

# Improving the Management and Use of Water Resources for Small-Scale Irrigation Farming in the Garu Tempane District of Ghana

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## Abstract

Small scale irrigation farming has been recognized as an important avenue for improving the well being of poor people living in arid and marginal areas of the world. The contribution of small scale irrigation can be seen in its ability to ensure food security as well as contribute to the income of farmers. In the Garu-Tempane District, small scale irrigation farming is a major source of livelihood for people in the district. Despite the importance of the irrigation schemes to dry season farming the schemes face challenges such as inadequate water, inadequate canals, choked and broken canals due to frequent breakdown and inadequate repairs which affect their effective operation. Although the major use of the dam waters was dry season farming, animal watering and fishing were also found to be significant uses of the dam waters.

In north-eastern Ghana as it is in many parts of the third world, external development agencies support the formation of Water User Associations (WUAs) for the management of community-based irrigation schemes. Although, the management of the schemes and the use of the dam is the responsibility of the community represented by the WUAs it was revealed by the study that, in the management of challenges that confront small scale irrigation schemes, WUAs depended on the supportive roles of traditional authorities as well as district assemblies for discharging their management responsibilities more effectively.

**Keywords:** Improving, management, use, small-scale, irrigation, water resources, Garu Tempane district

## 1. Introduction

Ghana has witnessed dwindling and unstable economic development since independence in 1957. The economic terrain has been very unstable with mixed fortunes over the years. This was clear in the early 1980s when Ghana and most developing countries were forced to restructure their economies by adopting the Structural Adjustment Programme as prescribed by the World Bank and International Monetary Fund. The outcome of this programme had an adverse effect on some segments of the population as subsidies on agriculture were removed and government forced to redeploy workers from the civil service. Under this programme Ghana was supported with substantial amount of credit, but this did little for the economy as the composition of internal production and external trade remained largely unchanged (GPRS II, 2006-2009: iii). According to GPRS II, agriculture is the largest contributor to GDP, contributing about 6% per annum and provides employment for over 60% of the population. It is therefore prudent that for the country to achieve its goal of attaining a middle income status (with a per capita income of at least US\$ 1000) by the year 2015, then agricultural modernization should be given topmost priority.

Even though the mainstay of the people is agriculture, it is still largely rain-fed and as such opened to the vagaries of the weather. Rainfall in Ghana is highly unreliable with regard to its onset, duration, intensity and amount; this has disrupted food crop production over the decades thereby leading to spirals of poverty among the farming populace.

Poverty is basically a rural problem; about 70 percent of the poor people in Ghana live in rural areas. Poor rural people have limited access to basic social services, safe water, roads, electricity and telephone services. Poverty is deepest among food crop farmers, who are mainly traditional small-scale producers. About six out of ten small-scale farmers are poor (IFAD, 2007:1). Poverty among these farmers remains nearly 19% above the

national average of 40% in 1998/99 and they together with those in non-farm self-employment experienced the least reduction (9%) (GPRS I, 2003-2005: 16). Seminal, DFID (2005:11), indicated that vulnerability in Ghana is more acute in the Upper East Region and this is based on the fact that the region has the lowest return on food crop production, the lowest household income from non-farm activities and the most food insecure region. This therefore means that pragmatic measures must be put in place to help the people in the District to create wealth and thereby ensure a sustainable reduction in poverty. Agriculture being the main source of employment for the people in the Garu-Tempane district should therefore be given a boost.

The Upper East region and the Garu-Tempane district for that matter is covered by the Sahel savannah in the north-east and grassland savannah in the north-west. There is one short rainy season between May to October, followed by a long period of dry weather influenced by the dry harmattan wind from the Sahara Desert. Farmers generally live at the subsistence level, and farming is confined mainly to the short rainy season. In the dry season farmers can only cultivate land under irrigation (IFAD, 2007:2). Irrigation therefore continues to be seen as a promising avenue of public investment for solving problems of hunger, malnutrition and poverty. International donors and lending agencies and national governments alike conceive the development and improvement of an area under irrigation as one important strategy to increase levels of food production, cash income and achieve food security. This study examines the management and use of water resources of small-scale irrigation facilities of the Bugri and Gagbiri communities of the Garu-Tempane District.

## **2. Background of the Bugri and Gagbiri Irrigation Schemes**

The Bugri and Gagbiri dams were constructed in 1952 and the early 1960s respectively. The former was constructed by the then colonial government of the Gold Coast while the later was constructed by the Nkrumah regime. The contractors and supervisors to the construction of the dams were Mr. Bush or Buse as the indigenes gave varied names to the supervisor of the project and Mr. Thomas respectively for the two communities. Mr. Buse was an Indian contracted by the colonial government and Mr. Thomas was a British contracted by the new independent government of Ghana. The dams initially were not constructed as small scale irrigation schemes but for domestic and animal use. Due to the intention of the originators of the projects at that time they were fitted with valves and later developed into irrigation schemes. The major uses to which the dams were put to after their completion were for the cultivation of tomatoes, onions and leafy vegetables during the dry season. This was only for domestic and household consumption. Today the schemes serve as a major source of livelihood for the people of the communities especially during the dry season as produce from rainfed agriculture is not enough to meet the needs of the people.

The Bugri scheme has a capacity of 51 hectare meter, a canal length of 1350 meters. The reservoir size is 24 hectares, a reservoir height of 7.5 meters and the total irrigable area is 30 hectares. The Gagbiri scheme on other hand has a capacity of 95 hectare meter, a canal length of 2.9 kilometers. The reservoir size is 36 hectares, a reservoir height of 10 meters and the total irrigable area is 35 hectares.

After the construction of the dams they have not seen any major rehabilitation until the 1990s. The Gagbiri dam was rehabilitated in the 1980s but deteriorated over time. The rehabilitation of the Bugri dam started in 1992 and was completed in 1996. The Gagbiri dam's rehabilitation started in 1992 as well and was completed in 1994. The rehabilitation of the dams was part of the Land Conservation and Smallholder Rehabilitation Project (LACOSREP I), in the Upper East Region. The International Fund for Agricultural Development (IFAD) provided funds for the project with further assistance from the World Food Programme (WFP). The main aim of the project was to support in the alleviation of poverty by providing communities with dams while rehabilitating existing ones. The communities provided labour as their contribution to the project. This was due to the fact that LACOSREP I was labour intensive. To motivate communities to provide labour they were offered food every month in appreciation of their labour. This was termed Food-for-work programme. This component of the project was funded by the WFP. People who participated were given rice, beans, canned fish and oil.

The Irrigation Development Authority (IDA) was in charge of supervising the projects, providing technical advice and expertise to the communities and in turn communities provided their own local knowledge to the design of the infrastructure. The main reason for the involvement of the local people in the rehabilitation of the dams was to give them a sense of ownership and therefore ensure sustainability of the schemes.

### **2.1 Uses of the Dam Waters**

According to the executive committee of the Water User Association (WUA) and District Agricultural Development Unit (DADU), the categories of water users include gardeners (small scale irrigation farmers), livestock farmers and fishermen. All these users have their own interest and aspirations. According to the executives of the water user association, the main reason for the construction of the dams are for small scale

irrigation farming and livestock watering, but due to pressure on the dams they have agreed to use the water more for small scale irrigation farming, while dialoguing with livestock farmers and fishermen to give the dam a respite in times of inadequate water. In Gagbiri the WUA intimated that the chief has been strict on fishermen who still want to fish during the lean season when the water in the dam is not enough for the small scale irrigation farmers. This is because fishing has the tendency of reducing water in the dams since their activities can impede the smooth flow of the water.

As noted above even though there are several users of the dam almost all of them engage in irrigation farming as the main source of their livelihood and sustenance especially in the dry season. This is because rain-fed agriculture does not yield the desired result to ensure the food security of the people. In view of this conflict among water users is almost non-existent. Even though all respondents in the study are irrigation farmers who draw their food and income from the irrigation scheme through dry season gardening, there are other uses to which these farmers put the water to.

About 5% of farmers at the schemes use the water from the dams for only irrigation farming. From Focus Group Discussions (FGD) organized with sections of farmers in the communities, it was realized that the 5% of those who use the water for irrigation farming only do not live near the catchment area of the dam as such after their day's activities they retire to their homes. Also, 34.2% use the water for domestic consumption and livestock drinking. This means that majority of people in the community rely on the dam to water their animals and for domestic purposes. From the interviews the domestic uses are for building and repair of houses, washing of clothing and for household chores such as washing of bowls and cooking utensils, but they do not drink or encourage the use of the water for human consumption since the communities have a number of bore holes and hand dug wells which can serve the potable water needs of the communities. A combined percentage of 95% of farmers use the water for other purposes apart from farming and this underscores the importance of the dam waters to the communities.

## *2.2 Management of the Irrigation Schemes*

The management of community resources and for that matter small scale irrigation schemes has shifted from government management to community management. The ownership and management of the irrigation schemes in Bugri and Gagbiri is in the hands of the communities. The Water User Associations of the two communities are in charge of the day-to-day management of the irrigation schemes. This was buttressed by the Regional Director of IDA who said apart from the Tono and Vea irrigation schemes which are under the control of government and managed by the Irrigation Company of Upper Region (ICOUR), all the other irrigation schemes are managed and owned by the communities. In view of this communities were encouraged and supported to set up Water User Associations (WUAs) with elected executives to carry out the day-to-day management of the schemes during the rehabilitation period. The WUAs is made up of all water users with varying interest but the dominant users in the two irrigation schemes are farmers. Presently, even though the ownership and management resides in the communities there are a number of organizations and institutions who have a stake in the management of the dams.

### *2.2.1 Water User Association (WUA)*

The Water User Associations were formed primarily to take over the day-to-day management of the irrigation schemes. The WUAs in the two communities have moved the two communities from their hitherto passive participation in the management of the schemes to the main stakeholders and active participants in the management of the schemes. The idea of the water user association is to actively involve the communities in the management of the scheme and to ensure a sense of ownership within the communities. Among the benefits derived from the water user association are that: people can participate in decisions that affect them directly pertaining to the use of the resources as well as ensuring that land and water is made accessible to all users irrespective of gender and ethnicity since all interest groups are represented in the association as well as ensuring the financial sustainability of the irrigation schemes. In the early days of the inception of the WUAs government provided the platform for them to flourish by providing the WUAs with training in book keeping, meeting and election procedures and how to mobilize people for the maintenance of the schemes. The other stakeholders in the management of the irrigation schemes are enumerated below.

### *2.2.2 The District Assembly*

The District Assembly which is the highest political body in the district has been instrumental in the sustenance of the schemes. The Bawku Municipal Assembly through the District Agricultural Development Unit (DADU) and the Irrigation Development Authority (IDA) was the main organ that negotiated for the rehabilitations of the two irrigation schemes in the 1990s. It was after the negotiations and discussions that led to the rehabilitations of

these dams and the formation of the WUAs. The Garu-Tempane District Assembly still shows interest in the management of the irrigation schemes since they remain the major source of funds for the rehabilitations of major facilities in the irrigation schemes.

### 2.2.3 Traditional Authorities

The traditional authorities comprising the chiefs, tindanas and elders of the communities are the custodians of the schemes since they are the link between the people and the gods. The traditional authority has relegated the management of the schemes to the WUAs, but in times of taking major decisions and resolving conflicts that are beyond the powers of the WUAs, the chiefs and their elders are consulted for their opinion and advice. In Bugri and Gagbiri the chiefs are the life patrons of the WUAs.

### 2.3 Management Practices at the Irrigation Schemes

The effective management of small irrigation schemes is very critical for the sustenance of the dams and the facilities for irrigation farming. The management of the irrigation schemes has not been an easy task for the WUAs but they have been able to stand the challenges. In this regard the effective participation and contribution of all community members who directly or indirectly derive benefits from the dams is very crucial to ensure successful management of the dam. The contribution of community members ranges from making financial contribution to communal labour if the need arises. In terms of participation in maintenance activities which is an important aspect of dam management 99.2% of respondents participated in maintenance activities while 0.8% representing one respondent does not take part in maintenance activities.

The above contribution of farmers is purely based on extra contribution they make in the maintenance of the schemes if the need arises but not the compulsory fees they are supposed to pay for water use. The contribution and participation of irrigation farmers in the maintenance and management of the irrigation schemes was very encouraging. For example, 73% of respondents who contributed labour in the maintenance of the irrigation schemes gave the assurance that they are always willing to contribute their strength anything the need arises and the additional financial commitment that the respondents contribute is also worth commending since money is very necessary for the smooth management of the irrigation schemes. Among the management activities carried out by the WUAs are collection of water fees, distribution and regulation of water, allocation of extra plots, maintenance of irrigation facilities and catchment area protection.

#### 2.3.1 Land Ownership and Allocation

The ownership of land around the irrigation site is very complex. This is because part of the plot is owned by individual households while others are owned by the government but leased out permanently to farmers, who even have the power to hand them over to their families or prospective farmers. According to DADU the actual owners of the land at the irrigation schemes are the communities and the district assembly. According to them a memorandum of understanding was signed between the chiefs, tindanas and the district assembly leasing the land to the assembly. The district assembly in turn transferred the ownership of the land to the water user associations for distribution among farmers. The demarcations of plots were made by DADU. The agreement was that during the rainy season the landowners farm on their lands and revert it to the WUAs during the dry season for distribution among registered farmers. This arrangement has been problematic because some individual land owners at the sites have not been willing to release their lands to the WUAs. In the Bugri site some lands are owned permanently by members who acquired them legally after the construction. According to executives of the WUA and buttressed by the chief of the community, after the construction of the dam people were not interested in dry season irrigation farming and the few who showed interest were registered by the district agricultural officers and were allocated plots permanently. They reiterated that this arrangement so far has not faced any problems as members are satisfied with it.

**Land Allocation:** The allocation of plots for irrigation purpose is in the hands of the WUAs. The rule governing irrigation farming in the two schemes is that land should not lie fallow in the scheme but accessibility to land also depends on the distribution network, so where water cannot get to due to the limited length of the canals those lands are allowed to lie fallow. Fallow lands within the scheme are then allocated to prospective farmers upon the payment of a fee of GHC 2.00. In the Bugri scheme those who acquired land legally during the distribution can also lease it out to others but must notify the WUAs for them to take their charges. In the case of Gagbiri the plots are shared among all registered members, if there is extra land it is then allocated to new members also at a fee of GHC 2.00. The WUAs and respondents admitted that there has not been any dispute with regards to distribution of land, the only challenge is that some land owners lease their lands at a fee without the knowledge of the WUAs.

### 2.3.2 Levying for Irrigation Water Use

Charging for the use of water at the irrigation schemes is the major source of revenue for the management of the schemes. The revenue from the farmers is the main source of resources for the operation and maintenance of the irrigation schemes. According to executives of the WUAs levies are imposed on farmers annually and payment is made at the onset of the farming season in November. This was supported by all respondents who affirmed that they pay fees to the water user association annually even though varying figures were given.

In the Gagbiri irrigation scheme a flat amount of GHC 2.00 is paid by all farmers. In the Bugri scheme there are two groups of farmers. These are those who farm at the location the respondents refer as the 'garden' and those in the valleys or upstream. In the 'gardens' there are well demarcated beds of equal lengths and farmers at this site pay GHC 0.20 per bed. This indicates that at this site payment is based on the amount of land one farms on, this is in consonance with FAO (2005) assertion that one of the methods for charging users is by the size of the irrigated area. The second group of farmers at the scheme are levied between GHC 1.00 and GHC 2.00 and above. The variations here is due to the fact that the WUA levies a flat rate for the farmers in the valleys who have organized themselves into groups, therefore depending on the size of the farms of the entire group they are levied a flat rate. This ranges between GHC 20.00 and GHC 60.00. The farmers then divide the amounts among themselves to meet the flat rate levied on them. The levies here are therefore based on the farm size but not on the amount of water utilized.

### 2.3.3 Water Distribution and Regulation

*Water Distribution:* The distribution of water at the schemes depends largely on the amount of water available in the reservoirs. If the water in the reservoirs is enough then farmers are given constant supply of water, but if the water tends to wane the executives result to scheduling water among the various sections and group of farmers. The distribution of water in the two schemes is mainly through the lined open main canals. The schemes are fitted with pumps and connected to the main canals. In both schemes the lined length of the lined canals are not enough to supply water to the entire farms in the catchment area of the dams. Those downstream and in the valleys receive water through buried pipelines. They dig big holes to collect the water. They then use improvised water cans made out of gourds to water their plants. The case of Gagbiri is precarious because the length of the main lined canals cannot even serve the farmers who are about 2000metres from the dam as such they rely on opened pipelines. In both schemes laterals canals are lacking so farmers dig opened earthed and unlined canals in between beds to receive water to irrigate crops. This practice leads to a lot of water loss as water tends to seep into the ground. The lack of lateral canals was a major concern to the WUAs as they complained about the wastage associated with the earthed and unlined lateral canals. About 62% of respondents complained that the absence of lateral canals and the short length of the main distribution canals leads to them wasting a lot of productive hours going to and fro to obtain water to irrigate their crops and this has been a major contribution to low crop output in the two communities, hence limited income from the sale of produce.

*Regulation of water use:* In order to ensure efficiency and equity in the distribution of water, there are laid down and agreed times when the water should be supplied to farmers in the irrigation schemes. This measure of regulating water use is to reduce water loss and to minimize conflicts among farmers. The frequency of supply largely depends on the amount of water in the reservoirs, if the water is enough then water can be supplied on an everyday basis but when the water in the reservoir reduces, a rationing method is used to supply the water to the farmers. From the above table the supply regime at the irrigation schemes is largely based on the agreement between farmers. It is based on this agreement that the WUAs officers act upon to open the water for the farmers. According to the executives of the WUAs in the mornings from 6:00am to 6:00pm they supply water for farmers who are near the dam or water points and from 6:00pm till the next morning they supply those downstream and in the valleys. They further added that when the water in the reservoir is not enough they reduce the time they supply the water instead of the 24hours and in extreme cases they ration the water on daily basis among the farmers.

### 2.4 Maintenance of Irrigation Schemes

For small scale irrigation schemes to serve their intended purpose of providing a source of livelihood for beneficiary communities, then their sustainability is very paramount. To achieve this, the facilities at the schemes must be maintained regularly to avoid their breakdown and collapse. The routine maintenance of these schemes is the main responsibility of the WUAs. It is only when it is above their capacity that they report the problem to the District Agricultural Development Unit and District Assembly. The maintenance activities carried out at the scheme are enumerated and discussed below:

*Fixing of broken pumps:* Repairs of pumps is one of the maintenance activities that is carried out by the WUAs.

The reason is that the pumps serve as the main artery for the supply of water to the farmers, therefore in its absence it brings farming activities to a halt. The repair work is done by local artisans. For instance in Bugri the one in charge of opening the water said he learnt the act of repairing the pumps from his acquaintance with external artisans. It is only when the damage is beyond the might of the local artisans that experts are brought in to fix the pumps.

*Embankment of the dam walls:* This aspect of maintenance is carried out by the members of the communities through communal labour. The activities undertaken include filling of pot holes on the dam walls and lining the walls with heavy boulders to prevent the walls from breaking its banks and also to prevent erosion occurring on the dam walls. Maintenance of the bank is carried out during the rainy season. This is to enable the dam to store plenty water during the rainy season.

*Spill way protection:* Maintenance of the spill way is carried out during the rainy season to prevent it from collapsing. The spill way regulates the amount of water in the dams. When the dam is full the spill way ensures that the excess water is released to prevent the dams from breaking their walls. The spill way in Bugri is in good condition but that of Gagbiri is in a poor state. During the rainy season the community members line the walls of the spill way with big boulders to prevent it from falling and also avoid erosion. In the dry season they pour concrete at the foot of the walls to reinforce it.

*Renovation and cleaning of canals:* The renovation and cleaning of canals is a maintenance activity carried out routinely by the community members. Whenever the concrete slabs or walls of the canals are broken, officers of the WUAs organize community members and with their own expertise cement and patch cracks or build the slabs entirely. The repair works on the canals are carried out with funds generated internally. The WUAs buy cement and stones needed for the repair works. Prior to farming at the schemes the WUAs organizes its members to clean the canal and other distribution networks. This is to allow for the smooth flow of water to the farms. The cleaning of canals is necessary because during the rainy season the canals are not used and weeds tend to grow inside them. Some are also choked with sand and mud hence the need for them to be cleaned before the dry season farming begins.

*Protection of the catchment area:* During interviews with the WUAs and chiefs in the two communities it is evident that the stock of water in the dam has been reducing with time. A major case of the problem is siltation of the dams. Farming around the catchment area of the dam has been blamed for the siltation of the dams. In an attempt to arrest the situation the communities were encouraged by the District Agricultural Development Unit to plant trees and grasses to protect the catchment area of the dams. The species introduced to the WUAs was the *vertira* grass. The advantage of the grass is that it can guard against siltation of the dams. Farmers also undertook the planting of trees around the dams catchment area all in an effort to protect the dam.

### 2.5 Challenges Facing the Irrigation Schemes

The irrigation schemes in Gagbiri and Bugri are plagued with a number of challenges which hamper the smooth flow of management activities as well as irrigation farming. The challenges are discussed below:

***Insufficient Water to meet Demands:*** This is by far the major challenge facing the irrigation schemes. The water level in the two schemes has been dwindling, and this is as a result of siltation and the low and erratic rainfall pattern of the district which hampers the ability of the reservoirs to store plenty water, as well as the high demand for water for small scale irrigation farming. This high demand stems from the increasing populations in the two communities coupled with the fact that small scale irrigation farming still remains the major source of income for people in these communities. The high demand for water and its insufficiency is the major source of conflict among farmers as well as low crop output. The limited amount of water in the reservoirs has led to some farms been abandoned, due to the inability of management to distribute water to such areas. This situation creates a number of problems to management since there is always enormous pressure from people to be allocated farm lands in areas where they can have access to water.

***Limited Funds to support Management Activities:*** This challenge stems from the inability of the WUAs to effectively mobilize funds. Currently the mechanism put in place to mobilize revenue is not yielding the desired results. This leads to some farmers still not paying the approved levies. The measures stipulated in the bye-laws to prevent defaulting farmers from engaging in farming activities the following season until they settle outstanding arrears are not being enforced. This creates room for some farmers to continue to default in the payment of levies. Also some landowners allocate lands to prospective farmers at a fee which should have been paid to the WUAs. This practice has contributed significantly to eroding the revenue base of the WUAs. The interviews with the WUAs in Bugri and Gagbiri revealed that their balance currently at the BESSFA Rural Bank in Garu stood at GH¢101.00 and GH¢235.00 respectively. This precarious financial situation makes it very

difficult for management to undertake major maintenance activities at the irrigation schemes thereby hampering farming activities since some facilities tend to breakdown and are not repaired in time.

**Lack of a Fence Wire:** The catchment areas of the irrigation schemes do not have fence walls around them. The challenges the absence of the fence creates include the following: destruction of crops by animals especially cattle, goats and sheep, encroachment of the catchment area by some individuals and stealing of water which is already not sufficient by farmers outside the catchment area of the scheme.

**Low Technical Knowledge and Inadequate Infrastructure:** The WUAs are constraint when it comes to technical knowledge pertaining to maintenance of infrastructure at the schemes and without enough funds to hire expertise all the time, major repairs such as repair of valves, building of canals and pump maintenance are always delayed. Inadequate infrastructure is another challenge faced by the irrigation schemes. Among the problems are the short length of the canals, lack of lateral canals and lack of modern equipments to measure the level of the water in the reservoirs, the rate of discharge as well as sedimentation.

**Problems with Equity in Water Distribution:** The issue of equal access to water still remains a major challenge to the WUAs. The rationing adopted by management to some extent has been successful but there are still problems with regards to access to water. Distant farmers still feel that their counterparts near the water points are stealing water meant for them and this sometimes creates quarrels among farmers, even though these are mostly resolved by the executives of the WUAs. The challenges enumerated supports Perret (2002) assertions that the causes for the poor functioning of irrigation schemes in Africa are infrastructure deficiencies emanating from inappropriate design, management and maintenance, both beneficiaries and government-assigned extension officers lacking technical know-how and ability, absence of peoples involvement and participation in maintenance activities, inadequate institutional structures, inappropriate land tenure arrangements, local political power games, a history of dependency and subsistence orientation, low land productivity and high cash costs.

### *2.6 Opportunities for Improving the Management of the Irrigation Schemes*

Despite the above challenges facing the irrigation schemes, opportunities still abound in the communities which can improve upon the management practices at the dam. These were revealed during the interviews and FGDs. The opportunities include the following;

- A willing and readily available labour force. The survey revealed that 60.8% of respondent's contribution towards the maintenance of the irrigation schemes was in the form of labour and over 80% of respondents are willing to offer labour anytime the need arises. This communal spirit by the farmers is one major potential which can improve management practices.
- The users of the dams are also willing to contribute financially towards the maintenance, dredging, desilting and even expansion of the dams. The chief of Bugri had this to say: *"If government or any donor request that we provide counterpart funding and labour for the expansion of our dam we can meet their demands since the farmers and traditional council are prepared to commit in that regard."*
- In both communities the WUAs and the traditional authorities have been collaborating well. The harmonious relationship between the two institutions is a very good potential to improve upon the operation and maintenance of the irrigation schemes to ensure the sustainability of the irrigation schemes.
- Peaceful co-existence among the users of the schemes as indicated by 70% of respondents who revealed that they have never had any conflict with neighbouring farmers as a result of water distribution and their acceptance and adherence to a rationing system by the WUAs executives is an important catalyst to promote the sustainability of the dams.

### **3. Conclusion and Recommendations**

In finding out the views of small scale irrigation farmers on measures to improve upon the management of the scheme various suggestions were given. From responses, farmers were of the views that if WUAs are provided with training to upgrade their knowledge and skills it will help improve the management of the irrigation schemes. This is true and necessary because knowledge is not static and if WUAs are given the needed training it will go a long way to improve the management of the dams and facilities at the irrigation schemes. Also farmers have also shown their awareness that money is the backbone of successful operation and maintenance of the scheme therefore they are of the view that if more monetary contributions are made it can lead to improving the operation and maintenance activities in the irrigation schemes. Finally, they are of the view that if the dams are expanded to enable them store more water it will reduce the challenges faced by the irrigation schemes and management with regards to inadequate water.

In conclusion, the study examined issues on the maintenance of the irrigation schemes and use of dam waters and the challenges and prospects to improve upon the management of the schemes. From the analysis it was revealed that the educational level of farmers was very low. This situation has implications for the management of the irrigation schemes since education is necessary for people to be able to imbibe knowledge and new skills successfully.

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