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The Management and Sustainability of Water Supply Facilities in Rural Communities: Lessons from the Volta Region of Ghana

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Abstract

This article is based on research conducted between July 26 and September 12, 2007 to find the extent to which target communities, working through Water and Sanitation (WATSAN) Committees, were able to continuously maintain water supply facilities extended to them under the Volta Region Community Water Supply and Sanitation Programme (VRCWSSP). Attempts were also made to determine the factors that influenced their ability to achieve uninterrupted water supply through an efficient maintenance management culture. The results of the investigations became the basis for making some policy recommendations for, first, enhancing the capacity of the Watsan committees to maintain the water supply facilities on a sustainable basis and, second, developing a framework for re-shaping thinking about community management of water supply systems in general.

Introduction

The Volta Region Community Water Supply and Sanitation Project (VRCWSSP) was a joint venture between the governments of Ghana and Denmark. Its development objective was to contribute towards better living and health conditions for rural populations in the Volta Region of Ghana. This was to be achieved through the provision of reliable and

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easily accessible sources of drinking water and a reduction in water and excreta- related diseases through the adoption of hygienic practices and improved sanitary installations (Ghana, CWSA, 1996; GWSC/CWSD/ DANIDA, 1996). By the end of 2003, the VRCWSSP covered 933 rural communities with an approximate population of 460,000 people. In terms of specific programme outputs, 47 hand-dug wells, 830 boreholes - with or without hand-pumps, 98 piped systems and 35 rainwater-harvesting tanks were constructed. In addition, 249 abandoned boreholes were refurbished and fitted with hand-pumps (VRCWSP/CWSA, 2003a and 2003b).

The VRCWSSP operated under the principles of community ownership and management of water supply facilities through a demand-driven approach and sustainable institutional development at the district levels in line with the government's decentralization policy (Ghana, CWSA, 1996; GWSC/CWSD/DANIDA, 1996). To actualize these principles the programme formed 1,022 Water and Sanitation Committees (Watsan committees) in the target communities (VRCWSP/CWSA, 2003a and 2003b). According to Baidoo (1999), the idea behind the setting up of the committees revolved around the notion that community development involves local empowerment through organized groups of people acting collectively to control decisions, projects, programmes and policies that affect them as a community.

The Watsan committees were charged with the responsibility of ensuring the sustainability of the water supply facilities provided for the communities by the Programme through efficient operational and maintenance management practices. Specifically, the committees were tasked to coordinate all community efforts towards effective ownership and management of the communal water supply facilities; select and supervise caretakers from the community for the system; design effective tariff and other revenue collection mechanisms in support of water supply activities; maintain accounts and records of the functioning and maintenance of the facilities; ensure a proper financial management and accounting system; and establish and operate a bank account to support the construction, operation and maintenance of the communal water supply facilities. The Watsan committees have, therefore, become essential and integral parts of the process for sustainable delivery of water and

improved sanitation in the communities where the Programme operates. In other words, these committees constitute the basic management bodies in the participating communities and the focal points for community ownership and management of the water supply systems. This article examines the performance of the Watsan committees in terms of their ability to sustain the water supply facilities provided them under VRCWSSP, and provides some policy guidelines for enhancing their capacity towards an effective and sustainable maintenance management.

Conceptual and theoretical framework

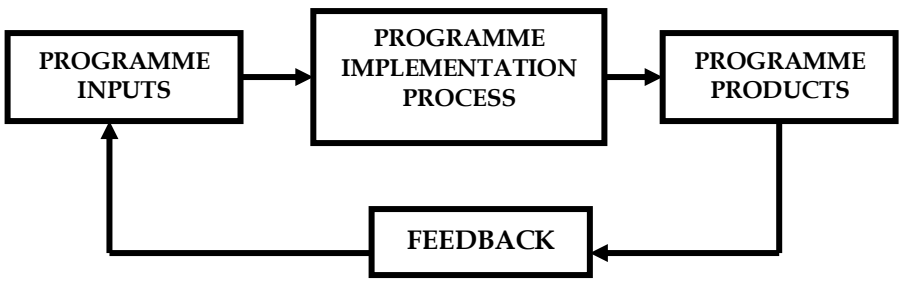
Basically, the study sought to appraise the performance of Watsan committees and how they manage community water supply facilities in the Volta Region of Ghana. For the purpose of the study, performance appraisal was conceived as the process of systematically assessing the committees' tasks in relation to their strengths and progress towards achieving set goals and standards. The aim was to use data from the investigation to determine ways of improving their capacity to sustain the water supply facilities.

Subsequently, the study was considered as a process analysis that involved the assessment of the "means-goals" of the VRCWSSP rather than the "end-goals". In order to assess these "means-goals", it became imperative to develop an integrative framework within which variables necessary for measuring their performance could be clearly defined and selected. To derive these variables, the whole concept and practice of a community management strategy was examined from the context of the open systems approach to performance evaluation.

The open systems theory is derived from the general systems analysis conceptualised by the biologist, Bertalanffy (1951) and later developed into a theory of organisations by Boulding (1956) and Miller and Rice (1967). According to Robbins (1987:9) this theory sees an organisation as "an input-output transformation system that depends on its environment for survival". An organisation receives input of energy in the form of information and materials from the environment, engages in transformation processes to generate output, and returns the resultant outputs to the environment.

From the perspective of this theory, it is argued that the level of operational and maintenance management efficiency that a committee achieves relates directly to its ability to continuously acquire input, process and channel it to its environment, and maintain stability and balance (see for example, Yutchman and Seashore, 1967a, 1967b). The committee can be described as performing well to the extent that it is capable of continuously receiving sufficient input of resources, maintaining its operations, and exporting transformed resources to the environment in sufficient quantity and quality to continue the cycle. The model adopted here (see Fig 1) is an adaptation of a simple systems theory presented by Cole (1993: 71).

Figure 1. A Performance Appraisal Model



Programme input refers to tasks that are necessary for managing operations. These include such administrative tasks as Watsan committee meetings, facility usage control, timely decision-making, proper and up-to-date record-keeping and efficient revenue collection. The programme implementation process constitutes the maintenance management tasks; and it was the focus of this investigation. It is conceptualized in terms of regular maintenance and repair of the water supply facilities. The output of the efficient performance of the maintenance management tasks is the programme products which include functional and usable systems, regular supply of water and clean water collection points. For the purpose of this study, a high performing Watsan committee was the one that had

achieved a high degree of efficiency in maintenance management. The evidence for measuring this level of performance was obtained from the programme output which was easily observable in the communities and the feedback received from the programme's strategic constituencies.

Methodology

The population of the study included all the 1,022 Water and Sanitation (Watsan) Committees in the 933 rural communities with approximately 460,000 people covered by the Volta Region Community Water Supply and Sanitation Programme (VRCWSP/CWSA, 2003a and 2003b). At the time of this research, the VRCWSSP was operating in all the twelve districts of the Volta Region. In order to cater for geographical, economic and socio-cultural differences, it divided the region into three main operational zones, each made up of four administrative districts. The northern zone comprised of Krachi, Nkwanta, Jasikan and Kadjebi-Asato districts. The central zone was made up of Hohoe, Kpando, Ho and Ketu districts while the southern zone covered North Tongu, South Tongu, Akatsi and Keta districts.

Since the study dealt with large populations spread over a very large geographical area, a multi-stage sampling technique was used. At the first stage, one district was randomly selected from each of the three zones defined by the programme. The districts are Nkwanta, Hohoe and North Tongu. At the second stage, approximately ten per cent of the total number of communities reached by the programme in each of these three districts was randomly selected. This was to give proportional representation to each of the sampled districts. A total of 26 communities were thus selected for the study.

At the third stage, two categories of respondents were selected both accidentally and purposively. Programme beneficiaries in the sampled communities were selected accidentally because it became practically difficult to select them by any probability sampling technique. Although no quota system was adopted, efforts were made to include significant characteristics of the populations of the various communities in the sample. These included opinion leaders such as traditional rulers, members of Unit Committees, members of District Assemblies, teachers, community

health workers, members of recognized groups and those other persons living in the communities but did not fall into any significant groupings. This was significant because it provided the means by which knowledge of the local populations was used to increase the precision of the sample (Moser and Kalton, 1971). In all, a total of 352 persons was interviewed from the 26 communities sampled.

All members of Watsan committees found in the sampled communities were purposively selected. However, the research instru-ments were administered on a total of 155 members who attended scheduled meetings; making an average of about six persons per committee. The sample sizes for the communities, Watsan members and programme beneficiaries for each district are represented in Table 1.

TABLE 1 Sample Sizes by Districts

District	*Total Number of Communities in the District*	*Number of Communities Sampled*	*Number of Watsan Members Sampled*	*Number of Beneficiaries Sampled*
Nkwanta	92	10	56	135
North Tongu	67	7	44	92
Hohoe	93	9	55	125
TOTAL	**252**	**26**	**155**	**352**

Source: Results of analysis of field data, September 2007

The study adopted the process evaluation design which falls within Stufflebeam's (1975) context-input-process-product construct for formative evaluation. This research design was used because it involved, basically, the assessment of procedural or implementation strategies for the attainment of the corporate goals (see Bhola, 1990 and 1995; and Tuckman (1972) of VRCWSSP in the communities. The research, thus, focused on the internal evaluation of the programme in the target communities in which the performance of the Watsan committees was compared with the specific tasks assigned them. To achieve this, the survey research method of the descriptive type was used. The study also utilized some elements of the cross-sectional survey design as a means to providing a meaningful framework within which information from a large number of programme beneficiaries and Watsan committees drawn

from different communities and with equally different backgrounds and characteristics could be collated and analyzed to reach valid conclusions.

Both qualitative and quantitative methods were used for this research. Separate interview schedules were administered to individual members of Watsan committees and programme beneficiaries. Focus group discussions were held with each of the twenty-six selected Watsan committees and observational formats were used to assess the state of water supply facilities in the communities.

The emphasis of this research was on ensuring content and predictive validity of the instruments of measurement (Moser and Kalton, 1971). To achieve content validity, much effort was made to obtain a representative sample of items from the universe of the subject under study. Subsequently, the items in the research instruments were designed so that they contained, in a balanced way, almost all issues relating to the subject of study. Since content validity is a matter of judgement, the items in the research instruments were peer reviewed and subjected to thorough scrutiny and re-organisation. To achieve some appreciable level of predictive validity, all the relevant social characteristics within the Watsan committees and the communities were captured in the sample.

Data analysis and findings

The focus of this study was the extent to which the Watsan committees were achieving programme sustainability through an efficient maintenance management culture. In the context of this research, maintenance management efficiency was measured in terms of the frequency of breakdown of water supply facilities, response to breakdowns, and the proportion of water supply facilities that were in good condition and were therefore functioning.

Water supply systems

Two main types of water supply systems were observed in the study area. These were the manually operated boreholes and piped systems. The piped systems include gravity driven, mechanized boreholes and those deriving their sources from dams, ponds, streams and rivers. Manually

operated boreholes were the most available and used water supply facilities found in the study area. At least 61.3 per cent of the communities, totalling about 73.7 per cent of the population studied, were using them. The data also revealed that whereas approximately 82.5 per cent were managing single systems comprising manually operated and mechanized boreholes as well as piped systems drawn from rivers, ponds and streams, approximately 17.5 per cent had access to two water systems: either mechanized and manual boreholes; manual boreholes and gravity driven piped systems; or mechanized boreholes and gravity driven piped systems.

Information on the extent of usage of these facilities indicated that the main source of water for approximately 87.8 per cent of the respondents was those provided by the VRCWSSP. Whereas 5.4 per cent did not use them at all, 6.8 per cent used them with other sources. This situation makes the sustainable maintenance of the water supply facilities provided by the Programme critical for ensuring the health and well-being of the target communities.

Frequency of Breakdown of Water Supply Facilities

Programme beneficiaries were asked to state the number of times their facilities had broken down completely in the six months due to major faults before this research. About 24 per cent stated that they were either not aware or did not experience any major disruptions in water supply due to breakdown of their systems; 36.6 per cent said their facilities broke down only once; 29.4 per cent indicated that they had broken down two or more times; and 16.5 per cent observed that their water systems had broken down three or more times. Overall, the data suggests an increasing rate of breakdown of water supply facilities in the study communities.

Responses to Breakdown of Water Supply Systems

Respondents, who indicated that within the past six months their water supply facilities often broke down, were asked to state how long it usually took for their systems to be restored. Their responses are analysed Table 2 below.

TABLE 2: Period between Breakdown and Repair of Water Facilities

Period	*Frequency*	*Per cent*
X ≤ one week	63	32.0
One week < X ≤ two weeks	22	11.2
Two weeks < X ≤ one month	32	16.2
One month < X ≤ three months	44	22.3
Three months < X ≤ six months	11	5.6
Six month < X< one year	1	0.5
X ≥ one year	24	12.2
Total	197	100.0

In the table X represents the period between breakdown and repair.

On the average, it took not less than one month for most communities to get their broken down water supply systems fixed. In about 40.6 per cent of the cases, it could take between one month and over one year to fix broken down systems. The results suggest that the majority of the communities were becoming increasingly incapable of promptly repairing their water supply facilities when they broke down. This was confirmed by the proportion of water supply facilities that were either not functioning properly or had broken down completely in the various communities at the time of this research.

- *Level of Maintenance Efficiency*

The results of field observations made on the extent of the breakdown of water supply facilities in the communities at the time of this research are shown in Table 3.

TABLE 3: Broken Down Water Supply Facilities

Number of Broken Down Facilities	*Number of Communities Involved*	*Percent*
One	8	30.8
Two	6	23.1
Three	1	3.8
Four	-	-
Five	1	3.8
None	10	38.5
Total	26	100

The data indicates that at least two of the water supply facilities were either not functioning well or had broken down completely in not less than 53.9 per cent of the communities. Again, out of the 64 boreholes fitted with hand pumps in 16 communities, at least 43.8 per cent of them had either broken down completely or were not functioning properly. It can be argued therefore that majority of the communities were becoming increasingly incapable of achieving any appreciable level of maintenance efficiency especially in the case of boreholes fitted with hand-pumps. This was because the proportion of water supply facilities provided in the communities studied that were either not functioning properly or had broken down completely was generally high.

Factors Influencing the Ability of Watsan Committees to Achieve Maintenance Management Efficiency

In determining the factors that could enhance the ability of the Watsan committees to achieve sustainable water supply systems through an efficient maintenance management culture, it became necessary to investigate their level of operational efficiency. The level of performance was measured in terms of revenue management efficiency, decision-making efficiency, enforcement of water facility usage regulations and members' motivational orientation.

Revenue management efficiency

In this study, revenue management efficiency was defined as the ability of the Watsan committees to facilitate community management by ensuring that there was always adequate funds for the operation and maintenance of their water supply facilities. Information gathered at the focus group meetings indicated that 88.5 per cent of the communities studied were operating some tariff system. According to respondents from communities not operating a tariff system, they were not paying for the use of water because at the time of this research:

i. No tariffs had been fixed. The use of water was therefore free for everybody because they contributed to the construction of the system (54.6 per cent)
ii. Community members were levied only when the water system broke down (22.7 per cent)
iii. Inability and unwillingness to pay for the use of water (13.6 per cent)
iv. No vendors were mandated to collect the fees (9.1 percent)

Significantly, the sale of water was the main source of revenue for the repair and maintenance of water supply facilities in almost all the communities. Three main modes were adopted for the collection of water user fees in the 23 communities that had a tariff system. The "pay as you fetch" system was operating in 61.5 per cent of the communities, monthly dues per adult was applied in 19.2 percent of them and monthly dues per household was adopted in 7.7 per cent of the communities. This had made the "pay as you fetch" system the most prevalent mode of payment for the use of water in the study communities. For this system, payment was made directly at the collection point by means of a measuring vessel. The fee ranged from GH¢0.05GHP to GH¢0.10 per 18 litre bucket or between GH¢0.10 and GH¢0.20 per bowl of 36 litres. In the case of monthly dues per household, the rates ranged from GH¢0.10 to GH¢0.20 per household irrespective of the number of people involved. Alternatively, households were asked to pay annual dues of between GH¢1.20 and GH¢2.40. For monthly dues per adult, the rates ranged from GH¢10 to GH¢20 per adult. An adult in this case was defined as any resident who was 18 years and above. This rate could also be paid annually.

All piped systems were metered and revenue was either collected at public water points (stand pipes) or at the household level. At water collection points, measuring vessels described earlier were used and vendors accounted for total water consumed as per the daily, weekly or monthly meter readings, as the case might be. Individual household supplies were metered and rates were paid according to the amount of water consumed monthly.

The most effective mode of collecting water tariffs in the study regime was the system in which payments were made at the point of collection. The effectiveness of a particular mode of revenue collection

did not depend so much on the type of system being operated as on the ability of the Watsan committees to develop an effective system for monitoring revenue collection and controlling vendors and caretakers to ensure that such agents would submit regular and accurate accounts, pay acceptable remunerations to the vendors and caretakers as well as allowances to the key operatives in the committees. Also important was the level of accountability and transparency in financial administration. However, observations made during the focus group discussions suggest that most of the Watsan committees were unable to achieve this level of efficiency.

The bank and cash balances of the communities at the time of this study are shown in Table 4.

TABLE 4: Cash and Bank balance positions of the communities surveyed

Cash and Bank Balance Positions of Watsan Committees	Frequency	Percent
Less or equal to GH¢100.	13	50
GH ¢101m – GH¢200	4	15.4
GH¢201 - GH¢300	3	11.5
GH¢301 - GH¢400	1	3.8
GH¢601 - GH¢700	2	7.7
GH¢1001m - GH¢1100	1	3.8
GH¢3501m - GH¢3600	1	3.8
GH¢3601m – GH¢3700	1	3.8
Total	**26**	**100**

Source: Data collated from cash and bank accounts books of the Watsan committees

Half of the Watsan committees had about GH¢100 as their cash and bank balances. Approximately 57.6 per cent of them had cash and bank balances totalling GH¢400 or less. Only 19.2 per cent of Watsan committees had a balance of between GH¢601 and GH¢3,700. It is clear from the data that the bank and cash reserve position of more than half of Watsan Committees was extremely precarious. This means that the majority of the Watsan committees were not generating enough funds from the sale of water to be able to sustain their water supply systems. In fact, approximately 57.7 percent of the Watsan committees conceded that they did not have enough funds to meet the increasingly high cost of maintenance.

Informal discussions further revealed that some Watsan Committees were already heavily indebted to their creditors. For example, Keri and Asuogya in the Nkwanta district owed their area mechanics amounts totalling GH¢160 and GH¢250, respectively. Santrokofi Gbodome and Likpe Bala, both in the Hohoe district, were indebted to the Electricity Company of Ghana to the tune of GH¢230 (as at August 2004) and GH¢298 (as at October 2004) respectively in unpaid electricity bills. Santrokofi Benua, also in the Hohoe district had to borrow an amount of GH¢1152 in May 2004 to repair its water pumping machine and would require an additional amount of GH¢2000 to refill the two filters at the treatment plant. Yet, its cash and bank balance position by August 2004 was GH¢665 in addition to GH¢400 it had invested in treasury bills. Mafi Mawoekpor in the North Tongu district also required an estimated amount of GH¢250 to repair a broken down borehole; but its cash and bank balance was only GH¢12.44 as at August 2004.

The reasons given for the poor financial position of the Watsan committees were low levels of revenue from the sale of water (52.3 per cent) and the high cost of operation, repairs and maintenance that often eroded much of the revenues generated (36.2 per cent). High operational cost was reflected in the use of electricity and fuel to operate, especially mechanized systems, and the rising prices of spare parts needed for the repair and maintenance of water supply systems.

Members of Watsan committees were asked to state what they considered to be the possible reasons for the low level of revenue generation from the sale of water. The first major factor they identified was their inability to enforce payment for the use of water, especially in the case of monthly or annual rates and household metered piped systems. The second was low patronage of the boreholes because of the availability of other sources of water. The third was their inability to control their vendors; and the fourth was their inability to ensure that all community members paid for the use of water.

The fifth major constraint was their inability to levy economic but realistic rates for the sale of water. Focus group discussions revealed that approximately 78.3 per cent of the Watsan committees did not have any clear criteria fixing their rates. Only about 23.1 per cent said they used calculations provided by the Environmental Health Assistants (Project

Officials) to fix their rates. According to the Environmental Health Assistants, they considered variables such as operational and maintenance costs as well as affordability to fix the rates.

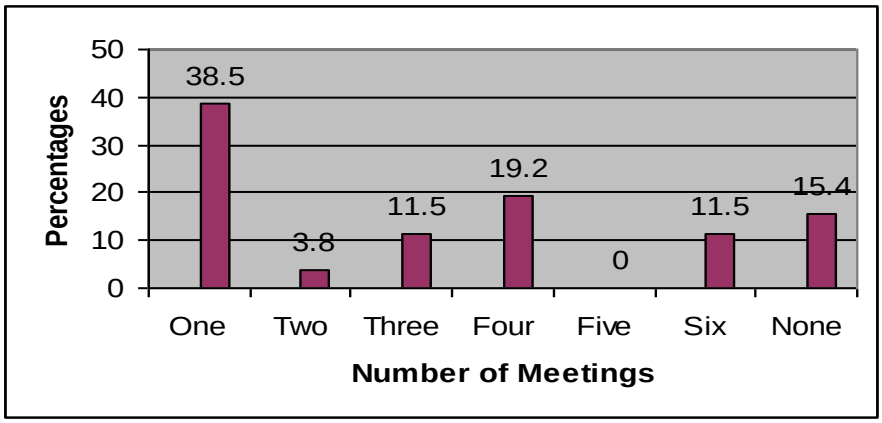
An attempt was also made to find out what plans the Watsan committees had to raise funds from other sources to support their maintenance management efforts. The result indicated that 69.2 per cent of them had no immediate plans in that direction. Whilst 19.2 per cent said they intended imposing special levies, 7.7 per cent wanted to seek support from outside and 3.8 per cent were planning to organise fund raising activities.

Watsan decision making and implementation

Watsan meetings were the means by which committee members could be involved in the management decision-making process, and also the moment when commitment to all programme management efforts could be mobilized. However, the results of the study show that whereas approximately 87 percent of the Watsan committees stated that they had scheduled meeting days, about 72.5 per cent of them were unable to hold regular and frequent meetings as scheduled. In order to determine the frequency of meetings by the Watsan committees, participants at the focus group discussion sessions were asked to state the number of meetings held between January and June 2007.The responses are shown in Figure 2.

Whereas 38.5 percent held meetings once during the period under investigation, about 15.4 did not hold any meetings. On average, the committees held three meetings during the period. It was also observed that out of 91.7 per cent of committees that had decided to have monthly meetings, only 30.7 percent were able to hold between four to six meetings and a majority of about 69.2 percent held less than three meetings during the period. The data on how recently they had held their last meetings also revealed that whilst approximately 50 per cent held their last meetings between May and June 2007, 34.6 percent did so between January and March and 15.4 percent, before the end of December 2006. The study further revealed poor attendance at meetings which had discouraged the executives from conveying regular meetings.

Figure 2 Number of meetings held



The result was an emerging trend in which decision making was becoming the responsibility of individuals or a few operatives including the chairmen, secretaries and treasurers/financial secretaries.

Management efficiency depends not only on what and how decisions are taken but also the relevance of decisions as well as the extent to which they are successfully implemented. In view of this, Watsan committees at the focus group meetings were first asked to state major decisions that they had taken at their last three meetings between January and June, 2007. The results show that 50.0 percent of the committees had taken major decisions at all the three meetings, 7.7 per cent could mention two decisions, 19.2 per cent recalled only one, and 23.1 per cent could not mention any major decision. The data obtained showed that decisions taken by the various committees were relevant to their tasks. When the results of the number of decisions taken are matched with the number of decisions actually implemented, the frequencies obtained are represented in Table 5. The chi-square value computed from the table was 14.5 and found to be significant at 0.05 indicating that there were significant differences between the number of decisions taken and the number implemented by the Watsan committees.

TABLE 5: Decisions taken and implemented

		Number of Decisions Implemented				
		None	*Three*	*Two*	*One*	*Totals*
Number of Decisions Taken	**None**	6	0	0	0	**6**
	Three	3	5	2	3	**16**
	Two	1	0	0	1	**2**
	One	4	0	0	1	**5**
	Totals	**14**	**5**	**2**	**5**	**26**

Lack of commitment by members and their preference for other social and economic engagements such as funerals, farming and markets were cited as the main reasons why it was difficult for them to attend meetings. In fact, there was much evidence of low morale, lack of commitment as well as poor team spirit in most of the Watsan committees.

Enforcement of usage rules and regulations

Most Watsan committees were unable to enforce compliance with rules governing the use of water facilities and payment of user fees by community members. There was no evidence indicating that the high rate of non-compliance was due mainly to the nature of the facility usage control frameworks and the rates being charged. On the contrary, almost all the people interviewed were able to provide candid justifications for the levies. Most of them were equally aware of their importance in sustaining the water supply facilities. The information available, however, suggests that most Watsan committees and their vendors or care-takers could not enforce these rules and payments because firstly, they lacked the authority to institute sanctions that would ensure compliance. Secondly, they were not getting the support that they needed from some traditional rulers and opinion leaders to enforce them.

The general complaint in almost all the communities visited was the total disrespect for Watsan committee members as well as the vendors and care-takers. These people were almost always targets of verbal assaults when they attempted to perform their management tasks. The main issues of contention were payment of tariffs, schedules for the col-

lection of water, reconciliation of water bills, proper handling of hand-pumps and stand pipes and keeping water collection sites clean. Generally, it can be argued that most Watsan committees provided weak leadership when it came to inspiring members to attend meetings, implementing decisions taken at meetings, enforcing rules and regulations regarding the use of water supply facilities, and enforcing the collection of user fees. Some of them were also not able to mobilize the support of traditional leaders, other opinion leaders and identifiable groups for the effective performance of their management tasks.

Motivational orientation

The majority of the members of Watsan committees felt that they were not being motivated enough to commit themselves to the programme management process. When questioned as to whether or not they would want to be remunerated, the responses showed that whereas a majority - about 62.6 per cent - thought they should, 32.9 per cent felt otherwise and 4.5 per cent were undecided. The decisions of those who wanted to be remunerated were informed by the following considerations:

i. As a morale booster or incentive to enhance their performance and to make other people wiling to serve on the Watsan committee (46.3 per cent)
ii. The work is demanding in terms of time, energy and, in most cases, they had to sacrifice their jobs to participate in Watsan activities (37.1 per cent)
iii. As appreciation and recognition for their contributions to the development of the community since money is being generated from the sale of water (9.4 per cent)
iv. To compensate for the insults, threats, harassment and other inconveniences (7.2 per cent).

With regard to the kinds of remuneration they wanted, the respondents mentioned packages that would include monthly or annual cash payment, free use of water, re-imbursement of transport and traveling expenses (in the case of Watsan Boards), payment of sitting allowance, refreshments at meetings and awards during the celebration of annual festivals.

It became clear from the discussions held with them that the morale, performance and efficiency of the committees were being marred by lack of adequate remuneration for their contributions to the community. This is essentially since they were harassed and abused, especially, when collecting fees and enforcing behaviour control measures. Thus, although membership of Watsan Committees was initially driven by the desire to promote the welfare of people living in their communities through voluntary service, the orientation of the members was becoming materialistic, motivated by remunerative values.

Discussion of research findings and conclusions

The research results suggest that the level of maintenance efficiency attained relates directly to the kind of water supply facilities being managed by the Watsan committees. Whereas committees managing various kinds of piped systems obtained high levels of maintenance efficiency, those in charge of boreholes fitted with hand-pumps were having difficulty doing so. The evidence is that, while almost all piped systems were functioning well, a large proportion of boreholes fitted with hand pumps were in disuse or disrepair, most of them for more than three months at the time of this research. Similar to conclusions reached by Harvey and Reed (2003), it is not likely that most communities, especially those operating boreholes with hand-pumps, will be capable of sustaining their water supply systems all by themselves in the future without some institutional support. The fact that majority of them had weak financial reserves, were without clear plans to look for funding beyond their traditional sources, and obtained low revenues from the sale of water means that most of them would not to be able to sustain their water supply facilities.

The findings are consistent with the views of Schouten, Moriarty and Postma (2003) that most communities, especially the most deprived and vulnerable ones may not be able to achieve a high maintenance efficiency level if their efforts are not supplemented by governments, local governance institutions, support agencies, non-governmental organizations and the private sector within a comprehensive and effective framework of continuous support. At the same time, a high maintenance culture cannot

be attained if beneficiary communities and their local management committees are not empowered enough to plan and mobilize internal support for the sustenance of their water supply facilities.

As with similar projects, the provision of spare parts was one of the key barriers to sustainability (see for example, Harvey and Reed, 2003). In the study area, the problem was not only the high costs and non-availability of spare parts but also almost all of the essential spare parts could only be obtained from either Ho or Accra. The people had to travel all the way to Accra and Ho often to find that these parts were not available. As indicated earlier, it was not possible for most of the Watsan committees, in the light of their present financial position, to stockpile spare parts for future use.

Unlike the Yacupaj Project in Bolivia, water committees managing the Tegucigalpa systems in Honduras and local managing organizations in Guatemala (Evans and Appleton, 1993), a considerably large proportion of Watsan committees were unable to achieve significant levels of revenue management efficiency. In fact, most of them hardly made any substantial savings through the collection of water user fees. This was evident from the low cash and bank reserve positions of the majority of Watsan committees, and the fact that some of them were already heavily indebted to their creditors. Indeed, the majority of them had cash and bank balances of about 400 Ghana Cedis and below. Only 11.5 per cent of them had cash and bank balances of between 1,000 and 3,700 Ghana Cedis.

The main explanation given for this low level of revenue generation from the sale of water was that fees being charged were considerably low. This had been the case for many community-managed water systems. As observed by Evans (1992:7), low levels of cost-recovery in the water and sanitation sector "remain the rule" and financial self-sufficiency of communities managing their systems is "generally ineffective" and remains a "distant goal". According to him, it had never been possible to establish the real cost of water and sanitation usage in any system. This is because it has often been considered that basic water and sanitation services can be delivered at relatively moderate cost which could easily be determined by rough estimates. He observed that though the need for accurate cost estimates was clear, a methodology for making such estimates had not

yet been developed. Indeed, the research results show that almost all the committees were not capable of making clear and accurate estimates about the actual financial costs of running the systems in terms of the level of resources required to ensure that adequate liquidity was maintained. Thus, in spite of the rough cost estimates often provided by the VRCWSSP, almost all the Watsan committees could hardly ensure that enough funds were always available to cover the cost of repair and maintenance. Yet, as argued by Briscoe and de Ferranti (1988), effective financial and technical planning and management can only be achieved if changing patterns in operation and maintenance costs over time is recognized.

This, obviously, brings to mind the issue of whether or not users within the programme regime were both willing and capable of paying rates that would cater for the real financial costs of operating and maintaining their water supply systems. A large majority of the people interviewed had expressed both their willingness and ability to pay at least the existing rates for the use of water. Ironically, there were high default rates of the existing low rates in most communities, especially in those that had adopted monthly and annual levy systems. Even in the case of public boreholes and stand pipes where payments were made at the points of collection, there was evidence of low patronage as a result of the availability of other water sources. It is therefore unlikely that they would be willing or able to pay fees beyond the rates being charged for the use of water.

Indeed, it was clear from the results of this study that majority of the Watsan committees were unable to enforce payment for use of water especially in the cases of monthly or annual contributions and household metered piped systems. At the time of this research, it was not possible to obtain actual default figures from the communities due to the lack of proper records. However, informal discussions had revealed that in almost all the communities, with the exception of those operating the 'pay as you fetch system', there were high rates of default in the payment of water user fees. The reasons for the high default rates and low patronage were found not to be different from those obtained from other studies. Research findings made by the International Water and Sanitation Centre (IRC, 1997 and 2004) identify three main causes for high default rates in

the payment for use of water by local peoples. The first was that there were often no institutionalized and regular procedures for following up on funds collection. The second was that action against defaulters had never been taken seriously. At the same time, those who had not paid for the use of water continued to enjoy regular service. Most Watsan committees never had the courage, authority and legitimacy to prosecute defaulters. Results obtained from this study indicate that those who failed to pay the initial contributions towards the installation of the systems and those who continuously defaulted in the payment of water rates were not sanctioned and this had caused many other people to stop paying the levy.

A fourth explanation, equally applicable to this study, is provided by Evans (1992: 9) thus;

> Rather than instilling in villagers a sense of ownership and responsibility, the raising of cash contributions, and provision of labour and local materials for the construction of the schemes, convinced them that they had already paid a fair share of the cost. The government should therefore be willing to take on the longer term responsibilities for operation and maintenance.

In the cases studied in this research, some respondents, in fact, argued that water should be free because they made initial contributions towards the installation of the water supply system. The fifth reason can be found in the intimations of Baum and Tolbert (1985) that prospects of full cost-recovery in rural areas are particularly problematic due to low incomes and the attachment of rural communities to their traditional and free sources of water supply.

It was beyond the mandate of this research to investigate income levels of the respondents. However, research reveals that about 70 per cent of poor people are found in rural areas of Ghana and live in communities of less than 1,500 people. These are mostly small-scale subsistence farmers whose incomes are so low that it becomes difficult for them to pay for water facilities brought to their doorsteps (Ghana/UNICEF, 1990). By the World Bank's (1990) estimation people earning an annual per capita income of below USD 370 could be considered poor. The general rule, according to Evans (1992), is that people should not spend more than about three to five per cent of their income on water and sanitation

services. According to this criterion, therefore, the "poor" should pay not more than between USD 11 and USD 18 per year for the use of water.

Thus, for the majority of rural poor in the Programme area, whose incomes were below the poverty line, an annual contribution of even USD 10 per person per year is likely to be beyond their ability to pay. Accordingly, where incomes are low and money is scarce the issue of opportunity cost is highly pertinent from the users' point of view. Thus, as indicated in a World Health Organisation report published in 1987, although rural people may have high water needs they can still object to cash payments. This is because cash income is scarce in rural areas and they will always continue to use, at no expense, traditional sources of water in order to save their cash income for the acquisition of goods which cannot be purchased without money.

Similarly, communities differ considerably in their socio-economic structures. Indeed, poverty levels differ since economic opportunities available to members are not the same in all communities. Subsequently, the human and financial resources available to Watsan committees to mobilize towards the operation and maintenance of their water facilities would differ from one community to the other. This definitely had made some communities more capable in the performance of their maintenance management tasks. It means, therefore, that the existing programme management system that treats all communities as equals is not tenable.

With the increasing costs of operation and maintenance, the current rate of indebtedness and the low levels of cost-recovery being experienced in most of the communities, the possibility of most committees attaining financial self-sufficiency through the sale of water alone will remain a mirage. Similarly, since communities are not likely to be able to charge realistic rates for the use of water, it can be said that without deliberate efforts at exploring alternative sources of income and obtaining external intervention, there is no way a majority of the communities can attain financial self-sufficiency and sustain their water supply facilities in future.

Under the prevailing circumstances, the committees were forced to adopt what Bannock and others (1987) described as shadow pricing. This is a concept applied to situations where actual prices cannot be charged or where actual prices do not reflect the real costs of a specific activity. In

other words, the committees were forced by the prevailing circumstances to charge small amounts that hardly covered high operational and maintenance costs in managing the systems let alone providing some net cost savings to their communities.

Unfortunately for most of the Watsan committees, their inability to ensure an appreciable level of revenue management efficiency was compounded by the fact that almost all of them were unable to identify alternative sources of funding for ensuring sustained operation and maintenance management of their water supply systems. Furthermore, there was considerable pressure on some Watsan Committees, especially those managing water projects in the Nkwanta district, to keep the rates for the use of improved water facilities as low as possible in order to stem the spread of guinea worm and other water and excreta related diseases. This had led different agencies operating in the water and sanitation sector to implement contradictory policies in the communities. For example, water from boreholes provided by the Social Investment Fund through the District Assemblies was free, and so the people did not understand why they should pay for water from boreholes that they had contributed to construct. Similarly, in a bid to eradicate guinea worm in the Nkwanta district, the Global 2000 Sasakawa Guinea Worm Eradication Programme felt that water provided by any external support should be free. They argued that this was the only way to stop the people from using water from the streams, ponds and rivers.

This situation thus brings to the fore the need for communities to seek alternative sources of funding for their operational and maintenance management. Examples from Indonesia's CARE supported Community Self Financing of Water and Sanitation Systems Programme show how the diversification of sources of revenue could provide adequate funding to cover operation and maintenance costs. According to Evans and Appleton (1993:17), cash to cover maintenance cost was raised from both inside and outside the community. Within the community, money was raised through household contributions, local credits, renting and showing movies and in-kind contributions using "traditional mechanisms such as zakat, a system where members of Moslem communities donate agricultural produce or part of incomes to support improvements to social services". Outside funds were secured through bank loans and the estab-

lishment of credit from suppliers. By such arrangements, essential parts, pipes, fittings and cement were frequently obtained on credit and repayments made over several months. Evans and Appleton (1993) observed that a community was so successful in raising funds to support their water and sanitation management that it was possible for them to grant a loan to a neighbouring village to start its own project.

The most effective mode of collecting water tariffs identified by this study was the system in which payments were made at the points of collection. However, this depended to a large extent on, first, the ability of the Watsan committees to institute effective revenue collection systems and second, develop effective monitoring mechanisms to ensure that monies collected by vendors were properly accounted for. Finally, it depended on the payment of acceptable remuneration to the vendors and caretakers as well as allowances to the key operatives on the Watsan committees. These were found to be the motivating factors that led to high levels of performance in terms of revenue collection. These, undoubtedly, required a strong leadership within the Watsan committees and in the communities to accomplish. Indeed, all the available literature on the subject had established a positively close relationship between strong leadership and enhanced performance by local organizations. Cases cited by Briscoe and Ferranti (1988), Evans and Appleton (1993), Kendie (1994) and the UNDP-World Bank (1998), for example, have clearly shown that successful community managed water supply and sanitation projects were those in which local committees had strong and innovative leaders who were able to enforce usage control rules and regulations, implemented their decisions, ensured transparency in handling community finances and adopted prudent administrative and financial management practices.

Similarly, the fact that they preferred other social engagements to Watsan Committee activities implied that it was not possible for them to subsume their personality values in the organizational ones or put communal objectives and interests above their personal ones as postulated by Kanter (1969). This proposition thus questions the viability of the management of community-based development efforts by committees that work purely on voluntary basis. This is in keeping with the research findings of other studies. For example, Katakweba's study (2001) of the

Arumera West Water and Sanitation Programme in Tanzania concluded that most projects based solely on voluntarism were not sustainable. Scott (2001) also observed that such projects were often characterized by non-functional committees, unable to collect fees; meetings were hardly held or held regularly or frequently, and records were not properly kept and maintained. The reasons, as noted from the results of this research, is that the morale, performance and functionality of the committees were often marred by lack of adequate remuneration for their service to the community although they often felt harassed and abused, especially, when collecting fees and enforcing behaviour control measures.

As with similar projects (Bolt, Schouten and Moriarty, 2001), there seemed to be no legal or any definite policy framework that empowered Watsan committees to implement the regulatory policies that they had formulated, and enforce payment of user fees. To date, it has not been possible for either the government or the VRCWSSP to institutionalize community management by Watsan committees and effectively integrate them into the mainstream local government systems. Most Watsan committees, therefore, had to depend on traditional authorities, unit and zonal committees and their representatives in the various district assemblies, as support structures, for their legitimacy to function effectively. Thus, it was found that Watsan committees operating in communities which had strong traditional authorities, proactive leadership of Unit Committees and influential District Assembly members could offer them support were able to ensure some appreciable levels of citizens' compliance.

Compliance was also found to be possible in communities, especially those in the North Tongu district, that had closely knit and kinship ties where clan and family heads and, indeed, their entire membership collectively had considerable influence on the behaviours of their members. These observations lend support to earlier findings made by the United Nations Research Institute for Social Development's project that those cooperatives that used existing kinship structures and local leadership in their operations usually obtained positive management results (UNRISD, 1975). This case emphasises the pattern of authority and leadership in traditional societies in which the system is an admixture of hierarchy and equality, intertwined with kinship and other status mechanisms for deci-

sion making and for ensuring compliance with norms (Bennet, 1983). In this study, it was found however that Watsan committees enjoyed support from these mainstream traditional and local authority structures only because they recognized and respected these positions, had established favourable working relationships with, and made themselves accountable to, them. Similarly, this kind of positive working relationship existed in communities where there was some kind of fusion among all local government structures, to the extent that, membership of Watsan committees comprised of all the key political and socio-cultural leaders found in the communities.

On the other hand, lack of support was experienced mostly in communities where Watsan committees had assumed some autonomy and were neither accountable nor reported regularly to their communities. This was also the case in multi-ethnic communities, especially those that were divided by chieftaincy disputes, in which the legitimacy of community authority systems were themselves under threat. In such cases, the committees became incapacitated in enforcing compliance with operational rules and regulations. As observed by Bolt, Schouten and Moriarty (2001), such situations exposed local management institutions to abuse and total disrespect in their communities. In effect, the performance of Watsan committees in terms of ensuring proper handling of hand-pumps and stand pipes, hygienic use of water at collection points, obtaining orderly collection of water, effectively managing conflicts arising from the collection of water levies, and keeping water collection sites clean, had not been satisfactory.

Recommendations

To remedy some of the shortcomings in the performance of Watsan committees in terms of sustaining the community water supply systems provided under the Volta Region Community water Supply and Sanitation Programme (VRCWSSP). There should be a comprehensive and effective institutional framework within which the efforts of most deprived communities are continuously supplemented by governments, local governance institutions, support agencies, non-governmental organizations and the private sector until they become financially capable of

efficiently performing the tasks of operating and maintaining their water supply systems on sustainable basis.

It would be vital for the management of the Volta Region Community Water and Sanitation Programme (VRCWSSP) to re-orient communities and their leaders and Watsan committees through intensive educational programmes as a means to re-enforcing in them the sense of ownership and responsibility to sustain their water supply systems.

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