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The role of local institutions in the creation of an enabling environment for water project sustainability in Iringa District, Tanzania

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ABSTRACT

Sustainability of water projects is increasingly becoming an area of concern for researchers and development practitioners given the increased scarcity of water resources and the continued failure of many water projects in developing countries. The cited unsustainability of water projects indicates the lack of strong local institutions that would create an enabling environment. The argument put forward by this paper is that, for water resource projects to be sustainable there must be a well embedded local institution to facilitate effective supervision and management. This study was conducted in three villages of Iringa District to establish the role played by local institutions in creating an enabling environment for water project sustainability. The establishment of the roles played by various institutions was done through institutional mapping and focussed on the types and roles of each institution in ensuring sustainability of water projects. The findings show that the present institutional framework for the management of water supply and sanitation services in the study area is complex and has overlapping roles coupled with inadequate coordination and communication mechanisms. The binary regression model reveals that institutional related factors namely, project maintenance per annum and meetings conducted per annum, to be leading factors for sustainability. The study concludes that the coordination of various institutions is an important aspect for the sustainability of water projects. Therefore, local governments, donors and communities should make sure that technical aspects and regular follow-ups, as well as capacity building among members of the community and water user associations become an integral part of any water project for the realisation of sustainability.

KEY WORDS: sustainability, institutions, water project, coordination, enabling environment

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1. Introduction

Water is an essential component of life, and its availability and quality are crucial. It is projected that by 2025 more than 3 billion people will be living in water-stressed countries, and 14 countries will slip from water stress to water scarcity (HDR, 2007; OECD, 2011). A major challenge facing developing countries today is how to supply safe drinking water to their citizens. The demand for water is rising at an exponential rate due to an increase in populations in both urban and rural areas (AKPOR & MUCHIE, 2011). A vastly uneven distribution of freshwater resources, combined with climatic change, is already deepening water-related problems (WORLD BANK, 2010). Following this crisis, several stakeholders around the world have joined the efforts to address the problem by supporting various water supply related projects. Regardless of these efforts, almost 50% of the people in Tanzania do not have access to safe water (WATER AID, 2014).

Despite the continued support of water related projects offered by various stakeholders in addressing the rising demand of water resources in developing countries, a significant number of these projects have failed to operate sustainably (ANTONIO, 2005; RWSN, 2010). It has been estimated, for example, that the hand pump, which provides nearly half of the protected water supplies for

Africa's rural population, has an estimated functionality rate of approximately 66%. Across rural sub-Saharan Africa, an average of 36% of hand pumps is non-operational at any given time, and in some countries, it is estimated that more than 60% of hand pumps are non-operational (WHO, 2011). This shortage is attributed to, the short life span of these water projects among other factors. This trend raises questions as to why, regardless of the scarcity of water resources and the raising demand for water resources by people, the projects are still not sustainable.

A lack of sustainability in the water supply has been attributed to a number of problems related to the projects, and which include the following: the intervention was not desired by the community, the capital and/or recurrent costs are too high for the community, neglect of maintenance and repairs due to lack of ownership , failure of the promised benefits to materialise, short duration of education programmes causing the trained members of the community to move away or lose interest (CARTER ET AL., 1999). Other reasons listed include, poor local financing and cost recovery, and a lack of dynamic operations and maintenance (MONTGOMERY ET AL., 2009). These reasons cumulatively amount to a lack of an enabling environment for water project sustainability. Therefore, this paper investigates the role of local institutions in creating an enabling environment for water project sustainability in Tanzania.

2. The concept of sustainability

The concept of "sustainable development" emerged in the literature after the World Commission on Environment and Development's landmark report, 'Our Common Future' was published in 1987 (PANAYIOTA, 2012). Today, the word sustainability is frequently used in many platforms using different combinations such as sustainable development, sustainable growth, sustainable community, sustainable industry, sustainable tourism, sustainable economy, and sustainable agriculture (OINO ET AL., 2015). Despite being in use for a long time the word sustainable development is still incredibly difficult to comprehensively define and is difficult to fully operationalize (TAHSEEN, & KARNEY, 2017). According to RICHARD (1999), sustainability is defined simply as the continued delivery of a particular service. Sustainability means to support and maintain a condition so that it continues without interruption, diminution, giving way, fading, or yielding (CONARD, 2013). Sustainability might also mean the capacity to endure and adapt, prompting the question

what existing conditions need to and should be maintained (STARIK & KANASHIRO, 2013)?

Sustainability was soon adopted by those providing water and sanitation services to mean that service and "management which are cost effective, taking into account constraints on the resource itself, and on the availability of financial resources" (BLACK, 1985). ABRAHAM (1998) on the other hand, views sustainability of water projects as a continued flow of water at the same rate and quality, as when the supply system was designed. KIMBERLY (1998) maintains that sustainability in water projects means ensuring water supply services and interventions continue to operate satisfactorily and generate benefits over time as expected. Furthermore, the benefits for the water supply should continue to be realized over a prolonged period of time (DAVID & BRIKKE, 1995) and so is the maintenance of the initial project service standards (KIMBERLY, 1998). OINO ET AL. (2015) argue that it is sustainability that makes the difference between success and failure of community based projects.

The varying connotations of the concept of sustainability are accompanied by measurement challenges. As LOUCKS (2000) argues, despite the challenge of defining and measuring sustainability, the limitation should not stop the efforts of identifying and valuing the possible impacts of what we are doing, or are thinking of doing, over time periods much longer than the lives of our investments, or even of the lives of those of us living today. According to AMJAD ET AL. (2015), sustainability can be measured and evaluated by focusing on functionality, achievements of identified goals, and efficient financing and management of the project. The measurement indicators proposed by AMJAD ET AL. (2015) set a foundation for this study given the fact that research in this area is still nascent and fragmented (AARSETH ET AL., 2017).

3. Institutions as an enabling environment for sustainability projects

In developing countries, a significant number of projects, including those in the water sector, fail to deliver to the target society over a long term (ANTONIO, 2005), and many of these include those supported by international agencies (ADEMILUYI & ODUGBESAN, 2008). This trend affects the sustainability of water service provision and hence questions the existence of the enabling environment for sustainability. The purpose of making water projects sustainable is to develop a long-term performance, of the service or the project; thus there is a need for creating an enabling environment, which means, the context that can "grow" a desired

process and outcome (AMJAD ET AL., 2015). The concept of an enabling environment has been conceptualized and applied in different disciplines of study. Although the idea varies between, and within various fields, it has been acknowledged that an enabling environment needs to be present to bring about positive project outcomes (RAO, 2007; BRDJANOVIC, 2007; AMJAD ET AL., 2015) hence making it a key feature in determining performance and success factors (OINO ET AL., 2015).

The enabling environment, which in this paper refers to effective institutions, can be measured through the presence and implementation of policies and laws that clearly define the roles and responsibilities, capacity and capability, of these institutions (AMJAD ET AL., 2015). Therefore, as acknowledged by scholars, one of the key drivers of the sustainability of water sustainability projects is the availability of well-established institutions (enabling environment). Adequate institutional support and policy arrangements are important in supporting community management indefinitely (ADEMILUYI & ODUGBESAN, 2008). Building of appropriate institutional structures for the administration of water services is a crucial aspect in achieving the sustainability of water projects (MWAKILA, 2008).

Local institutions are varied in nature and their success in creating a conducive environment for sustainably managing water resource projects depends on the local context. The argument put forward by this paper is that, for water resource projects to be sustainable there must be a well embedded local institution to facilitate effective supervision and management. The general purpose of water management institutions is to organize the provision of water resources so as to respond to the collective needs of water users and at the same time to secure the sustainable use of the resource (MOSHA ET AL., 2016). Therefore, this paper answers the following research questions: what types of institutional structures are established to support water project management in the study area? What are the key roles played by various established institutions? How does the existing institutional arrangement support the sustainability of the water project?

4. Methodology

4.1. Study area

The study was conducted in Iringa District Council which is one of the Four District Councils in the Iringa Region of Tanzania (Fig. 1). The District borders with Mpwapwa District (Dodoma

Region) to the north, Kilolo District to the east, Mufindi District to the south, Chunya District (Mbeya Region) to the west and Manyoni District (Dodoma Region) to the north west. The Iringa District Council Headquarters are located in Iringa Municipal Council along Dodoma Road. In terms of international identification, the District is found between latitudes 7°0' and 8°30' south of the Equator and between longitudes 34°0' and 37°0' east of the Greenwich Meridian. Administratively, Iringa District Council is divided into 6 divisions, 25 wards, 123 villages and 718 hamlets. The Council has two Parliamentary Electoral constituencies namely: Ismani and Kalenga.

Iringa Rural District has a total area of 20,413.98 km² which is about 34.9% of the total area of the Iringa region, most of which is plain land with very few hills or valleys. Only 9,857.5 km² are habitable, leaving the remaining land either as national parks, rocky mountains or water bodies. About 9,437.5 km² are covered by Ruaha National Park and 1,119 km² are covered by water bodies. The available arable land amounts to 479 258 hectares, or about 23.5% of the area in the District. Of the arable land in the District, only 184 465 hectares are cultivated annually. There is insignificant variation in the sources of water during wet and dry seasons. Data from the National Sample Census of Agriculture 2007/08 show that the piped water contributes 40.7% of the source of drinking water in Iringa Rural District followed by other unreliable sources such as surface water, including rivers, dams, streams and lake (21.7%), unprotected wells (9.6%), unprotected springs (9.4%) while a small percentage (9.1%) protected wells.

4.2. Study design, sampling procedure and sample size

A cross - sectional research design was used. According to KOTHARI (2004), this design allows data to be collected at a single point in time. The design allows for the descriptive analysis, interpretation, as well as determination of relationships between variables (BAILEY, 1998). Three villages, namely Kitapilimwa, Mgera and Kalenga were randomly selected within Iringa Rural District. The criterion for village selection was availability of a water project. The study involved Kitapilimwa water project, Mgera water project and Tanangozi-Kalenga water project. Therefore, three projects were used by the study. Sixty (60) households which were benefiting from the project were randomly selected to make a total of one hundred and eighty (180) households. Nine key informants, six from the village level and three from the district level were

purposively selected for the purpose of soliciting detailed information. These informants were: village chairpersons and project leaders from the village level, the District planning officer, the District water engineer and the District Community Development Officer (DCDO) at the district level. Their selection was based on their experience of water availability (water sources, supply challenges, distance and time), participation of people in the water project development, gender issues on water management, and resource allocation for project infrastructure maintenance. The essence of using key informants was to supplement the information which was collected through observation and structured questionnaire surveys. The basis for choosing 180 households as a sample size was to adhere to MATATA ET AL. (2001) argument that 80-120 persons are adequate for most socio-economic studies in sub-Saharan Africa.
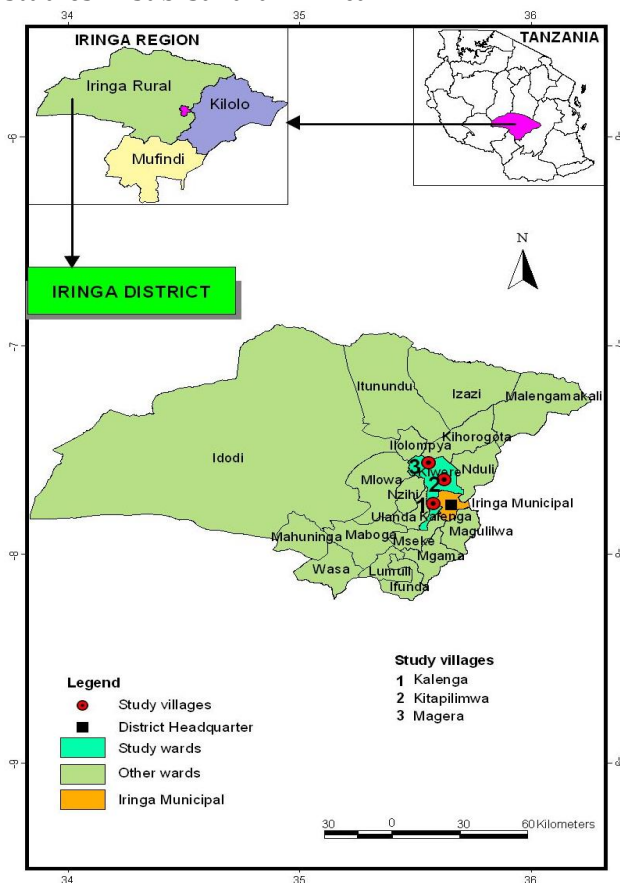

Fig. 1. Map of Iringa District, Tanzania, showing the study area

4.3. Data collection and analysis

Qualitative data were gathered through key informant interviews and focused group discussions where checklists of items were used to guide the interview and discussions. Field observation methods through personal observation were also employed. Focus group discussions involving between 7-12 members were conducted using a checklist of questions. Personal, or Participant, observation was used to collect qualitative data such as observations of the functionality of water sources, and the roles performed by various institutions. Quantitative data were collected through interview where a structured questionnaire with both closed and open-ended questions was used in order to obtain various pieces of information such as the roles of different institutions, social factors, economic factors and environmental factors affecting the sustainability of water projects. Data from Focus Group Discussions (FGDs) and field observations were analysed using content analysis. Information obtained from key informants and FGDs using semi-structured interviews was broken down into the smallest meaningful units. This enabled the researcher to ascertain the values and attitudes of the respondents (BERNARD, 1994).

In this study the mapping of institutional arrangements for water project management was done by showing the types, roles, responsibilities and management functions of the institutions in ensuring the sustainability of water projects in the villages. Institutions from water users' level to the district level were identified and their roles explained.

Also, a binary logistic regression model was used to determine the factors for the sustainability of the projects. The model was necessary to explain the prediction of factors which are likely to determine the outcome variable (sustainability) which is based on a set of values and the sustainability was a dichotomous variable with two values: 1 if the projects were perceived to be sustainable, and 0 if otherwise (HOSMER & LEMESHEW, 1989). A number of institutionally related factors for water resource governance and sustainability were selected and tested as a predictor for the sustainability of water projects. These factors were maintenance, length of time for the replacement of spare parts, time spent on water collection, water project management training, user meetings, gender balance in water committees, user fee, daily water intake and economic activities in water sources. All these predictor variables were modelled against the dependent variable (perceived sustainability of water projects). The model is presented in the following equation:

$$\text{Log} = [p/(1-p)] = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots B_n Xn + \varepsilon_i$$

whereby:
Log = [p/ (1-p)] = a logarithm of sustainability of water projects
P = Chance that water projects are sustainable

$\beta_1X_1 + \beta_2X_2 + \beta_3X_3......B_n$ = Constant coefficients for the independent variables

ε = Error term representing a proportion of the variance in the dependent variable that was unexplained by the regression equation.

$X_1 = X_n =$ Predictors

X_1= Maintenance per annum (1 = if done, 0 = if not done)

X_2= Conduct of Meetings per annum (1 = if done, 0 = if not done)

X_3= Spare parts replacement per five years (1= if done, 0 = if not done)

X_4= Water management trainings per annum (1 = if 2 or more, 0 = if less than 2)

X_5= Time spent for water collection (measured in minutes) (1= if less than 30 minutes, 0 = if more than 30 minutes)

X_6= Water consumed per day (measured in litres) (1 = if satisfying, 0 = if not satisfying)

X_7= Activities in the water sources (1 = if not done, 0 = if done)

X_8= User fee (1 = if paid, 0 = if not paid)

X_9= Gender balance on the water committee (1 = if committee is gender sensitive, 0 = if not).

5. Results and discussion

5.1. Water sources protection strategies

Effective and sustainable management of water resources is vital for ensuring sustainable development. Different institutions have different strategies for ensuring water sources are protected around their areas. At the study area, village by-laws and regulations and penalties were the strategies which were used to protect water sources. The results (Table 1) reveal that nearly 93% of the respondents were aware of the village by-laws and regulations for environmental protection. Only 6.7% of the respondents were not aware of these by-laws and regulations. This implies that the village and water committee leaders in the project areas play their roles of educating people accordingly on protecting their environment especially water source areas.

Table 1. Presence of by-laws and regulations for protection of water sources (n = 180)

Responses	Frequency	Percentage
Yes	168	93.3
Not aware	12	6.7
Total	180	100.0

Human activities that are conducted near water resources affect the water resources management, river ecology and the quality of water through pollution and silt sedimentation. In order to minimize the impact, the villages at the study area have enacted by-laws that limit people from carrying out economic activities around water sources. This resembles what is done in the rural areas of Mwanza Region where in most of the villages, the communities enacted by-laws to limit human activities such as bathing and washing clothes close to the sources of drinking water (Dungumaro et al., 2003).

Effective implementation of the by-laws depends largely on users' knowledge about the laws and the associated penalties. The findings in Table 2 show that the majority of community members are aware and knowledgeable about the content of by-laws for environmental protection. When the respondents were asked to explain what the by-laws stipulate, 74.4 % of the respondents managed to cite farming restrictions around water sources as one of the items in the by-laws. About 6% of the respondents mentioned keeping animals around water sources as an activity which is not allowed by the by-laws. Nearly 13% of the respondents were able to mention two restrictions namely: farming and keeping animals around water sources as unacceptable activities in the village by-laws. Only 6.1% of the respondents were not able to mention what was contained in the village by-laws for environmental protection. Despite their existence a few villagers indicated that they were not aware of what is stated in by-laws and regulations. It can be concluded that the awareness level is high given the findings from various focus group discussions. Once the FGDs participants at Mgera Village were asked to explain what might be the cause of unsustainability of water resource projects in the area the following was the response.

'*people are just stubborn, nobody in our village can say that he/she is not informed about the existence of by-laws governing water resource use…. the only challenge is that we can't cite the specific regulations…… we always be conscious once we do anything around water sources*'

The purpose of soliciting this information was to know if people were able to mention specifically what was contained in the village environmental protection by-laws. Having this knowledge would help the community to refrain from engaging themselves in activities that go against their by-laws hence environmental protection is ensured.

Table 2. Knowledge and awareness of respondents on the by-laws and regulations

Category	Frequency	Percentage
Farming is restricted around water sources	134	74.4
Keeping animals around water sources is not allowed	11	6.1
Farming and keeping animals are restricted	24	13.3
Not aware	11	6.1
Total	180	100.0

When the respondents were asked to explain the punishment which is associated with failure to observe the by-laws governing water resource use, it was found that 85.6% were informed while only a few were not aware of the existence of penalties (Table 3). When the respondents were asked about the type of punishment given, nearly 70% of the respondents indicated a penalty of 50 000Tsh was charged to those who pollute the water source environment for whatever activity they carried out. Nearly 11% of the respondents indicated 30 000Tsh as the penalty against the people who pollute the environment around their areas. The discussion with key informants from government authorities reported the fine of 50 000Tsh to be the right amount required to be paid by a person found guilt of polluting the environment around a water resource. The discrepancy in terms of knowing the official amount required to be paid by someone can be attributed to the negligence as shown before that people know the existence of by-laws but they don't feel responsible to understand its content.

Failure to provide payment receipts to people who were penalised for polluting the environment was the other reason for some people failing to remember the actual penalty amount as stipulated in the by-laws. This is so because without receipts, there were no records of the payments. This practice creates an avenue for the guilty people to negotiate the penalties with the responsible officers. VADEN, (2004) argued that punishment is used to teach, reform, and persuade individuals to accept what members of the society view as acceptable, or tolerable behaviour. Through punishment, the chances for destruction of water sources at the study area would be minimized.

Payment receipts are very important in any business or service; receipts are used to show that a payment has been made and generally specify the purpose of the payment. The findings in Table 3 show that 82.8% of respondents admitted that the payment receipts were not issued once the fine was paid by the one who was found guilty of polluting the environment. Thus without the

receipts, village leaders are likely to mis-use water funds as the auditing of the real expenditures will be difficult without payment vouchers or receipts concerning project funds. Also, these leaders may not be serious in restricting people from polluting the environment so that they continue to benefit from these penalties.

Table 3. Awareness, type of punishment and issuing of receipts after penalty (n = 180)

Category	Frequency	Percentage
Awareness on the existence of punishment		
Yes	154	85.6
No	26	14.4
The type of punishment given to people who destroy the environment		
Penalty of 50 000Tshs	120	66.7
Penalty of 30 000Tshs	19	10.6
Destroy properties	15	8.3
Not aware	26	14.4
Receive Receipt after payment of penalty		
Yes	4	2.2
No	149	82.8
Not sure	27	15.0

5.2. Mapping of institutional arrangements for water project sustainability

For the purpose of this study, institutions in water management are the organizations and stakeholders at the national and local level that enable effective and efficient management of water services at the study area. As shown in Fig. 2, these are in the form of the district authority, village water committees, and community-based organizations (CBOs) or water user groups. Management of water projects at Iringa District has four levels: District level, Village level, Users (Water user associations and individual water users).

5.2.1. District council authority

The overall operation and management of water supply and sanitation services in Iringa District is under the Iringa Water Supply and Sanitation Authority (WSSA). District Council and District The Water and Sanitation Team (DWST) facilitate the identification of needs and preparation of community plans through participatory planning. They prioritize sub-projects and annually prepare a district plan and budget through a Sector-wide Approach to Planning (SWAP). National Rural Water Supply and Sanitation Programme (NRWSSP) funds are released to District Councils (DCs) on the basis

of these plans and budgets. The DWST implements the NRWSSP at district level. It provides technical and financial support to communities in planning, implementing, operating, and maintaining water facilities, and is a linkage between water basin offices, village Water and Sanitation Committees (WATSANs)/ Community Owned Water Supply Organizations (COWSOs), Water User Groups (WUGs) and other Water user entities, the private sector and NGOs. The DWST also oversees and coordinates NRWSSP activities within the district, and leads in the preparation of annual district water and sanitation plans.
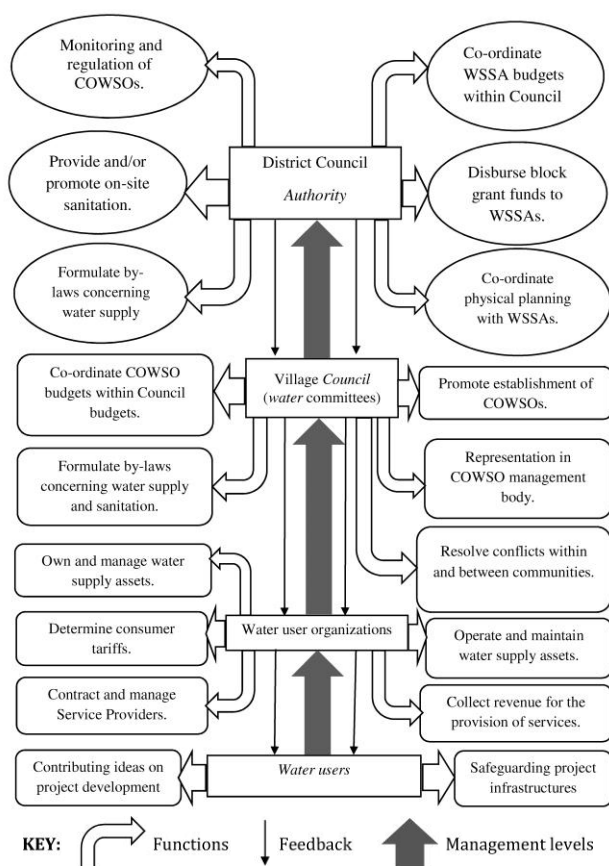

Fig. 2. Institutions and actors involved in management of water projects at the study area

5.2.2. Village council (water committees)

The village council is formed by different committees of various sectors of concern. Each committee is responsible for taking care of all matters which are under a particular sector. Water resource governance needs collaboration with other sectors, hence its governance structures are expected to work together with different committees including environment, land and forest in ensuring an effective water governance system (KABOTE & JOHN, 2017). The existence of the water committee is essential in strengthening and sustaining the established water structures and services. The water committee is important to enable detailed monitoring

and in finding solutions to various problems confronting proper functioning of the installed water infrastructures. In this perspective, water committee members are elected to manage projects on behalf of the whole community. The roles of water committees in the management of water are: promoting establishment of community owned water supply organizations (COWSOs), coordinating COWOSO budgets within Council budgets, representation on the COWSO management body, formulating by-laws concerning water supply and sanitation services, resolving conflicts within and between communities concerning water services and all other matters pertaining to the water sector.

5.2.3. Water user organizations

Water user entities and user groups are the lowest appropriate management level for Rural Water Supply and Sanitation Services (RWSS). COWSOs and WATSAN committees, which are established in the villages, are responsible for the planning, management, and Operation and Maintenance (O&M) of the facilities. This includes designing sub-projects and preparing proposals, getting approval and subsequent funding, monitoring construction, setting tariffs, collecting revenue, and providing reliable services to the consumers. Community management of water and sanitation services can take different legal forms. There are several options for rural water supply and sanitation management systems for both small scale and large schemes. These COWSOs may be in the form of a Water User Group (WUG), Water User Association (WUA), Company limited by guarantee, Company limited by share, Board of trustees or a cooperative society. At the study area, they opted for water user associations. The Facilitation Service Providers (FSPs) from the district level assisted communities to draft constitutions for appropriate legal entities to manage their water projects.

5.2.4. Water users

This category is not in the form of organizations but it is an important category of actors for water management at the study area. Water users are the common people who benefit from the project service. These are stakeholders who are the reason for the existence of the project. Their roles are to ensure the project infrastructures are safely kept by safeguarding them and reporting any problem which is detected at the project, and they are also the ones who are responsible for contributing ideas on the development of projects in their villages.

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The present institutional framework for the management of water supply and sanitation services in the rural areas has led to overlapping roles among the various institutions, inadequate coordination among the various agencies and inadequate communication and awareness building between these agencies and the local organizations and water users. By-laws concerning water supply and sanitation are enacted by both District Council Authority and village councils through water committees. Due to inadequate communication and coordination between the District council and village councils, the by-laws enacted may contradict each other or differ from one village to the other within the same District. It is much better for this responsibility be done at the District council level so as to create uniformity among all village councils within the same District council. The framework has also caused "conflict of interest" as the responsibility for the regulation and performance monitoring of the provision of water supply and sanitation services is vested in the same organization that is responsible for the service delivery and investment financing. The Government has always continued to be the owner and in some cases the operator of these schemes. These approaches have led to a lack of commitment by the beneficiaries for safeguarding the facilities, and unwillingness to contribute to the cost of the operation and its maintenance, let alone the costs of investment. This poor performance results in a lack of proper management, lack of ownership, and poor delivery of services.

5.3. Factors affecting sustainability of water projects

The study underscores the institutional related factors that influence the sustainability of water projects in the study area. To test the strength of the model, a Logistic regression model was estimated using (R^2). The results of the test using this model show that Cox and Snell (R^2) was 0.171 and Nagelkerke (R^2) was 0.232, the results imply that the selected factors explained between 17.1 to 23.1% of the variation in sustainability, hence the remaining percentage is explained by other factors.

The results show that only two independent variables which are project maintenance per annum and conducting the annual meeting were significant at $p \leq 0.001$ and $p \leq 0.010$, respectively (Table 4). The findings indicate that the more the meetings are held by project implementers the higher the level of maintenance and the higher the likelihood of project sustainability. According to WHO and the UNICEF report (2000), in order to ensure sustainability of water projects, a clearly structured, resourced, and trained maintenance organization is necessary. The implication of the findings is that the conduct of regular project operations and management meetings facilitates community ownership of the project while at the same time promotes a willingness to contribute the cost of the project operations and hence ensuring sustainability. The interview with the District Community Development Officer (DCDO), who used to discuss and create awareness about water issues with the communities at the study area, revealed the following:

… information sharing stands at the central focus for any project sustainability… conducting meetings between various water resource governing committees and water users increases chances of project ownership and ultimate long term project survival ….'

The quotation from this key informant implies that the existence of local institutions like water user committees is not an end in itself rather a means to sustainability through effective planning, management, operation and maintenance of the facilities. All these can be done well once meetings are regularly conducted to ensure collective responsibility.

Table 4. Socio-economic and institutional factors affecting the sustainability of water projects

Factors	B	S.E.	Wald	Sig.	Exp(B)
Project maintenance per annum	-1.566	0.171	15.976	0.001	0.209
Times of spare parts replacement per five years	0.635	0.810	1.325	0.250	1.887
Time spent for water collection	-0.335	0.326	0.410	0.522	0.715
Amount of water consumed per household per day	0.597	1.229	0.619	0.431	1.817
Economic activities in the water sources	-0.409	0.945	0.597	0.440	0.664
Affordability of water user fee	-1.416	0.470	2.192	0.139	0.243
Gender balance in water committees	-0.731	0.951	3.390	0.053	0.481
Conducted of meeting per annum	-1.713	0.985	12.029	0.010	0.180
Water management trainings per annum	-0.781	0.752	1.220	0.299	0.458
Constant	5.995	1.576	14.480	0.000	40.538

Generally, to ensure the sustainability of water project there is a need to shift from the approach of continuing with the expansion of the water project infrastructure in areas without the services to focus on the building operation and maintenance capacity of the local institutions. This approach will ensure the achievement of long-term functionality goals of the existing water projects. The approach of focusing on expansion of services without improving the capacity of local governing institutions in the management of the project has led to the lack of commitment by the beneficiaries in safeguarding the facilities, and unwillingness to contribute to the cost of operations and maintenance.

6. Conclusion and recommendations

The present institutional framework for the management of water supply and sanitation services in rural areas has demonstrated the existence of a complex layer of institutional arrangements with diverse and sometimes overlapping roles. Despite the complex setting in institutional arrangements the government continued to be the owner and in some cases the operator of water projects. Therefore, the government remained to be a key player in water project management. In spite of the distinct role played by the government, the study concludes that the progress towards attaining sustainability of water projects will require strengthening of the user's capacity in terms of project operation and maintenance. Building of appropriate institutional structures for the administration and management of water services is a crucial aspect of achieving the sustainability of water projects. It is recommended that, for the sustainability of water projects, setting clear and distinct roles for various institutions is important.

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