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Assessment of Sustainability of Community Water Supply Projects in Kandy District

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ABSTRACT. *Introduction of community water supply projects, implemented and managed by the community with an initial support from governments or international organizations has been considered as a useful strategy to provide access to safe drinking water to rural communities. Sri Lanka has also adopted this strategy through the Community Water Supply & Sanitation Project. Since there were concerns about the sustainability of numerous water schemes implemented throughout the country, a research was carried out in 20 community managed water schemes in eight Divisional Secretariat divisions in Kandy district to assess the sustainability of community based rural water supply projects using a methodology adopted by the UNDP and World Bank in six other countries. Participatory research methodology tools were used for the assessment based on 5 sub-indicators, such as physical condition, operation and maintenance, consumer satisfaction, financial management and willingness-to-sustain the system. The results show that the community water supply projects to provide water to rural areas of Kandy district has been a success since 14 out of 20 schemes were found to be sustainable indicating that the strategies followed during the project implementation have succeeded. However, the study has also highlighted areas which require further attention to ensure that these systems would continue to provide the expected services and improve the functioning of other potentially sustainable schemes in the longrun. A capacity building program along with an institutional arrangement to provide the support services by the authorities, at least in the short term, is considered vital to help improve the Community Based Organizations and to make them capable and mature entities.*

Keywords: *Community management, drinking water supply, sustainability*

INTRODUCTION

Access to water resource is an uninhibited right of the community. With this in mind, the United Nations Millennium Development Goals (MDG) aims to reduce the proportion of people without sustainable access to safe drinking water and basic sanitation by 50 % by year 2015 (WHO, 2010). The Sri Lankan government has set ambitious targets to provide access to safe drinking water and basic sanitation facilities to 85 % of the population by 2015 and 100 % by 2025 in line with MDGs (Ediriweera, 2005). However, by the year 2009, 84.8 % of the population of the country had access to safe drinking water and 35 % had the access to pipe borne water (Central Bank, 2009). Even though water supply and sanitation coverage has increased in many developing countries including Sri Lanka, there is an uneven progress between urban and rural areas (Hutton & Bartram, 2008 & World Bank, 1998).

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Access to safe drinking water is the proportion of people using improved drinking water sources such as household connection, public standpipe, bore hole, protected dug well, protected spring and rainwater (WHO, 2010). About 94 % of the urban population of developing regions uses improved sources while only 76 % of rural populations have access to improved sources. Poor or absence of safe water may lead to many unfavorable consequences, such as more time and energy consumption for collecting and carrying water and insufficient water to maintain good hygiene practices (Hunter *et al*., 2010). According to World Health Organization (WHO, 2010) 1.6 million deaths per year are attributed to the use of unsafe water.

The National Water Supply and Drainage Board (NWSDB), which functions under the Ministry of Water Supply and Drainage, is the principal authority providing safe drinking water and sanitation services in Sri Lanka. However, the NWSDB finds it difficult to cover the entire population in Sri Lanka in view of the large investments required to provide such services. At the same time NSWDB is overburdened by the expanding demand from the urban sector. Therefore, community based water supply schemes have been introduced by the Government with the support provided by International and National funding agencies and NGOs as a solution to the above problem in Sri Lanka. The high costs and administrative complexities of delivering water in rural and semi urban areas through line ministries have led many governments to consider community participation as a strategy for providing sustainable water supply systems (Ademiluyi & Odugbesan, 2008; Rondinelli, 1990).

A community water supply can be explained as a public water system that serves at least 25 residents throughout the year and may consist of one or multiple wells or reservoirs. Importance of community participation in decision making has been widely recognized by different international bodies. Principle two of the Dublin statement emphasizes that water development and management should be based on a participatory approach, involving users, planners and policymakers at all levels. The decisions should be taken at the lowest appropriate level, with complete public consultation and involvement of users in the planning and implementation of water projects. The Community Water Initiative (CWI) launched by the UNDP supports decentralized, demand-driven, innovative, low-cost, and community-based water resource management and water supply and sanitation projects in rural areas. The concept of community has also come to play a greater role in the debate on alternatives to private sector participation in water supply, particularly with respect to urban areas (Bakker, 2008).

The Community Water Supply & Sanitation Project (CWSSP), funded by the World Bank, Japanese Bank for International Corporation (JBIC) and the Government of Sri Lanka (GOSL) was commenced in thirteen districts in 1993/94. The project was designed to achieve the set objectives by integrating safe drinking water, basic sanitation, hygiene education, environmental programs and diversifying community activities to socio economic and cultural fields (Anon, 2010). The project supports decentralized implementation of rural water supply and sanitation activities at Provincial and local levels aiming to provide water supply and sanitation facilities to 889,330 people (Anon, 2010). Project adopts participatory development approach for water supply scheme planning, construction and scheme management. Under this approach, community has been represented by Community Based Organizations (CBOs), which actively participate in decision making at all stages of project implementation and fully responsible for construction, operation and maintenance of water supply and sanitation facilities. Water supply schemes are developed in a demand driven

approach, where community understand it's demand, available water resources, etc to ensure the long term sustainability of the scheme. The Grama Niladhari Divisions having true demand for safe water are selected by the Provincial Council through the Pradeshiya Sabha. After completing the construction, the scheme is handed over to the community. A tariff system established by the CBOs is expected to pay for the operators, electricity and repair cost, etc.

Though conceptually very sound, a significant number of community based projects in the water and sanitation sector fail to deliver benefits to society over the long term in developing countries (Antonio, 2005). Part of the cause for this failure lies in poor understanding of the issues of sustainability. The sustainability of a water supply system is "the maintenance of an acceptable level of services throughout the design life of the water supply system". After the project completion, responsibility for management and ownership is given to the community. It has been identified that some projects become noticeably unsuccessful, even without any technical failures, while others have achieved their targets without facing much difficulties. Therefore, identification of underlying causes for the performance differences of community water supply projects would be important not only for sustainable management of existing projects, but also in establishing new development projects.

With the above background, this study was conducted to assess the factors which are important in ensuring sustainability of a representative sample of community water supply schemes in the Kandy District implemented by the CWSSP.

MATERIALS AND METHODS

The second CWSSP project funded by the World Bank and implemented through the local government in Kandy district was selected for the study. A total of twenty CBOs, were selected randomly from eight Divisional Secretariat divisions.

Existing methodologies for measuring sustainability of community water supply projects by the UNDP and World Bank (Sara & Katz, Undated) were used in this study. The index used for sustainability assessment includes five sub-indicators, such as, a) financial management, b) operation & maintenance practices, c) consumer satisfaction, d) physical condition of system and, e) willingness to sustain the system (Table 1). Each sub-indicator is comprised of 8 to 15 questions with a total of 55. The scores of each sub-indicator as well as overall sustainability of selected community project were adjusted to a ten-point scale using the procedure explained by Sara and Katz (Undated). A multiple-choice questionnaire was prepared to gather data required to assess the sub-indicator scores.

Table 1. Description on sub-Indicators of sustainability

Sub indicator	Description
Financial management	Examines criteria for tariff setting, tariff structure, existence and capacity of the treasurer, regular payment of water tariff by beneficiaries etc. Assessment is based on 12 questions.

Table continued on next page

Operation and maintenance practices	Examines factors such as existence of a designated system operator and his capacity, community's capacity on repairing, access to tools and spare parts, and condition of water supply. Assessment is based on 15 questions.
Consumer satisfaction	Assesses overall consumer satisfaction with the water system. It is based on expressed opinions on factors such as satisfaction with quantity and quality of water received, hours of supply, taste, color etc. Assessment is based on 10 questions.
Physical condition	Assesses the overall physical condition of the water system. It is based on factors such as construction quality, pressure level, leaks or defects in the system, contamination possibility etc. Assessment is based on 10 questions.
Willingness to sustain	Assesses community support for sustaining the water system. Questions include community perception on tariff level, ownership, financial capacity of the community to sustain the system, willingness to pay for improvements etc. Assessment is based on 8 questions.

Open-ended questions and semi-structured interviews were used to collect qualitative data from the office bearers of the CBOs. In addition, informal interviews and discussions with beneficiary community were conducted during the field visits. Field observations were made to collect qualitative data and to verify the information provided by the respondents. Key informant interviews were conducted with the officials of the Rural Water Supply and Sanitation (RWSS) Unit of the Central Province to get an overall understanding of the CWSS project, prior to field visits. Information on the establishment of the second CWSS project, arrangement and different stages of implementation and coordination mechanism of the project were gathered during these interviews. Questionnaires were analyzed using Microsoft Excel software, and descriptive analysis method was used to interpret the results.

RESULTS AND DISCUSSION

According to the adopted scoring method, the sustainability score can lie between zero to ten. According to the UNDP and World Bank study (Sara and Katz, Undated), which was conducted using ten community water supply projects in six countries, communities scoring lower than 5.00 are considered "unsustainable", between 5.00 and 6.67 are considered "potentially sustainable," and systems scoring above 6.67 are considered "sustainable".

The results of the sustainability assessment of 20 schemes studied are given in Table 2. The overall sustainability of selected schemes lies between 4.29 and 8.85. The average sustainability score across 20 schemes is 7.18 implying that schemes are performing well on 71.8 % of the technical, institutional and social aspects. According to the assessment, 14 out of 20 schemes were found to be sustainable whilst four and two schemes were found to be potentially sustainable and unsustainable respectively.

The sub-indicator scores were fairly consistent within schemes. A scheme with high scores in overall sustainability usually has high scores in most of the sub-indicator categories as well. Those schemes that score poorly on overall sustainability tend to score below average

in all categories. The performance of financial management appears to be the best (8.33) whilst performance of consumer satisfaction was the poorest (6.66) among all the schemes studied.

Sustainable schemes

As shown in Table 2, the 14 sustainable schemes have earned a higher score for all five indicators, showing a trend of low scores for consumer satisfaction and willingness to sustain the systems. The water supply schemes were reinforced with strong CBOs having effective leadership, high performing staff, financial strength and strong constitution. The communities served under these schemes had a real water demand and, as a result, they were highly motivated and worked towards a common goal during project implementation period. Well educated young individuals or retired government officers with high reputation, who are have a higher capacity and good leadership qualities, have been selected as the committee members of these CBOs. Activities of the CBOs are conducted according to the rules and regulations specified by the constitution. Therefore, financial problems were minimal and consumer's trust on the CBO committee was high. A higher level of willingness to sustain the system was observed in these sustainable schemes, as they are achieving many benefits with excellent management. Physical condition of the system was good in sustainable schemes ensuring continuous service with minimum damages to the systems along with hardly any water contamination.

Table 2. Scores of sustainability indicators of community water supply schemes in Kandy district

CBO	Financial management	Operation & maintenance	Consumer satisfaction	Physical condition	Willingness to sustain	Overall sustainability
Sustainable (overall sustainability score of >6.67)						
Narangoda	9.17	10.00	8.00	9.09	8.13	8.85
Kandemeeya	9.58	8.00	9.00	10.00	8.13	8.68
Pussathenna	9.17	9.00	8.00	8.18	8.13	8.43
Balanthota/North	8.33	7.33	7.50	10.00	8.75	8.19
Udagama /East	9.58	8.00	8.00	9.09	7.50	8.12
Dolapihilla/North	10.00	8.67	8.00	8.18	6.88	7.98
Katugoda	8.33	9.00	7.50	8.18	6.88	7.94
Godahena	9.17	6.67	5.50	9.55	8.13	7.94
Pattapola	9.17	8.00	7.00	7.27	8.75	7.93
Walpalagolla	7.08	8.67	7.50	9.09	6.88	7.92
Owissa/ South	10.00	8.33	6.00	10.00	6.88	7.87
Owissa/North	8.75	7.67	6.00	9.55	4.38	7.19
Meegasthenna	8.75	5.00	6.50	7.73	8.75	7.01
Nugaliyadda	9.17	5.00	7.00	6.36	8.13	6.73
Potentially sustainable (overall sustainability score between 5.00-6.67)						
Watagoda	7.92	5.33	7.50	8.18	3.75	6.20
Pussallagama	7.92	5.33	6.00	6.82	5.63	5.98
Retiyagama	2.92	8.00	6.00	6.36	4.38	5.79
Hakmana	7.92	5.67	6.00	4.09	5.00	5.32
Unsustainable (overall sustainability score of <5.00)						
Wathuliyadda	7.50	7.00	1.50	5.45	5.00	4.89

Pallegama	6.25	5.67	3.50	4.09	3.75	4.29
Average	8.33	7.32	6.60	7.86	6.69	7.18

Potentially sustainable schemes

Financial management of potentially sustainable schemes was good except in a few schemes which have not considered any criteria for tariff setting and charging the same fee from each and every beneficiary. Capacity of treasurers was very low and accounts were not maintained properly. Committee members admitted the low financial capacity to maintain the system. Continuous assessment and provision of training to upgrade their performance are needed for such rural schemes. The committee members were not satisfied with training they received through the *Pradeshiya sabha*, and complained that the technical terms used during the training were not familiar to them. The Committee also admitted that they rejected the project at the beginning since they had no water scarcity, but later accepted considering the other benefits received through the water supply project.

Even though the project has listed the "Demand Driven Approach" as a project principle, the CWSSP project has constructed water supply schemes in some areas with abundant water for domestic purposes. Project expected that demand driven approach would provide incentives to sustain the investments and ensure that users obtain the services they want and are willing to pay for it (Anon, 2010). Some villages do not have a water scarcity, and the community uses traditional water sources without payments. Water pricing is hardly accepted by the communities who experience abundant water and, as a result loses its interest to sustain the community water supply project.

Unsustainable schemes

Consumer satisfaction score was the lowest in Wathuliyadda scheme where water supply has stopped for two months at the time of survey, due to drastically reduced water level at the source. The CBO has tried to practice intermittent water supply, but community was not satisfied with water pressure, quality and quantity. Capacity of the water source has been over-estimated and number of beneficiaries has been increased over time without conducting a proper assessment on demand and supply. Financial management and operation and maintenance practices are fairly good with a well organized, strong CBO. The severe drinking water scarcity existing in the village has catalyzed the community to become well organized.

The scheme with the lowest sustainability score has a very weak CBO where office bearers have neglected their responsibilities. The committee and general body did not meet to discuss the problems of the scheme. Score for the financial management is slightly higher in this scheme as the treasurer's capability on book keeping and account maintenance are good in addition to the existence of good criteria for tariff setting. However, the payment for water services by the beneficiaries was very low (30 %). As a result, the CBO finds it difficult to sustain the water supply scheme. To make matters worse, the system operator does not have adequate capabilities to overcome the water supply problems. The community was not satisfied with the water pressure, supply hours, water quality and overall service. They were complaining about the poor management of the scheme and have lost the faith on the CBO. Therefore, the level of willingness to sustain is very poor in this community. The poor

beneficiaries were complaining about the high tariff level. Physical condition of this scheme was also poor with high contamination possibility. The water intake was located in a private tea estate and exhibited a possibility of animal contamination as the protection measures were not adequate to maintain the water quality.

Critical factors affecting the sustainability

As indicated in the methodology, there were 55 questions in the questionnaire under 5 sub-indicators. If the performance of 5 systems, out of 20 studied, is found to be poor for a given question, the question is considered as a critical one to be addressed and listed in Table 3. For example, 5 CBOs, out of 20, giving a value of 25 %, did not take any punitive action such as disconnecting the water services due to non-payment of water tariff. Therefore, "No punitive action for non-payment" under "Financial Management" sub-indicator is considered as a critical factor affecting the overall sustainability score of the project. The objective of this exercise is to identify the most important factors responsible for poor performance of water schemes so that measures could be taken to rectify them. As shown in Table 3, there are 23 critical factors out of 55 and the magnitude of the percentage value indicates the severity of the problem.

A community with a strong financial management would have a differential tariff structure that is adjusted to cover O&M costs and to generate savings for future repairs and system replacement. These communities would employ a treasurer with higher capacity and CBO would charge people for connecting to the system, take action against people for non-payment, and would have tariff collection rates over 90 percent. As shown in Table 3, there are only three critical factors, out of 12, under the financial management sub-indicators which affect the sustainability. A total of 60 percent of the communities were unable to make the payments in time, whilst 30 % of the CBOs find it difficult to collect adequate funding to replace the system at a later date. A total of 25 % of CBOs do not practice any punitive measures, though, service cutoff for non-payments is mentioned as a punishment in the constitution.

Table 3. Critical factors responsible for reducing the sustainability score

Questions under each sub-indicator	Percentage responses
Financial management	
Defaulters of paying monthly water tariff	60
Inability of community to replace the system	30
No punitive action for non-payment	25
Operation and maintenance	
Operator has not undertaken major repairs	75
Number of breakdowns/year	70
Non-availability of operator manuals	55
Inability of community to do all repairs	50
Operator has no plans/blueprints	45
Inability to repair breakdowns within one day	40
Inadequate capacity of operators	35
Inability for adequate supply of water	30

Consumer satisfaction	
Continued use of alternative sources	90
Overall un-satisfaction with the service	45
Not satisfied with number of hours available	35
Water use after the project has not increased	35
Perception of colour (negative)	30
Not satisfied with the quantity	25
Perception of taste (negative)	25
Physical condition	
Leaks from exposed pipe	45
Possibility of contamination from animals	35
Non-protection of source (intake)	30
Willingness to sustain	
Non-willingness to pay for improvements	70
Health has not improved after the project	65
Problems in paying tariff (inability to pay)	60
Perception on the inability to replace system with funds in the community	30
Perceptions on tariff level (negative)	25

Table continued on next page

As shown in Table 3, more than half of the questions (8 questions out of 15) under the operation and maintenance sub-indicator are found to be critical. About 65 % of the systems had at least one breakdown per year and only 50 % of the communities were able to do all the repairs. Majority (75 %) of the operators could not attend to major repairs in the system, indicating the need for adequate training for them which is very vital for sustainability of water schemes. Approximately half of the communities had no manuals or blue prints for their operations, as the project has not paid sufficient attention to train them on preparing those documents.

As mentioned above, most of the areas under this project do not have severe water scarcity, and as a result, 90 % of the communities continue to use alternative sources, which they used traditionally, especially for non-drinking purposes. In addition, 35 % have stated that household water consumption remains the same after the project implementation. Some schemes supply water intermittently due to water shortage and 35 % of communities has reported that they are not satisfied with the number of water supply hours. Proper understanding on the capacity of water source is very important to maintain a sustainable water supply.

Leakages from exposed pipes are relative high (45 %). Project implemented in rural areas of the Kandy district is characterized with hilly terrain which causes difficulties in laying main lines. The pipes are not buried at the required depth, and in certain cases laid over the surface. Therefore, the exposed pipes are frequently subjected to damages. About 30 % of the water sources are not protected and 35 % intakes are under the threat of contamination from animal waste. The schemes implemented under this project do not practice a complete drinking water purification procedure as the water sources are in good quality compared to the water sources in municipal water treatment plants. However, filtration and maintaining a completely covered system are required to supply good quality water in the long-run. Even though the communities were educated on the importance of adding Chlorine to drinking

water, most of the communities have ignored this advice as they find the resultant odor and taste objectionable.

A perfect score for willingness to sustain indicates that all members of the community consider that the water system is community owned with acceptable level of tariff, expect the collected funds to finance future repairs, replacements, regular maintenance and express willingness to pay for improvements. Only 25 % of the communities have complained that tariff level is expensive, while majority of the communities (60 %) stated that they encounter problems in paying tariff. A substantial number of CBOs (70 %) were unwilling to pay for desired improvements, perhaps expecting government intervention again. A total of 65 % of the CBOs reported that the health of the community has not improved due to the introduction of water supply system and was the same as before, while the balance 35 % stated an improvement of the health situation.

CONCLUSIONS

The community water supply projects to provide water to rural area of Kandy district have been a success since 14 out of 20 schemes were found to be sustainable indicating that the strategies followed during the project implementation have succeeded. However, the study has also highlighted areas which require further attention to ensure that these systems would continue to provide the expected services and improve the functioning of other potentially sustainable schemes in the long-run. Inadequate training for system operators, poor performance of the CBO leaders, low financial capacity and inappropriate financial strategies, and inaccurate assessment on water demand have led to poor consumer satisfaction and willingness to sustain. This indicates the necessity to continue the support services provided by the authorities to help improve the CBOs and to make them capable and mature entities. A capacity building programme along with an institutional arrangement to provide these support services by the authorities, at least in the short term, is considered vital.

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