European Journal of Business and Social Sciences, Vol. 4, No. 04, **July 2015.** **P.P. 123 - 141**
URL: *http://www.ejbss.com/recent.aspx-/*
ISSN: 2235 -767X

# FINANCIAL MANAGEMENT ASPECT ON SUSTAINABILITY OF COMMUNITY MANAGED WATER PROJECTS IN KIENI WEST DISTRICT, NYERI COUNTY, KENYA

**Michael Mwangi Kinyua**

School of Business Management and Economics
Dedan Kimathi University of Technology,
P.O Box 657 – 10100, NYERI, KENYA
Correspondence Email: mkinyua08@yahoo.com

**Ann Wairimu Mwangi**

School of Business Management and Economics
Dedan Kimathi University of Technology,
P.O Box 657 – 10100, NYERI, KENYA

**G.K.Riro**

School of Business Management and Economics
Dedan Kimathi University of Technology,
P.O Box 657 – 10100, NYERI, KENYA

**Peter Muchiri**

School of Engineering
Dedan Kimathi University of Technology,
P.O Box 657 – 10100, NYERI, KENYA

## ABSTRACT

*Water is the most important natural resource, indispensable for life and at the same time the backbone of growth and prosperity for mankind. In the last decade, the provision of potable water for domestic and rural livelihood needs has moved to centre stage on the international development agenda and in the interventions of many Non-Government Organizations (NGO) and National Governments. The Government of Kenya Vision 2030 acknowledges the fact that Kenya is a water scarce country and underscores the central role water plays in the performance of key sectors of the economy and the livelihoods of Kenyans. Under the economic and social pillars of Vision 2030, improved access to safe water and sanitation in both rural and urban areas, and increasing the area under irrigation have been given prominence with the rehabilitation and expansion of water supply identified as some of the flagship projects. The purpose of the study was to investigate financial management factors that influence sustainability of community managed water supply projects in Kieni West District. The research adopted a survey research design. The target population for the study was 150 water committee officials and the sample size was 109 respondents who were selected using the stratified sampling method. Key findings are that adequate understanding, identification and estimation of the operation and maintenance costs is critical for the sustainable delivery of water supply services; transparency of financial management is a key issue in community management in water projects and that without water levies and fees charged for connection and usage, sustainability of the project will not be possible.*

**Key Words:** *Community: Financial monitoring; Financial administration; Financial management; Sustainability; Water project*

## 1.0 INTRODUCTION

Water is the most important natural resource, indispensable for life and at the same time the backbone of growth and prosperity for mankind (Hutton et al, 2007). In the last decade, the provision of potable water for domestic and rural livelihood needs has moved to centre stage on the international development agenda and in the interventions of many non-governmental organizations and national governments according to Scanlon, Cassar, and Nemes (2004). The General Assembly of the United Nations drew critical attention to the importance of water to sustainable development and poverty alleviation by declaring 2003 the International Year of Freshwater with one of its aims being to reassert the Millennium Declaration Goal (MDG) target for water of reducing by half the proportion of people without access to safe drinking water by the year 2015 and to stop the unsustainable exploitation of water resources (UNDP-WSP, 2006).

Kenya is classified as a water scarce country with surface water coverage of only 2 percent and registering a water scarce category of 647 cubic metres per capita against the global benchmark of 1000 $M^3$, making it one of the most water scarce countries in Africa and the world (Republic of Kenya, 2005). Water scarcity is further aggravated by unreliable and changing rainfall patterns, degradation of water resources and periodic droughts and perennial floods. Out of a total area of 583 000 square km, only 20 percent is medium to high potential agricultural land while the rest is mainly arid or semi arid (ASAL). In contrast, approximately 75 percent of the country's population lives within the medium to high potential agricultural land while 25 percent live in the arid and semi arid region (TI Kenya, 2011). Kenya has a strong culture of self help, which has been harnessed for many development activities, especially in rural areas (Mumma, 2005). According to Ministry of Water and Irrigation there are approximately 680 piped water systems which provide over 740,000 water connections throughout Kenya. An additional 350 community run water schemes exist in the country. A high percentage of these connections are however inactive as a result of poor management and maintenance. (Republic of Kenya, 2007).

According to the Kenya National Water Development Report of 2005 prepared for the second UN World Water Development Report, among 24 million rural dwellers in Kenya about 10 million have access to an improved water supply through piped or point source systems. Among those with access, 30 percent are served by community managed water supply schemes, many of which are developed by self help groups (Republic of Kenya, 2005). Looking specifically at the water sector in Kieni West District, of the 36 water projects, 83 percent are community managed water supply schemes (DWO, 2011). This underscores the importance of community managed water supply systems in Kieni West District. In the last 30 years community groups, government and other development partners in Kieni West have in earnest being pursuing to increase water coverage levels in the district. To this end a great deal has been done and enormous amounts of money spent, however coverage levels Kieni West district according to the Department of Water are estimated at 45 percent only (DWO, 2011). Furthermore, according to the 2012 short rains assessment report by Kenya Food Security Steering Group (KFSSG) between 60 percent and 65 percent of all boreholes in Kieni West district either do not function at all, or operate significantly below design expectations (KFSSG, 2012).

In a survey of 11 countries in Sub-Saharan Africa, Sutton (2004) found that the United Nation's Millennium Development Goals (MDGs), which aim to halve from 1990 figures, the proportion without access to water and sanitation by 2015 have been important in galvanizing global attention and support for water and sanitation. However, efforts such as the MDGs, which focus on expansion of new services, run the risk of

undermining functional sustainability by encouraging rapid construction of infrastructure rather than long term, critically needed, investments in operation and maintenance. According to Montgomery and Elimelech (2009), what is urgently needed to stem the trend of disrepair and accelerate progress in achieving the MDGs is a coherent focus on sustainability. In the last 30 years a close to 40 water supply development projects have been implemented in Kieni West District. However, in spite of these efforts water shortage remains a major challenge in the area. On the other hand demand for additional water projects continues, yet there is limited evidence on the current level of functionality and service coverage. According to Bolt and Fonseca (2001) financial management and transparency are among the more problematic aspects of community management. Furthermore the large number of failed, poorly functioning or unsustainable water supply systems raises critical questions about the success of community managed water projects in Kieni hence the need for this study. The purpose of the study was to investigate financial management factors that influence sustainability of community managed water supply projects in Kieni West District, Nyeri County.

## 2.0 LITERATURE REVIEW

### 2.1 Theoretical framework

A theoretical framework is a collection of interrelated ideas based on theories. It accounts for or explains phenomena. Therefore a theoretical framework attempts to clarify why things are the way they are based on theories. The researcher will adopt the sustainability theoretical framework developed by Carter et al (1999). Sustainability pertains to multiple aspects of a rural water supply, with institutional, social, technical, environmental and financial dimensions (WELL, 1998). This accounts for the fact that understanding and measuring sustainability is so difficult, and why solutions are highly context specific. The sustainability chain has been developed to capture the inter-linkages that relate to sustainability, a weakness in anyone of which can lead to failure of the scheme. The theoretical framework to achieve sustainability by Carter et al (1999) for rural water supply and sanitation services is depicted in Figure 1. According to these authors, a motivated community is the one that needs the service more and therefore considers the scheme as its own property. As a result schemes constructed by a motivated community are likely to be sustainable. Effective O&M is essential for sustainability and village level O&M is one of the ways through which sustainability can be achieved. In cases of scarce government resources the money collected from cost recovery can be used for capacity building such as sanitation education and village level maintenance training which can play great role in sustaining the services. Services cannot be always managed by the community alone. For example at times where village level maintenance trainees are lost from the community new training should be given to the trainees. Village level rural operation and maintenance has limited success if ongoing support is not provided.

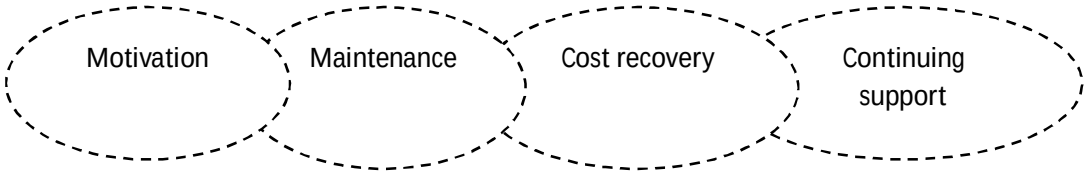


**Figure 1: The sustainability chain adopted from Carter et al (1999)**

Water supply development projects need to extend their scope beyond simply the provision of sustainable water supply infrastructure. Demand driven approaches are effective since communities are capable of making decisions, maintaining services, and making their contributions to capital costs, operations and maintenance. In addition, a strong and well-structured information campaign is necessary to empower communities to make an informed choice. Livingstone et al (1993) explained that poor program conceptualization, unimaginative planning, use of inappropriate technologies, and rigid management

approaches had contributed to high rates of program failure. Implementation approaches which resulted in non-sustainability of water supply projects should be identified so that they would not be repeated in the future. At the same time implementation approaches, which resulted in sustainability of water supply projects should be identified so that they can be used as a base for future project implementations.

**2.2 Sustainability of community water supply projects**

The concept of sustainability has been closely linked to environmental issues and, in ecology, is defined as the amount or degree to which the earth's resources may be exploited without damage to the environment (Carter and Rwamwanja, 2006). Sustainability is a concept that has arisen from the debate on sustainable development, which became important from the 1970 onwards. However, for many organizations in the development sector, the United Nations (UN) document written in 1987, entitled 'Our Common Future', is probably the most widely quoted definition. The United Nation World Commission on Environment and Development (WCED) report defined sustainable development as development that meets the needs of the present generation without compromising the ability of future generations to meet their needs (WCED, 1987). This definition marked an important shift away from the idea of sustainability as primarily a concern of ecology to one that emphasizes the economic and social processes of development (DFID, 2000).

Abrams (1998) in defining the concept of sustainability of water and sanitation services refers to a sustainable intervention as one which continues to work over time. Abrams views sustainability of water projects as a continued flow of water at the same rate and quality, as when the supply system was designed. To him if water flows, then all elements of sustainability would be in place. On the other hand Richard (1999) defined sustainability as a continued delivery of a particular service. Richard emphasized on the need to involve all stakeholders in consumption and cost recovery strategies to ensure delivery of high quality services and sustainable development projects. Brikke and Davis (1995) also refer sustainability in rural water supply to mean that water facilities are maintained in a condition which ensures a reliable and adequate water supply and that benefits of water provision continue to be realized over a prolonged period of time. A number of studies have identified various determinants of sustainability of rural water supply system. However according to Harvey and Skinner (2002) sustainability of rural water supply facilities is dependent on many factors. These actors include policy, legal and institutional framework, social factors such as demand for water, community participation and community organization; economic and financial factors such as ability to meet the cost of maintenance and ability to pay for services; technological factors such as technology choice, availability of spare parts and operation and maintenance and lastly management factors.

**2.3 Operation and maintenance budgeting and sustainability of community water projects**

Operation and maintenance (O&M) covers the efficient day to day running of the water supply facilities, regular preventive maintenance and the assurance of proper use. The long term success, according to Mogane-Ramahotswa (1995) of any water programme, depends almost entirely on effective maintenance although it is as an aspect that is very often neglected. It does not just entail having technical aspects but also encompasses social, gender, economics and many other aspects (Brikke et al, 2003). Water supply is a service, and just like any service it involves manpower, repairs, spare parts, energy and other inputs. These services as argued by Boland and Whittington (2000) are not free and therefore in order to provide a safe and sustainable water supply, a cost recovery system has to be introduced. According to Folifac and Gaskin (2011) provision of potable water supply services involves costs which are incurred at the design, construction and operational stages of any water supply system. However, the magnitude of these costs is utility specific and would depend in part on the type of technology used, management practices, and the

geology. The costs associated with potable water provision can be classified according to the subunits of operation (Whittington, 2003) which consists of: production costs such as reservoir, tanks, pumps and treatment plants; transportation costs for instance major pipelines and pumping facilities; distribution costs which include connection costs, metering and local reticulation; and administrative costs such as billing, collection and consumers relation.

According to Brikke and Rojas (2001), an adequate understanding, identification and estimation of the operation and maintenance costs is critical for the sustainable delivery of potable water supply services. The components of these costs are typically wide, varied and utility specific and may include: cost of chemicals for water treatment, cost of electricity and other utilities, purchase of software and capacity building, cost of fuel for equipment and vehicles, personnel expenses, cost of support services, repair costs, rehabilitation and extension, costs of billing and collection, payment of contractors and suppliers. The pay back cost and depreciation costs of assets and equipment should also be accounted for in operation and maintenance costs so as to provide capital funds for future growth extension of distribution network, additional storage and pumping facilities, as well as replacement of equipment. The operation and maintenance costs constitute a key component of the costs involved in potable water supply because of the daily occurrence of these costs needed for the functioning of the utility and delivery of services. Effective operation and maintenance (O&M) of rural water supply systems is a crucial element for the sustainability of the water project. According to Cardone and Fonseca (2003) sustainability of a service is achieved when the community wants and accepts the level of service provided, is able to pay for it and the skills are available locally to service the system. As argued by Harvey and Reed (2007) the presumption that once a new water supply is constructed and handed over to the user community it can be sustained by community financing of O&M costs is over simplistic, especially since the long term O&M costs are neither calculated nor communicated to water users. According to Binder (2008) budgeting sufficient O&M funding for rural water supply systems is an important factor for sustainability and proper maintenance.

### 2.4 Water tariffs and sustainability of community water supply projects

Levying of water tariffs is generally subjected to two ideological views (Whittington, 2003). On the one hand, water is viewed as a social good that should be provided for free and on the other hand, it is considered as an economic good that should be priced. However, in the past few decades, there seems to be a consensus that water should be priced despite increasing diversity on what is a fair price for water (Evans, 1992).

According to Nyoni (1999) water pricing in the form of water tariffs is based on user pays principle whereby users are charged for the services provided. World Bank (1993) and other international donors have argued that public or government funds can no longer provide for all the expenses associated with the provision of potable water services. According to critics of free water supply, this practice promotes unsustainable use of water and is partly responsible for the poor financial stability of water utilities in many low income countries. They argue that with increasing competition and debt burden on state budgets, governments can no longer afford to provide water for free. Water tariffs can be implemented for different reasons under different structures. In most cases water pricing is implemented to provide revenue to utilities for the efficient delivery of potable water services. The recovery of at least the operation and maintenance cost is essential for the financial sustainability of water utilities, adequate system maintenance, and hence the provision of quality services (Brikke and Rojas, 2001). According to Magnusson (2004) water pricing promotes efficient and sustainable use of water. This is essentially a water demand management and resource conservation tool, aimed at fostering wise water use and demand driven service delivery.

Water tariffs can also be used to promote poverty alleviation. This seems to be a controversial objective at first sight considering that paying for water will reduce disposal income and could prevent access to other fundamental services. However the argument is that water tariffs will generate revenue for the extension of improved water supply services to the poor with relatively high social and economic returns (World Bank, 1993). Brikke and Rojas (2001) states that decisions that need to be made when designing a system of cost recovery include deciding on appropriate rate and type of tariff to apply to water users. Tariffs can be set per volume of water consumed or standardized as one uniform price paid by all members of the community regardless of usage. Annis (2006) in a study on community managed gravity flow water supply systems in Madagascar showed that the uses of community funds must also be well defined and the method of periodic funds collection must also be clear including: who, where and when monies will be collected.

**2.5 Financial administration and sustainability of community water supply projects**

Financial administration in water supply systems covers the keeping of financial records, documents, information and books concerned with financial and accounting aspects (Bolt & Fonseca, 2002). A simple but reliable system of financial records can greatly improve community management. The production of records, documents and information is necessary to: keep clear and accurate accounts about the resources needed to provide the water service, control income and expenditure, make decisions based on clear and accurate information, provide information to users who are interested in checking the financial management and in addition maintain the confidence and trust of users. According to Appleton and Evans (1993) transparency of financial management is a key issue in community management in water projects. The whole structure of community management can fail rapidly if there is a suspicion that community funds collected for water supply services are being mismanaged or misappropriated. Adequate book keeping and regular review of accounts is therefore a major requirement (Lockwood, 2004).

Brikke and Rojas (2001) argue that the records must be clear, simple, complete and understandable. Clear, in the sense that they show the information without hiding anything; simple, because they have to be easy to carry out and appropriate for the type of administration; complete, in the sense that they provide enough information to make good decisions possible, and understandable, because they have to be easy to read and understand for all users, institutions, water committee members, and other stakeholders. Evans and Appleton (1993) recommend simple administrative structure for rural or peri-urban areas where he following records could be used: user registration forms, a diary, minutes book, work attendance register stock and issue registers. A high level of unaccounted for or non-revenue, water is an indicator of poor efficiency. According to Moran and Waughray (2003) unaccounted for water is the difference between the volume of water produced or delivered into the network and the volume of water consumed, whether metered or not. Many factors can produce unaccounted for water: leakage, wastage, fraud, illegal tapping, inaccurate meter readings, poor billing, and poor identification of payment centres. These factors are not only of a physical nature, but also administrative, and hence are strongly related to the managerial practices of the organization running the service. Levels of unaccounted for water in developing countries can be as high as 30 to 50 percent according to WHO (2000). Control of unaccounted for water is a result of efficient management, which helps the organization managing the service to attain its objectives at the lowest cost (IRC, 1989). A programme to reduce levels of unaccounted for water must not only address faults, but also investigate their causes and ways to reduce them. Schouten and Moriarty (2004) argues that the problem of unaccounted for water can be reduced by involving communities in identifying sources of wastage or leaks and promoting the benefits of conservation and the rational use of water.

**2.6 Community financial monitoring and sustainability of community water supply projects**

Participatory community monitoring and evaluation practices are extremely important for learning about the achievement or deviation from original concerns and problems faced by local development projects being implemented, so that corrective measures can be taken in time (White, 1981). One feature that is common to almost all village water schemes is the lack of regulation of those responsible for financial management. The term community management can be defined as the management through democratically elected representatives of the communities (Wood, 1994). Schouten and Moriarty (2004) defined community management to mean that a community took on the full range of management tasks related to maintaining and in some cases developing a domestic water supply. These tasks include, setting tariffs and collecting payment, carrying out routine maintenance, and making decisions about system extension.

Community monitoring involves engaging local beneficiaries in measuring, recording, collecting, processing and communicating information to assist water committee members in decision making. Making the management organization accountable to users is important factor in sustaining services (IRC, 1989). This includes observing transparent financial management and making regular reports and accounts to community meetings. According to Appleton and Evans (1993) effective control and monitoring is an on-going, regular necessity as part of financial management. This relies on accurate information, which will be mainly found in the records and books kept by the community. Control and monitoring are effective if they use clear, reliable, impartial and good quality information as a starting point. Wegelin-Schuringa (1998) considers community management as a form of community participation while McCommon et al (1990) distinguished community management from community participation by stating that community management is taken to mean that the beneficiaries of the service have responsibility, authority and control over the development of such services, sustainability being the point of emphasis. All the authors have used different terminology in defining community management but conceptually they are describing the same thing: a bottom-up development approach where the community members have a say in their own development; and the community assumes control in the management, operational and maintenance in addition to taking responsibility for the development and running of their water supply system through their elected representatives. According to van Wijk-Sijbesma (1989) community development is therefore operationalized through community management.

Harvey and Reed (2004) supports that the final objective of control and monitoring is to inform users about the financial situation of the water supply service. Control and monitoring has three stages: developing indicators and checking and analyzing information, presenting information to users, discussing information and decision making. According to Bolt and Fonseca (2002), monitoring indicators that can be used include: monthly revenue, payment received, O&M cost per user and expenditure per category. Monthly revenue: shows the capacity to recover costs, payment received: shows the rate of payment and therefore of non-payment; while average O&M cost per user: can be compared with the average tariff paid and level of expenditure per category: can help to detect abnormal expenditures. According to Wong and Guggenheim (2005) several community driven development (CDD) programmes have systematically introduced participatory public expenditure management of micro projects. Community representatives are tracking the implementation of thousands of micro-projects in a number of countries. Ad-hoc committees are set up and in charge of overseeing implementation. Mechanisms used include information disclosure and transparency on project budget, financing, contracting and procurement; anonymous grievance procedures; and community monitoring of contracts and implementation. This information is discussed publicly in villages and displayed (Narayan, 1993). Village committees established to oversee the project are required to report back regularly to the community. As a result community members are in a better position to influence local level planning and decision making.

## 3.0 RESEARCH METHODOLOGY

### *3.1 Research design*

A research design is the plan of action that helps answer research questions and realize the objectives of the study. This study used a survey design. According to Mugenda and Mugenda (1999) survey research is one of the best method available to researchers interested in collecting original data for the purposes of describing a population which is too large to observe directly. Use of the survey design permitted the gathering of information from respondents relatively quickly and inexpensively which was a major advantage for this study considering that Kieni West District is vast in size and the researcher had limitations in terms of time and resources.

### *3.2 Sampling Procedure and Sample Size*

Sampling is the process of selection of appropriate number of subjects from a defined population (Kothari, 2004). The primary purpose of sampling is that by selecting some elements of a population the researcher can draw conclusions about the whole population. When populations vary, it is advantageous to sample each subpopulation or stratum independently. There are three categories of water projects in Kieni West District and therefore the researcher used stratified sampling method to divide the study population into homogeneous subgroups and then took simple random samples in each subgroup. Simple random sampling ensured that each individual water project had an equal chance of being selected and therefore avoided bias. The sample size was determined through the use of the sample size calculator software developed by Raosoft Business Incorporated (Raosoft Inc, 2004). Raosoft sample size calculator takes into consideration four factors in determining sample size. These factors include the margin of error, the confidence level, the population and the response distribution. The Raosoft calculator is based on the normal distribution statistical method given by the formula:

$$X = Z\left(\frac{c}{100}\right)^2 r(100-r)$$

$$n = \frac{NX}{(N-1)E^2 + X}$$

$$E = \sqrt{\frac{(N-n)X}{n(N-1)}}$$

Where $n$ is the sample size, $E$ is the margin of error, N is the population size, r is the fraction of responses of interest and $Z\left(\frac{c}{100}\right)$ is the critical value for the confidence level $c$. Using the Raosoft online sample size calculator and entering the target population of 150, with a margin of error of 5 percent and 95 percent confidence level the recommended sample size generated was 109. To obtain the proportionate sample size per stratum the desired sample size was weighted against the target population then multiplied by the target population per each stratum. Out of the total of 150 water committee officials in Kieni West District, 73 percent of them took part in the study. In total, the study had 109 respondents as shown in Table 1.

**Table 1: Sample size by category of water project**

| **Category** | **Number of water projects per category** | **Target population** | **Sample size** |
|---|---|---|---|
| Gravity flow piped systems | 13 | 65 | 47 |
| Boreholes | 5 | 25 | 18 |
| Dams and water pans | 12 | 60 | 44 |
| **Total** | **30** | **150** | **109** |

### 3.3 Data Collection and analysis

Data was collected using self administered questionnaires. The choice of this method of data collection was selected because questionnaires can reach a large group of respondents within a short time and with little cost, at the same time use of questionnaires will enable the respondents to remain anonymous and be honest in their responses (Kasomo, 2007). Each questionnaire had five sections, namely section A, B, C, D and E to gather information on background information, O&M budgeting, water tariffs, financial administration and community financial monitoring respectively.The questionnaires with adequate instructions and easy to understand language were hand delivered to the already identified samples of the population by the researcher and the trained research assistants. Dates of collecting the filled questionnaires were agreed upon at the time of delivery and follow up was made through use of mobile phones. Kasomo (2007) defines data analysis as the process of bringing order to data and manipulating it. It involves organizing data into patterns, categories and basic descriptive units. For this study, descriptive data analysis was done. The researcher organized the data to ensure that raw data was sorted and coded. Data analysis was done with guidance of a statistician using the Statistical Package for Social Sciences (SPSS) computer software. Information from the analyzed data was presented using percentages and frequency distribution tables.

## 4.0 Empirical Results and Discussion

### 4.1 Response rate

Out of 125 questionnaires which had been administered to the respondents, 110 of them were filled and returned for data analysis. Therefore the study achieved a high questionnaire return rate of 88 percent. According to Linder and Wingerbach (2002), questionnaire return rate of above 50 percent is considered good for a study. The authors further state that surveys that have high response rates provide a measure of assurance that the findings can be projected to a population from which the sample is drawn. The reason for this high response can be attributed to the fact that the questionnaires were hand delivered to the respondents by the Researcher and two Research Assistants.

### 4.2 Type of water facility

The type of water technology in place has a big influence on sustainability of water schemes. In order to establish the various sources of water in Kieni West District, respondents were asked to specify their particular type of water facility. This information is presented in Table 2.

**Table 2: Type of water facility**

| Type of water facility | Frequency | Percentage |
|---|---|---|
| Gravity fed water systems | 47 | 43 |
| Boreholes | 28 | 25 |
| Dams or water pans | 35 | 32 |
| Total | 110 | 100 |

Table 2 shows that the main source of water in Kieni West District are gravity fed water projects. Boreholes and dams are also significant water sources. Gravity flow systems are popular because they are cheap to run and the technology matches the technical skill of the community to operate and maintain the installed water infrastructure

### 4.3 Form of community contribution during project construction phase

The design of projects should include elements of sustainability at initial stages, to ensure their sustainability. Consequently the study sought to verify whether sustainability issues were addressed at the project implementation stage by asking respondents about the form of community contribution made during project construction phase. Table 3 presents their responses.

**Table 3: Form of community contribution during project construction phase**

| Form of community contribution | Frequency | Percentage |
|---|---|---|
| Providing labour | 29 | 26 |
| Providing cash | 24 | 22 |
| Providing local building materials | 19 | 17 |
| Decision making | 17 | 15 |
| None | 21 | 20 |
| Total | 110 | 100 |

Table 3 shows that there was significant community involvement during project construction phase with the various forms of contributions accounting for a total of 80 percent. The table also reveals that community members contributed in the form of cash, labour and through provision of local building materials. However labour contribution with a percentage of 26% was the main form of community contribution during project implementation stage.

### 4.4 Sources of funds for operation and maintenance

Funding of operation and maintenance is an important aspect that influences the functionality of water facilities. The study looked into the sources of funds for operation and maintenance of water systems in Kieni West District. This information is given in Table 4.

**Table 4: Sources of funds for operation and maintenance**

| Sources of O&M funds | Frequency | Percentage |
|---|---|---|
| Government | 49 | 45 |
| Donors | 6 | 5 |
| NGO/FBO | 11 | 10 |
| Membership fee | 23 | 21 |
| Water user fee | 15 | 14 |
| Voluntary contributions/Harambee | 6 | 5 |
| Total | 110 | 100 |

Table 4 shows that 45 percent of water systems receive operation and maintenance funds from the Government, 5 percent from Donors while NGOs & FBOs puts in 10 percent. In addition 21 percent of the water projects get their O&M funds from membership fee, 14 percent from water user fee while 11 percent depend on voluntary contributions. This indicates that Government is the main source of operation and maintenance funds for water projects in Kieni West District. Communities also contribute a fair share of O&M funds through membership fee and water user fee which accounts for 35 percent.

### 4.5 Community meetings held to discuss O&M budgets

Community participation in financial decisions is an important aspect that influences the sustainability of water projects. To assess how community meetings contributes to sustainability of community water supply projects, the study looked into the frequency of community meetings held by the water project during the last one year to discuss O&M budgets and financial management decisions. Table 5 presents this information.

**Table 5: Community meetings on O&M budgets**

| Community meetings | Frequency | Percentage |
|---|---|---|
| None | 26 | 24 |
| Monthly | 3 | 2 |
| Quarterly | 0 | 0 |
| Half yearly | 0 | 0 |
| Annually | 81 | 74 |
| Total | 110 | 100 |

Table 5 shows that 24 percent of the water project did not hold community meetings to discuss O&M budgets and financial management decisions during the last one year, 2 percent met monthly and 74 percent annually. This reveals that water projects do not hold community meetings to discuss O&M budgets and financial management decisions regularly considering that a high percentage of 74% of the water projects meet to discuss their O&M budgets only once in a year. It further confirms that taking into account that O&M requirements are recurrent in nature; public meetings are not used in making decisions on financing water supplies O&M costs.

### 4.6 Water connection fee

Charging for water promotes sustainable use of water and also supports financial stability of water utilities. Therefore the researcher sought to establish the amount of money that water projects charge for water connection which in some of the projects is also referred to as membership fee. The findings are set out in Table 6

**Table 6: Water connection fee**

| Charges for water connection | Frequency | Percentage |
|---|---|---|
| None | 65 | 60 |
| 10,000 and below | 0 | 0 |
| 10,001 to 30,000 | 17 | 15 |
| 30,001 to 50,000 | 8 | 7 |
| 50,001 to 70,000 | 20 | 18 |
| Above 70,000 | 0 | 0 |
| Total | 110 | 100 |

Table 6 shows that 60 percent of the water projects do not charge for water connection or membership fee, 15 percent charge between Kshs 10,001/= and 30,000/=, 7 percent charge between Kshs 30,001/= and 50,000/=, 18 percent charge Kshs 50,001 to 70,000. This reveals that majority of the water projects do not charge for water connection fee. It also points out that connection fee is fairly expensive with 25 percent of the water projects charging above Kshs 30,000/= for a water connection.

### 4.7 Water user charges

Payment of water user fees means that water consumers reimburse the water project money to pay for the water service. This aspect is not only associated with the O&M aspect of water project, but also to its sustainability point of view in the sense that the water project has enough funds available to carry out the required O&M costs. The community which pays charges to the water services gives a good signal that the water supply project will operate for long period of time. The study therefore wanted to establish the amount of money that water projects charge for use of water. This information is given in Table 7

**Table 7: Water user fee per month**

| Water user fee per month | Frequency | Percentage |
|---|---|---|
| No charges | 68 | 62 |
| 50 to 100 | 7 | 6 |
| 101 to 150 | 13 | 12 |
| 151 to 200 | 16 | 14 |
| Above 200 | 6 | 6 |
| Total | 110 | 100 |

Table 7 indicates that 62 percent of the respondent do not pay any user fee, 6 percent pay between Kshs 50/= and 100/= while 32 percent pay above Kshs 100/= per month. This explains that majority of the water projects do not charge fees for use of water. On the other hand it also reveals that the amount collected by a significant number of projects for water service charges is fairly small.

### 4.8 Responsibility for setting water charges

When community members participate in setting water charges it is easier to contribute cash willingly for operation and maintenance cost. The water committees are also likely to be more accountable on income and expenditures of the project. Hence sustainability of the water project is further assured. Consequently respondents were asked to indicate who was responsible for setting water charges. Table 8 presents this information.

**Table 8: Responsibility for setting water charges**

| Setting of water charges | Frequency | Percentage |
|---|---|---|
| Government | 25 | 23 |
| Water committee | 38 | 35 |
| Community | 16 | 14 |
| Others | 31 | 28 |
| Total | 110 | 100 |

Table 8 shows that 23 percent of the respondents felt that Government was responsible for setting water charges, 35 percent water committee, 14 percent community and 28 percent said others. This means that water committees and members of the community are mainly responsible for setting water charges. But also Government plays a big part in setting water charges.

### 4.9 Recipient of water project funds

The researcher wanted to establish who receives the funds that are collected by the water project. Table 9 presents this information.

**Table 9: Recipient of water project funds**

| Receivers of project funds | Frequency | Percentage |
|---|---|---|
| Chairman | 31 | 28 |
| Treasurer | 36 | 33 |
| Secretary | 6 | 5 |
| Committee members | 14 | 13 |
| Water project clerk | 23 | 21 |
| Total | 110 | 100 |

Table 9 shows that 28 percent of the funds collected by water projects are received by the chairmen, 33 percent by water committee treasurers, 5 percent by the secretaries while members of the water committee receive 13 percent. On the other hand 21 percent of the funds collected by water projects are received by water project clerks. This explains that funds collected by water projects are mostly received by the chairmen and treasurers. Water project clerks are also key players in funds collection in 21 percent of the water projects. This further confirms that the responsibility of funds collection in water projects is not harmonized.

### 4.10 Operation and maintenance funds collection

Water supply systems require financial resources to ensure longevity and proper system functioning. To meet this challenge, an effective system of community funds collection must be implemented and followed over the lifetime of the system. Implementing and maintaining a sustainable system of funds collection is critical for sustainability of community water supply projects to be achieved. The researcher wanted to establish when water projects in Kieni West District raised or collected money to cover operation and maintenance expenses. This information is given in Table 10

**Table 10: Operations and maintenance funds collection**

| O&M funds collection | frequency | percentage |
|---|---|---|
| Monthly | 43 | 39 |
| Quarterly | 15 | 14 |
| Half yearly | 11 | 10 |
| Annually | 8 | 7 |
| When there is a breakdown | 33 | 30 |
| Total | 110 | 100 |

Table 10 shows that 39 percent of the projects raised money to cover operation and maintenance expenses monthly, 7 percent yearly, 10 percent half yearly, 14 percent quarterly while 30 percent when there was a breakdown. This illustrates that water projects raise money to cover operation and maintenance expenses most often on monthly basis and when the water system breaks down.

### 4.11 Authorization of use of funds

The study sought to establish who authorizes purchases, payments and other uses of funds for the water project. This is presented in Table 11

**Table 11 Authorization of use of funds**

| Authorization of use of funds | Frequency | Percentage |
|---|---|---|
| Chairman | 49 | 45 |
| Treasurer | 39 | 35 |
| Secretary | 15 | 14 |
| Committee members | 7 | 6 |
| Water project clerk | 0 | 0 |
| Total | 110 | 100 |

Table 11 indicates that authority to spent project funds is in most cases held by committee chairmen and treasurers. However project secretaries and committee members do also have authority to commit water project funds to some extent.

### 4.12 Financial management skills of the water management committee

Financial aspects are very crucial as far as operation and maintenance activities are concerned. Therefore financial management skills are an important component that influences sustainability of community water projects. The study looked into the financial management skills of the various water management committees. This information is given in Table 12

**Table 12: Financial management skills of the water management committee**

| Financial management skills | Frequency | Percentage |
|---|---|---|
| Very poor | 12 | 11 |
| Poor | 28 | 25 |
| Fair | 52 | 48 |
| Good | 18 | 16 |
| Very good | 0 | 0 |
| Total | 110 | 100 |

Table 12 indicates that 16 percent of the respondents rated the water management committee as having good financial management skills, 48 percent fair, 25 percent poor, while 11 percent were rated as very poor. This shows that water management committee officials possess inadequate financial management skills with only 16 percent of them rated as having satisfactory financial management skills.

### 4.13 Dissemination of information on income and expenditure

The researcher wanted to establish how community members are informed about the income accrued from water services and project expenditure incurred by water projects. Table 13 provides this information.

**Table 13: Dissemination of information on income and expenditure**

| Information on income & expenditure | Frequency | Percentage |
|---|---|---|
| Public meeting | 76 | 70 |
| Notice boards | 7 | 6 |
| Reports | 6 | 5 |
| No reports | 21 | 19 |
| Total | 110 | 100 |

Table 13 shows that 70 percent of the respondents are informed about income accrued from water services and project expenditure in public meetings, 6 percent through notice boards, 5 percent through reports while 19 percent of the water projects did not give financial reports. This further point out that public meetings are the main source of information about income accrued from water services and water project expenditures. However many respondents said that they were not involved in financial matters, given that income and expenditure were only disclosed to them during annual general meetings.

### 4.14 Communication on water projects financial matters

Community participation cannot take place without information. In order to determine the current situation on communication on financial matters in water projects, the researcher sought to establish how respondents rated the flow of information and communication on financial management issues between the water committee and community members. This information is given in Table 14

**Table 14: Communication on water projects financial matters**

| Communication on financial matters | Frequency | Percentage |
|---|---|---|
| Very poor | 0 | 0 |
| Poor | 37 | 34 |
| Fair | 43 | 39 |
| Good | 30 | 27 |
| Excellent | 0 | 0 |
| Total | 110 | 100 |

Table 14 shows that 34 percent of the respondents rated financial information flow from water committees to community members as poor, 39 percent fair and 27 percent good. However none of the respondents rated the information flow as either excellent or very poor. This implies that majority of the respondents felt that communication on water projects financial matters was inadequate.

## 5.0 CONCLUSIONS AND RECOMMENDATIONS

### *5.1 Conclusions*

The study established that the shift towards giving increased responsibility to communities to manage their water supplies although noble has also many challenges. The large percentage of non functioning water systems in Kieni West District is a stark indicator of inadequate operation and maintenance and lack of sustainable services. Although operation and maintenance (O&M) is critical to the sustainability of the water supply facilities, analysis of water supply systems in Kieni West District revealed that inadequate arrangement for O&M is the major cause of failure. The Kenya Government tends to pay more attention to building new facilities than to ensuring the use of existing ones. Although communities are usually expected to provide a share of O&M costs it is often unclear how the level of contribution, rate and type of tariff to apply to water users has been determined or how the fees relates to sustainability of water supply systems. In many cases, affordability of the service is not factored into a scheme at the planning stage. Consequently many schemes developed have been very expensive to maintain, resulting in their collapse. Furthermore even where communities are willing and able to pay for operation and maintenance costs, poor financial management systems often lead to these resources being inappropriately or inefficiently spent which further reduces the viability of the water systems.

### *5.2 Recommendations*

The following recommendations to ensure that rural water supply is sustainable are made:-

In order to strenghten community management of rural water supply, the researcher recommends that the government should build the capacity of community members and water project committees on financial management.

Poor collection of user fees is one of the major threats to sustainability of rural water supply in Kieni. The Ministry of Water and Irrigation should therefore ensure that an effective user fee collection system is put in place for every water supply facility that is constructed, if sustanability is to be achieved.

The researcher recommends that use of water for productive purposes should be promoted. Promotion of Agriculture, income generating activities or small scale business enterprises should be promoted along side water programmes. This will enable communities to have the ability to meet the cost of operation and maintenance of their respective water supply.

**REFERENCES**

1. Abrams, (1998) *Understanding sustainability of local water services.* Retrieved from http://www.africanwater.org/sustainability.htm.
2. Annis, J. (2000) *Assessing Progress of Community Managed Gravity Flow Water Supply Systems in the Ikongo District, Madagascar*. Retrieved from www.cee.mtu.edu/peace corps/studentfiles/Annis.pdf.
3. Boland, J. and Whittington, D. (2000). *Water Tariff Design in Developing Countries: Disadvantages of Increasing Block Tariffs and Advantages of Uniform Price with Rebate Designs.* World Bank Water and Sanitation Program, Washington, D.C.
4. Bolt, E. and Fonseca, C. (2002). *How to Support Community Management of Water Supplies: Guidelines for managers*. Netherlands, IRC International Water and Sanitation Centre.
5. Brikke, F. and Bredero, M. (2003). *Linking technology choice with operation and maintenance in the context of community water supply and sanitation*. World Health Organization and IRC Water and Sanitation Centre Geneva, Switzerland.
6. Cardone, R. and Fonseca, C. (2003). *Financing and Cost Recovery*. Thematic Overview Paper. IRC Water and Sanitation Centre.
7. Carter, R. C. and Rwamwanja, R. (2006). *Functional Sustainability in Community Water and Sanitation: A Case Study from South-West Uganda*. Retrieved from www.tearfund. org/ Uganda/ 20 Watsan%20 final pdf.
8. Carter, C., Tyrrel, S. and Howsam, P. (1999). *Impact and Sustainability of Community: Water Supply and Sanitation Programs in Developing Countries*. Journal of the Chartered Institution of Water and Environment, Vol. 13, pp 292 – 296
9. DWO, (2011). *District Water Officer Kieni West Annual Report for 2011*. Ministry of Water and Irrigation, Kenya.
10. Evans, P. (1992). *Paying the Piper: An overview of community financing of water and sanitation*. IRC International Water and Sanitation Centre. The Hague, The Netherlands.
11. Folifac, F. and Gaskin, S. (2011). *Understanding potable water supply costs, pricing, tariffs and cost recovery in low income and developing countries*: Journal of Ecology and the Natural Environment Vol. 3(13), pp. 400 - 409 Retrieved from www.academic journals.org/JENE.
12. Harvey, P. & Skinner, B. (2002). *Sustainable hand pump projects in Africa: Report on fieldwork in Zambia* April 1 - May 4 2002. Leicestershire: WEDC.
13. Hutton, G., Haller, L. and Bartram, J. (2007). *Global cost benefit analysis of water supply and sanitation interventions*. J. Water Health 5, 481.
14. Kasomo, D. (2007). *Research Methods in Humanities and Education. Research, Statistics, Measurement, Evaluation and Testing*. Zapf Chancery Eldoret, Kenya.
15. Kothari, C.R. (2004). *Research Methodology: Methods and Techniques*. Second Edition, New Age International (P) Ltd. Publishers, New Delhi.
16. Lockwood, H (2004). *Scaling Up Community Management of Rural Water Supply*. Thematic Overview Paper. IRC International Water and Sanitation Centre. Retrieved from www.irc.nl/*content/.../9525/.../ScalingUp_CM.pdf.*
17. Magnusson, T. (2004). *Household responsiveness to water demand management incentives in Windhoek.* Namibia. Water Policy, 6(1): 453-471.
18. McCommon, C., Warner, D. & Yohalem, D. (1990). *Community management of rural water supply and sanitation services*; Washington: UNDP World Bank Water and Sanitation Programme.

19. Mogane-Ramahotswa, S. (1995). *A community based approach to rural water supply and sanitation*: Three case studies. Pretoria: Unisa.
20. Montgomery, M. and Elimelech, M. (2009). *Increasing Functional Sustainability of Water and Sanitation Supplies in Rural Sub-Saharan Africa*. Journal of Environ. Sci. Technology, Vol. 26, No, 5, pp. 1017-1023.
21. Moran, D & Waughray, D. (2003). *Cost Recovery in Water and Sanitation Projects*. Department for International Development Knowledge and Research Projects. Environmental Resources Management. Cavendish Square, London
22. Mugenda, O. M. & Mugenda, A. G. (1999). *Research Methods, Quantitative & Qualitative Approaches*, Nairobi: Acts Press.
23. Mumma, A. (2005). *Kenya's new water law: an analysis of the implications for the rural poor: Plural Legislative Frameworks for Rural Water Management in Africa* (Eds. B. van Koppen, J. A. Butterworth and I. J. Juma). Proceedings of a workshop held in Johannesburg, South Africa, 26-28 January 2005. IWMI, Pretoria.
24. Narayan, D. (1993). *Participatory evaluation: Tools for managing change in water and sanitation*. Washington, World Bank. World Bank technical paper no. 207.
25. Raosoft, Inc. (2004). *Raosoft online Sample Size Calculator*. Retrieved from www.raosoft. com/samplesize.html
26. Republic of Kenya, (2005). *Kenya National Water Development Report prepared for the 2nd UN World Water Development Report 2006.* Water: A shared responsibility. Retrieved from www.unesdoc.unesco.org/images/0014/001488/148866e.pdf.
27. Republic of Kenya, (2007). *National Water Services Strategy: 2007 - 2015*. Ministry of Water and Irrigation, Nairobi.
28. Richard C. (1999), *Impact and Sustainability of Water Supply and Sanitation Program in Developing Countries.* Journal of the Chartered Institution of Water and Environment Management. Vol. 13, .292-296.
29. Scanlon, J., Cassar, A. and Nemes, N. (2004). *Water as a Human Right?* IUCN, Gland, Switzerland and Cambridge, UK. Retrieved from *http:/www.data.iucn.org/dbtw-wpd/edocs/EPLP-051.pdf.*
30. Schouten, T and Moriarty, P. (2004). *Scaling up the community management of rural water supply*. Water lines Volume 23 No. 2 October 2004.
31. Sutton, S. (2004). *Preliminary Desk Study of Potential for Self Supply in Sub-Saharan Africa*. UK SC: WaterAid and the Rural Water Supply Network.
32. TI Kenya, (2011). *Kenya National Water Integrity Study*. Transparency International Kenya Retrieved from http:/ www.tikenya.org
33. UNDP-WSP, (2006). *Getting Africa on Track to Meet MDGs on Water and Sanitation: A Status Overview of Sixteen African Countries.* Nairobi, Kenya: Water and Sanitation Program Africa, World Bank.
34. Wijk-Sijbesma, C. van (1989). *What price water? : User participation in paying for community based water supply*. The Hague, The Netherlands, IRC International Water and Sanitation Centre. Retrieved from *www.irc.nl/content/download/2549/.../OP10-E.pdf.*
35. Wegelin-Schuringa, M. (1998) *Community Management Models for Small Scale Water Supply Systems*. Paper for discussion in workshop on public private partnerships in service provision for community managed water supply schemes, held in Kakamega, Kenya, 7-10 December.
36. WELL, (1998). *Guidance manual on water supply and sanitation programs.* Loughborough University, WEDC, UK. Retrieved from http://www.lboro.ac.uk/well/resources/ publications

37. White, A. (1981*), Community Participation in Water and Sanitation: Concepts, Strategies* and. Methods, Technical Paper Series No. 17, IRC International Water and Sanitation Centre.
38. WHO, (1993). *Operation and maintenance activities in Africa: A consolidation report.* Harare. Retrieved from www.who.int/water_sanitation_ *health/*
39. WHO/UNICEF, (2000). *Global Water Supply and Sanitation Assessment 2000 report.* World Health Organization New York. Retrieved from www.who.int/water_sanitation_ *health/monitoring/Jmp.*
40. WHO, (2000). *Tools for assessing the operation and maintenance status of water supply and sanitation in developing countries.* World Health Organization: Geneva, Switzerland. Retrieved from www.who.int/water_sanitation_health/hygiene/om/omtools/en/
41. World Bank, (1993). *Water Resources Management*: A World Bank Policy Paper. World Bank, Washington D.C.