to gardeners to contribute towards operation and maintenance. Further, in the case of Venne, non-community livestock owners who water their animals at the facility should be made to contribute towards operation and maintenance. These livestock owners can be identified through their shepherds.

Capacity Development/Training: The WATSAN committees require capacity development to be able to detect and repair minor faults of the system including record keeping on the facility. In Meguo, a woman received a seven-month training in India on repair of solar lamps and other solar appliance. Such a person can be part of the committee and developed further on solar repairs.

Security: It is important that a person be selected to watch over the facility though other members of the communities are equally vigilant over the use and safety of the facilities. To improve security of the facility, the existing solar panels can be used to generate light for the facility.

Support for Children in Gardening: provide fence materials for children to do gardening. This would take away some difficulties and risks associated with going into the bush to cut and carry sticks for fencing the gardens every year. The sticks do not give adequate protection as animals easily get through and destroy crops. Children would be encouraged to do gardening and the environment would also be spared of deforestation. There is however the danger of children over concentrating on the garden to the neglect of their studies especially where they are reaping a lot of money. In relation to this, they should be sensitized on the importance of education.

Extend water to the school at Meguo: The school depends on the facility for drinking and preparing food. Extension of water to the school would further help reduce the time children spend in fetching water for both drinking and cooking. The school has a Rambo 1000 water polytank which can be used to store water.

Special Community Engagement and Extension of Venne Water Facility to Gengenke: From the study, it is clear that there are some unfavourable differences among community members in Venne especially in the management of the garden and this can unfavourably affect the sustainability of the facility. There is thus the need to take steps to resolve the problem. The resident population of Venne is so small and thus household contributions are small. This contributes to a sustainability challenge.

The facility could therefore be extended to a larger and nearby community (Gengenke). As more people use the facility, more money could be raised from household contributions towards operation and maintenance. During the study the research team however observed that Venne is

on a lower elevation relative to Gengenkpe which can affect the cost of extension. Secondly Venne is inaccessible in the rainy season and this can affect any repairs required within this period. Based on these factors, an alternative is to relocate the facility to Gengenkpe and extend back to Venne. In this case, a hand pump could be fixed on the borehole in Venne.

Notwithstanding the above suggestions, a feasibility study should be conducted to establish issues including the following;

- the willingness and ability of Gengenkpe community to participate in the usage and management of the facility. This will require an established dialogue and agreement between the two communities to co-manage the facilities.
- the cost of extension from Venne to Gengenkpe,
- the cost of relocating the facility to Gengenkpe and fixing of hand pump in Venne,
- the cost of relocating the facility to Gengenkpe and extending back to Venne as well as fixing a hand pump in Venne.

Establishment of a “Mango Village Project”: While the women are engaged in gardening, the men especially in Mantari and Meguo can engage in plantation. Therefore we recommend the men to use the facility to establish tree nursery and grow trees. The communities can raise funds from these seedlings by supplying tree seedlings to other communities. This would also facilitate the tree plantation exercise of communities as indicated in their FMPs

Knowledge Sharing: Communities should learn from each other on the operation and management of their facilities. In particular, the idea of non-washing of cloths around the facility is laudable and should be emulated by all. Similarly in Mantari, the women planted flowers around the base of the fence and this should be emulated by other communities.

Extension of Water Troughs: The trough for animals should be at least 50 meters away from the garden fence. This is to prevent pollution of the environment through animal dropping as they can to water. Also, troughs should be quite shallow to make it easy for animals to access the water. As the population of animals increases future extension of the trough should consider these dimensions.

Continuous Sensitization: Given that some community members who have the resources were unwilling to pay increased levies, there is the urgent need to continuously sensitize people on the need to be committed to the facility.

4.4 Conclusion

The concept and practice of multiple water use system is good especially in rural savannah areas where the main economic activity is seasonal farming. The provision of the facility is a good strategy to providing access to water that responds to the full range of people's needs: both domestic and productive, contributing to poverty alleviation and equity. The provision of the MUS facility in the study area has enormously enhanced the socio-economic lives of the communities – general expansion of productive activities, food security, insurance, healthy living, social capital and women empowerment. These benefits have further resulted in increased income, savings in terms of time and money, and investment. Direct monetary benefits such as sales and cost savings from gardening alone are very encouraging. Other benefits from savings made on health, time savings, domestic uses of water, construction and small scale industrial activities and the prestige and pride of ownership and all the other bundles of social satisfaction if quantified, would outweigh the capital and operation cost of the facility. In order to keep the inflow of benefits from the facility, communities are actively involved through contribution and management activities in sustaining the facility. If the recommendations provided herein are implemented and above all, communities are committed to promoting their own livelihood, the ultimate goal of the MUS concept of alleviating poverty in the study area would be achieved.

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Appendix A: Details of Children in Gardening in Mantari and Meguo

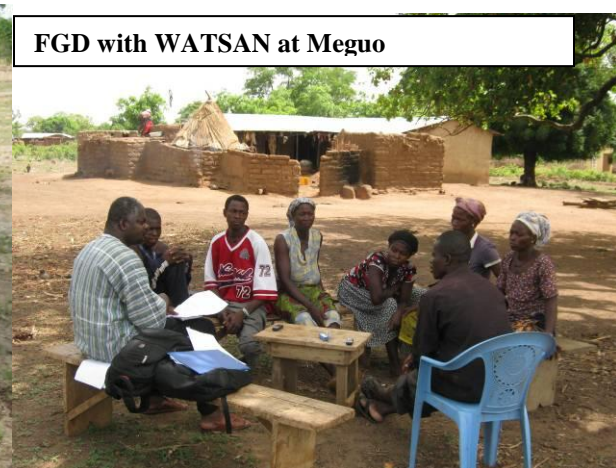
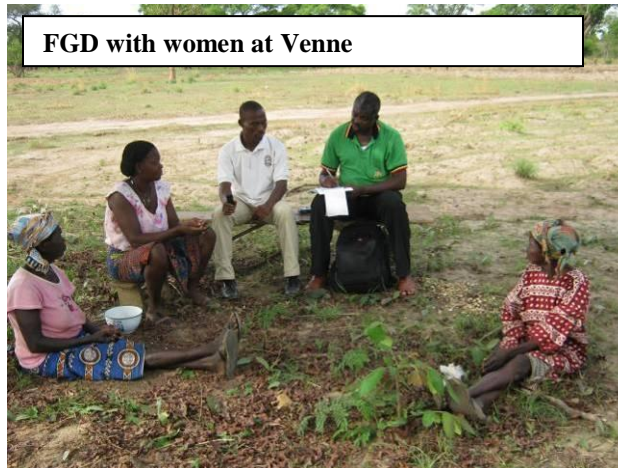
Mantari Community								
	Name	Sex	Age	Class in School	% consumed	% Sold	Income from sales this season	Cost of inputs (seed)
1	Tonazie Jennifer	Female	12	5	30	70	5.00	2.10
2	Thormas Gifty	Female	12	2	20	80	5.00	1.30
3	Ambierima Kudjo	Male	10	4	50	50	6.00	0.70
4	Tonazie Juliana	Female	14	JSS 1	40	60	5.40	0.60
5	Buree Akua	Female	15	6	30	70	14.20	1.20
6	Tonazie Lydia	Female	15	5	20	80	10.60	1.60
7	Na-ile Amanda	Female	15	JSS 1	30	70	4.00	1.4
8	Kuunanang Afia	Female	12	6	10	90	9.00	1.3
9	Bavi Diana	Female	14	3	10	90	3.20	1.10

Meguo Community								
	Name	Sex	Age	Class in School	% consumed	% Sold	Income from sales this season	Cost of inputs (seed)
1	Kyiere Cynthia	Female	12	2	50	50	1.20	1.00
2	Kuunanang Soma	Female	8	3	30	70	1.00	0.90
3	Miire Hilda	Female	16	JHS 1	50	50	7.50	2.10
4	Naah Janet	Female	18	JHS 2	50	50	7.80	3.30
5	Kyiere Lydia	Female	15	JHS 1	50	50	2.00	1.30

6	Kuunanang Bog-yen	Female	7	4	50	50	0.80	1.30
7	Dakurah Rita	Female	6	Day Nursery 2	60	40	1.40	0.00
8	Suglo Kojo	Male	15	JHS 1	40	60	8.30	1.90
9	Kyiere Hipolyte	Male	13	6	30	70	2.00	0.00
10	Kongveng Eunice	Female	13	JHS 1	40	60	4.60	2.00
11	Koku Suglo	Male	14	6	40	60	7.00	1.00
12	Kalibi David	Male	12	5	40	60	1.20	0.00
13	Kwame Abena	Female	12	6	30	70	7.70	1.60
14	Kuunanang Sophia	Female	8	2	40	60	1.40	0.00
15	Kyiere Helen	Female	12	5	30	70	6.20	1.20
16	Kuunanang Dessi	Female	12	5	50	50	6.00	0.80
17	Kuunanang Ama	Female	13	6	40	60	7.30	2.00
18	Kyiere Diana	Female	10	2	60	40	2.00	1.20
19	Amadu Hawa	Female	13	6	30	70	5.50	1.00
20	Donkor Vivian	Female	14	6	30	70	7.00	1.60

APPENDIX B: PICTURES

The Research Process

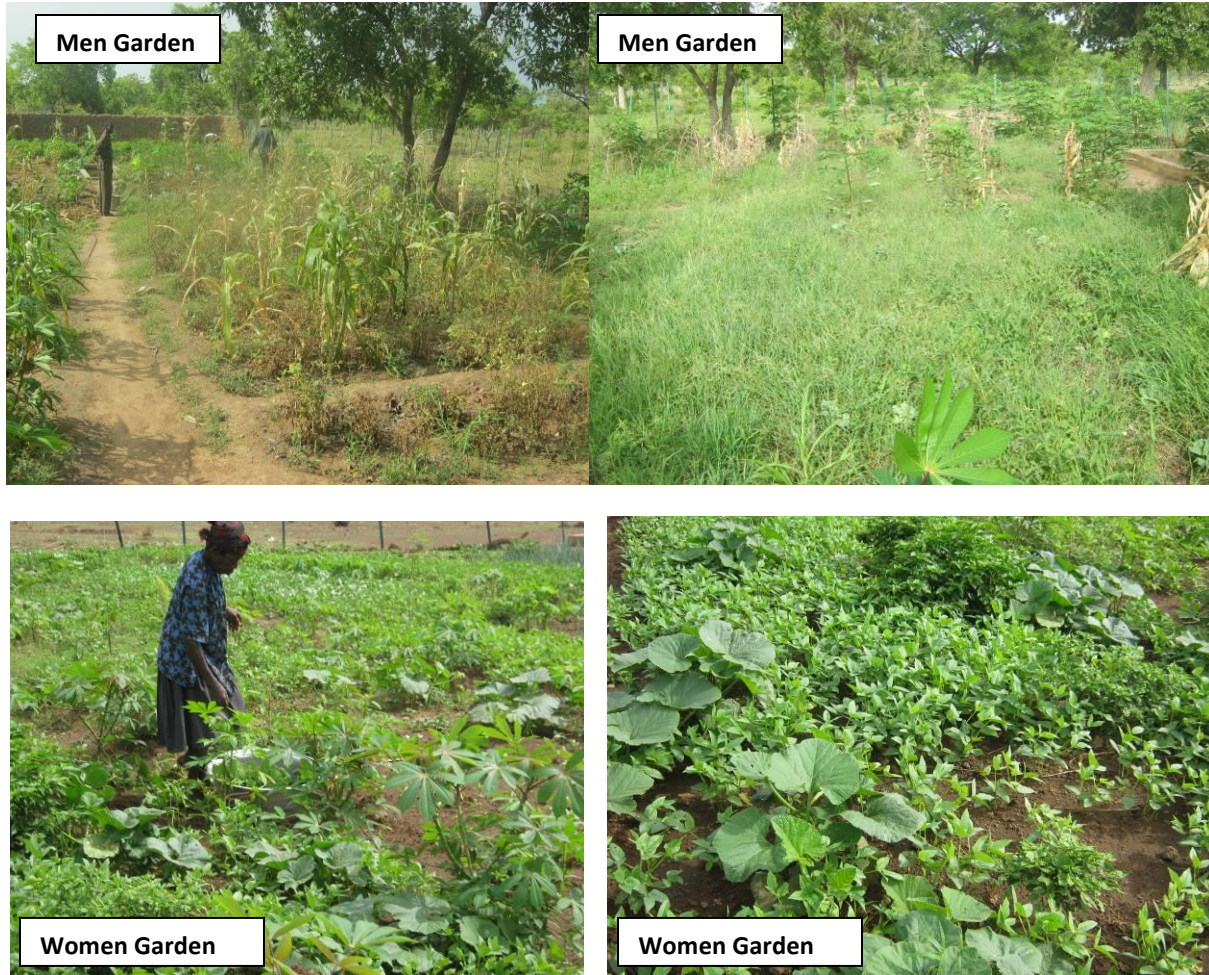


Process of Gardening in the Study Area (from A to F)



A: This shows planting and application of manure. B: Weeding C: Watering of vegetables
D: Harvesting of vegetables E: Washing of vegetables in preparation for marketing
F: Marketing of vegetables at Nanville market

Gender Dimension of Garden Management: Men verses women



The above pictures show the gender dimension of garden management. Whereas the men cultivate maize, the women cultivate vegetables. The men's gardens are weedy while the women's gardens are cleared of weed and well maintained. From the pictures, it may not be out of place to say that what men can do, women can do better.

CLEANLINESS AT THE FACILITY

Whereas washing and drying at the facility is done at Mantari and Venne, it is prohibited at Meguo. This is to ensure that the environment around the facility and vegetables are not polluted by waste water after washing.



A woman washing at the facility in Venne



Drying of clothing at the facility in Venne



Children washing at the facility in Mantari

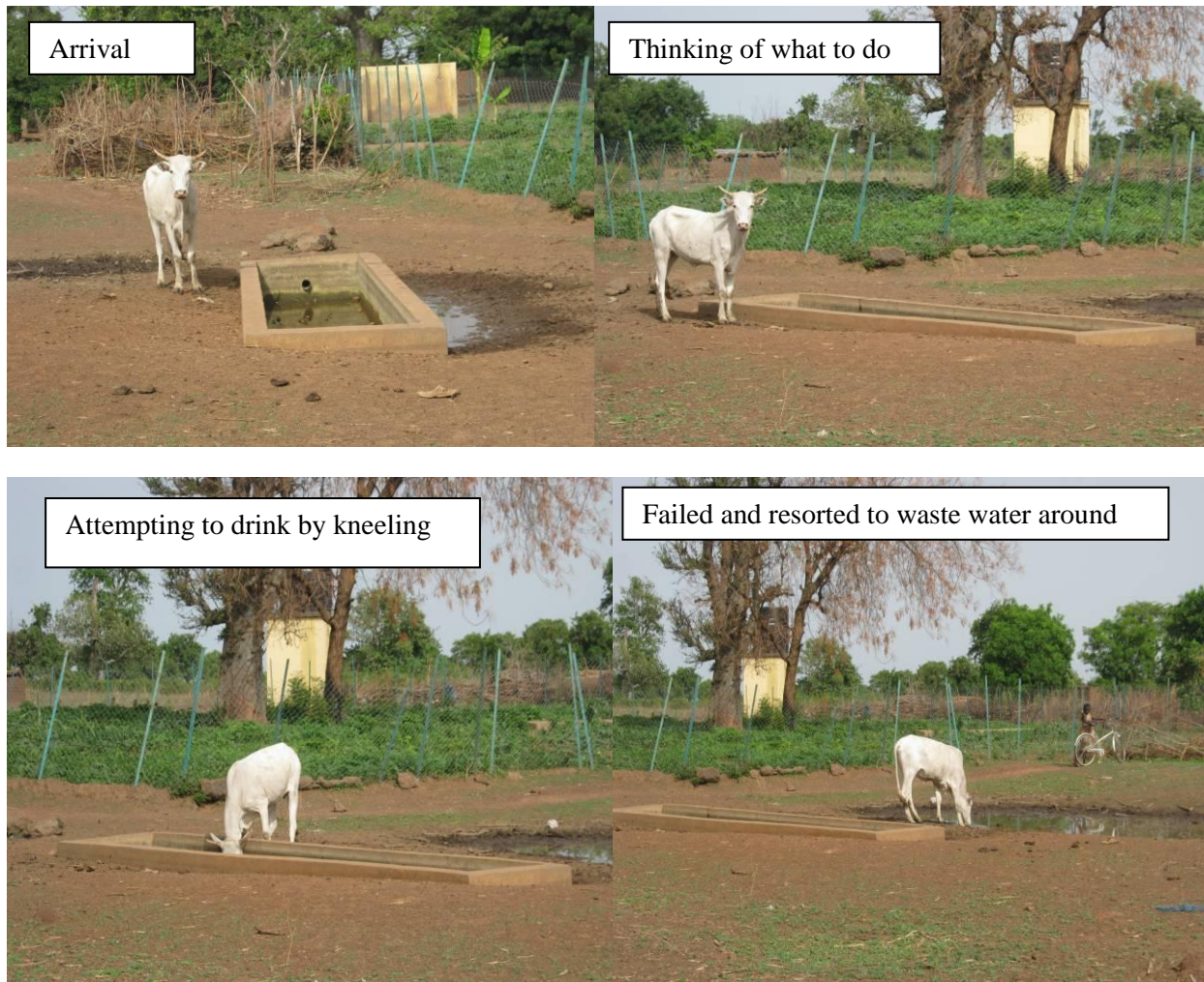


Drying of clothing on garden fence in Mantari

Animals drinking from the facility



Design Challenge of the Animal Trough



After the research team observed that there was a design defect in the animal trough, the team decided to observe this cow. As shown in the pictures, the animal arrived and observed that through was deep and started thinking of what to do. It later went round to the other side of the trough and tried to drink by kneeling. The animal still could not access the water in the trough due to its depth coupled with limited water. It was fortunate that there was collection of waste water close by and thus it was compelled to resort to that. This means if there was no water around, the animal would have suffered thirst.

OTHER USES OF THE FACILITIES



Other users of the facility include domestic usage, construction, brewing of pito and extraction of shea butter as shown in the pictures above