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Community Based Rural Drinking Water Supply System (Sustainability Challenge in Kannahipuram CBO Scheme)

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Abstract

Rural Water Supply (RWS) system implemented and maintained by a community-Based Organization (CBO) adopting a participatory approach, which is considered a useful strategy to supply safe drinking water to the people, especially in rural segments of the country in a sustainable manner. This study was carried out based on Kannahipuram CBO managed RWS schemein Alayadivembu Divisional Secretariat Division (DSD). The study gathered primary data through field-based interviews with key stakeholders in CBO managed water supply system and field observations. Also, it collected secondary data from statistical reports from NWSDB, RWS, and CBOs, etc. The findings have been interpreted mainly based on the descriptive qualitative method. This study examines the extent to which the community participation influences community ownership of rural water projects and its sustainability in the Kannahipura scheme. This paper also sets out to analyze the impacts of the participatory approach in the rural water supply system using qualitative and quantitative information that compiled project data with field surveys. The study found that the participatory approach was effectively exercised in Kannahipuram CBO managed water supply scheme to ensure a sustainable system at the village level. However, it was observed that the quality of water is not in a drinkable condition for drinking purposes, and the water source has been contaminated, particularly in the Shallow-well due to climate change, increased demand, and seasonal drought in the region. Hence, this study suggests improving the water quality by using advanced treatment processes to provide safe drinking water at a drinkable level through CBO operation and community participation successfully and effectively.

Keywords: CBO, RWSS, Sustainability, Shallow-well and water quality.

Introduction

Drinking water supply is one of the pressing problems in this century, and water scarcity and its impacts have become an utmost threat to human security in terms of health, environment, economy, food, nutrition, and social improvement. The water supply, the matter is not whether or not people have access to water since everyone has access to water in some form or another as it is impossible to live without water but whether or not the water is within reasonable proximity, reliable, safe for consumption and sufficient to meet their needs (UN-HABITAT, 2003 as cited by Inkani et al. 2015). Water supply to meet the basic requirement of humans is far from being adequate and stress and more serious in rural communities everywhere, especially developing and underdeveloped nations.

According to the WHO (2010), only 32% of rural people in developing countries have access to safe drinking water, and Dada (2009) notes that a large percentage of the rural communities in developing countries to live without adequate access to safe and convenient water supply and sanitation and supply is still unreliable (Inkani et al. 2015). Numerous progress has been marked in the recent past to extend the accessibilities for rural drinking water services to unserved communities globally. Toward achieving the Sustainable Development Goals (SDGs) epoch, especially the SDG 6.1 proclaimed; achieve universal and equitable access to safe and affordable drinking water for all by 2030, an important demand thus reveals to extend water supply services to all? And how will it be possible that all water supply systems continue to function well into the future? (Marks et al. 2017). To answer this question, many countries have adopted intense and effective measures for overcoming drinking water issues, including countries in Asia, Africa, and other continents. However, many countries have formulated various strategies to overcome this drinking water issue, especially among rural communities and established community networks to provide safe drinking water without any struggle. Thus community participation approach has been adopted by many governments and non-state institutions as an alternative mechanism to relax this water stress.

The community-based water project is a unique rural water supply approach where local people are supported to undertake all responsibilities of the project, from initiation through designing to implementation and management continuing. The fund transaction and management can be done by the local community (WASH National Program). In this backdrop, the Sri Lanka government also has established a community supported water supply system that was specifically introduced at the village level to promote the amenity of drinking water supply to the rural people. Thus, the National Water Supply and Drainages Board (NWSDB), as a responsible government institution, has taken steps to introduce Rural Water Supply (RWS) system and implemented this plan in approximately 4500 villages in Sri Lanka (Statistical Guide Book, NWSDB, 2017). Most of the RWS systems have been operated with the support of Community-Based Organizations (CBOs) at the village level. The CBO managed water supply system is one of the best alternatives to the prevailing rural water supply system operated by the public sector. This system has more effectiveness, and it requires durable public engagement in operating rural drinking water supply in Sri Lanka. The participatory approach has been adopted in this project to design, plan, implement, monitor, and evaluation of the project for ensuring the involvement of the local community in their projects.

Kannahipuram in one of the villages in the Alayadivembu Divisional Secretariat Division (DSD) in the Ampara district. The map of the study area is shown in the ArcGIS map. The Kanchipuram CBO managed rural scheme was established during 2014, funded by the Japan International Corporation Agency (JICA). At present, the scheme is functioning with 390 connections of 1870 populationresiding in 589 households in this study area (CBO Report, 2019). It was observed that this water supply scheme had been managed by the local community with the help of a donor agency using a participatory approach mechanism. It was studied that this CBO has been organized and structured with a water supply management administration body (President, Secretary, Treasurer, advisor, and eight members) and Operation and Maintenance team (Pump Operator, Meter Reader, Technician, and Clerk) in Kannahipuram Village respectively. It was noted that this rural water supply system operated by the community was represented by CBO.

The CBO participates in decision making at all stages of project implementation, operation, and maintenance of the scheme. The construction of the project or scheme has been accomplished by the respective organization and designed the participatory strategies of the people in the project operation. It was identified that the scheme was handed over to the local communities after construction works. The tariff system for the water supply was decided by the local community in terms of CBO's proclamation. Every month, the administration body of CBO holds a meeting to discuss water supply issues, electricity bill payment, staff salary matters, and so on. And quarterly, the general meeting is used to call with all administrative and Operation & Maintenance staff, including 390 beneficiaries to discuss general water supply related issues and issues related to water bill payment. In the above background, this study was carried out to assess the features of the participatory approach in the CBO managed water supply system and its sustainability in the Kannahipuram rural segment in the Akkaraipattu NWSDB region, Sri Lanka.

Literature Review

Silva De (2018), 'Alternative Management Models in Small Town Water Supply Schemes in Sri Lanka,' elaborated on the alternative management models for water supply system which has been exercised in Sri Lanka. The NWSDB of SriLanka, as a part of its rural water supply and sanitation development programs for small towns, has introduced 03 alternative management models by ensuring the beneficiary participation for the management of water supply systems. In each model, CBO, Local Authority (PS), and the NWSDB together share the responsibilities as respecting each other. This reveals that CBOs are the nucleus of this implementation process, and the distribution of responsibility was assured through the establishment of tripartite operational and maintenance agreements. This study has also suggested establishing the involvement of all parties in water sectors, and recognizing the CBO participation as a core of the water supply system in Sri Lanka.

Gleitsmann et al. (2007). 'Analysis of a rural water supply project in three communities in Mali: Participation and sustainability,' presented qualitative valuation of the participatory water management approaches employed at the community level in rural Mali through a water supply project - The West Africa Water Initiative (WAWI) - coordinated by World Vision International, a non-governmental and humanitarian organization. This study outlines that when community based rural water supply is a positive step in responding to the requirements of rural people in Mali, the installation of boreholes with hand pumps informed merely by consultative participatory approaches and limited extension involvement will not necessarily provide sustainable rural water supply in the region.

Chakrabarti et al. (2013). 'Sustainable Integrated Water Supply for Rural Communities,' explained that many challenges were encountered in setting up of a community water supply scheme in India, especially in remote villages, not covered by government water scheme and not having safe drinking water source the expansion of a water supply owned and operated by the community is a core necessary. It reveals that public appraisal workshop and need assessment were conducted to promote the people's participation in designing catchment area and reservoir management, the treatment process, distribution network, and waste water collection and treatment were exercised by the local community, with the combination of reliable technological solution and required equipment.

Inkani et al. (2015) researched 'An appraisal of Institutional Strategies of Managing Rural water supply in Katsina State, Nigeria.' This study appraised the institutional strategies for managing rural water supply in Katsina state, Nigeria. For this study, the field data collection procedure involved a multi-stage sampling procedure guided by the three differentiated rainfall Zones (north, central, and south) of the state. It revealed that many people in rural areas had not received any support from the government in meeting their water demands, the involvement of government in monitoring quality management and funding of water facilities recorded in a poor or minimal level.

Ishaku et al. (2010) carried out a study on 'Community Participation: Alternative Approach to Water Supply in Nigerian Rural Communities,' in their paper explored that rural Nigerian people

have no access for safe drinking water supply facilities. Thus, the government has taken an effort to establish hand-operated boreholes and wells yield little during the dry season and frequent breakdowns. Community participation has identified as key to the success of rural water supply in Nigeria. The study found out that community participation carries the feelings of ownership and builds a strong base for government intervention in any given society. So, this kind of public involvement paved the way for greater credibility in all levels of community because it was planned by a group of people representing all segments of this community in Nigeria.

Liyanage (2013) authored the study titled 'Sustainability Requirements for CBOs to Manage Rural Water Supply Schemes,' emphasized that community participation coupled with planning, implementation, and operation is an effective basis for providing sustainable services. The government should achieve construction standards before handing over the schemes to CBOs. The CBOs are capable of many O&M activities. However, they do not engage in water quality monitoring; they do not have continuous training and development,t and they do not have regular feedback on their work. The author suggested that the sense of ownership, financial transparency, technical knowledge, capacity building, women participation, water resource management, and hygiene education are basic drivers for sustainable rural water supply projects.

However, the above literature focused on community participation as a key core for the success of a community operated rural drinking water supply system. The participatory approach is an essential measure to evaluate the level of participation in all phases of any project implemented by the government or any non-governmental organization. However, the application of the participatory approach in the CBO managed water supply scheme of Kannahipuram village needs to be addressed. Thus, this study fulfills the gap of this existing knowledge.

Objectives

Many projects were failed in rural areas in many countries, especially in developing nations. The reasons for this failure was lack of community network, poor attitude on community ownership, and lack of social responsibility among rural people and the fault of the institutional strategies. Thus, this study mainly focused on understanding the engagement of local people in the project by using the participatory mechanism. Hence, the main objectives of this study set out to analyze the role and function of Kannahipuram CBO based on a participatory approach in managing the rural water supply scheme in the study region. The specific aim of this paper is to find out the sustainability challenges being confronted by the CBO in Kannahipuram rural water supply scheme and to suggest recommendations to the policy makers and development stakeholders to ensure the sustainability of the rural drinking water supply scheme in the region and the country significantly.

Materials and Methods

This study has employed both primary data (field-based interview with key stakeholders in CBO managed water supply system and field observation) and secondary data (statistical reports from NWSDB, census, and population – Sri Lanka and so on) in evaluating the NWSDB and RWS strategies of drinking water supply system in Kannahipuram village. The date collection sources include an in-depth assessment of CBO managed water points and interview with people who expertise in the water sector and village level water operation. Semi-structured interviews have been conducted with Technical officers, Community officers, and engineers. In-depth discussion was conducted with village people to assess their involvement in project designing, planning, and implementation, which are positively associated with community-managed water facilities. The assessment of CBO managed water coverage data was gathered from 2015 to 2019 to specify the consumer appraisal. The details of CBO managed water treatment plants, its operation, and the numbers of CBOs and public involvement data have also been collected to understand the assessment of participation level of rural people in the drinking water supply process in the study area. Further, the Annual Report and Action Plan of the NWSDB were also used to get information relevant to the study. Subsequently, the secondary data were administered and analyzed using the descriptive

method and presented through percentages, frequencies, and cross-tabulation. The data gathered from experts' interviews were used to extend and validate results qualitatively. At the initial stage of the study, a preliminary survey had been conducted across the Kannahipuram village, which helped the researchers to be familiarized with the study village to identify the size of the population and details of households and to gather contextual information related to this study.

Results and Discussion

This study depicts that Kanahipuram water supply scheme has been principally maintained using a participatory approach through community participation. Although this CBO has been running with water source issues that cause its dysfunction of supplying drinking water in the study area, the CBO has been well organized and managed without many issues compared to the other community-managed water supply schemes in Ampara district. The participatory approach has been very effective in that community voluntarily and actively being participated in water supply management in the study area.

An in-depth interview with the President of Kannahipuram CBO, Mr. Kanthasami Kohulan pointed out that,

> *'…the CBO was running without any communal issues in water supply management. In addition to this, people were engaged in social services such as providing chairs and roofing hut for the funeral house, weddings, sports meetings,sand cultural programs free of charge. And the community has carried out-many Siramathana activities as well in this area. Thus people have ownership and reacted on it' (05/09/2019).*

Also, it was studied that the charges for their water service are lower than those of the Urban Water Supply (UWS) System, which is directly managed by the NWSDB. The UWSposes more material and human resources such as; Engineers, Engineer Assistant, Chemist, Geologist, Sociologist, OIC, Meter Reader, Vehicles, laborers, and machinery compared to this rural water supply system functions in the study area. The Operation and Maintenance staffs(Pump Operator, Meter Reader, Technician, and Clerk)serve as volunteers in this CBO are being paid a very lower amount of money each for their service, which labor in UWS is being paid more. It was found out that the consumer pays lower as connection fee in Kannahipuram CBO scheme, while consumers needed to pay more for a new connection in UWS schemes generally. In this way, this CBO scheme has been managed the water supply in a service-oriented manner in the study area.

It was learned that from the period of 2014 to 2015/16, this particular water supply scheme was operated with the full participation of local people and supplied uninterrupted (24 hours) drinking water to the consumers who obtained water connections from this CBO scheme. Pathetically, after 2016 the CBO faced huge deadlock due to lack of quality for drinking water in the scheme. The water quality analysis from 2015 to 2019isshown in the following table 1.

Table 1: Water Quality Analysis of KanahipuranWater Supply Scheme

S. No	Parameters	Requirement (Maximum) (SLS) 614:2013	Year				
			2015	2016	2017	2018	2019
01	Colour (Hazen Unit)	15	15	35	1	30	24
02	Turbidity (NTU)	2	2.6	4.6	2.6	4.4	9.51
03	Chloride (as CI) mg/L	250	26	32	34	21	479.0
04	Total Alkalinity (as CaCO3)	200	60	74	245	236	219
05	Total hardness (as CaCO3)	250	105	122	320	641	720
06	Fluoride (as F)	1	2.4	0.48	1.04	0.32	0.70
07	Sulphate (as SO4)	250	34	36	51	80	98
08	Total Iron (as Fe)	0.3	0.02	0.18	0.06	1.02	0.70

Source: Water Quality Analysis Report, NWSDB, Akkaraipattu 2015-2019.

As per the above data, notably from 2016 to 2019, the water quality of this scheme has not been at a satisfactory level. The above mention parameters such as Colour, Turbidity, Chloride, Alkalinity, hardness, Fluoride, Sulphate, and Iron have been higher than the SLS water quality stranded. Further, it was noticed that this scheme supplied drinking water only one year period of time from its establishment in the Kannahipuram area. It was identified that the main reasons for the obstruction on drinking water supply are the poor water quality of this water source due to climate change, increased demand, and the server drought in this area. As per the interview had with Regional Senior Chemist in Regional Office, NWSDB, Akkaraipattu, Mr. M.M.Sharifeen,

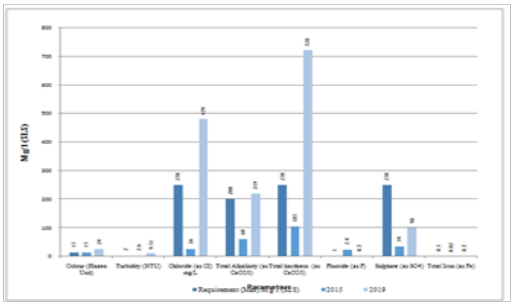
'The water quality of the Kannahipuram CBO scheme is not in the drinking SLS stranded. The color, Turbidity, Alkalinity, hardness, andIron are high than the SLS standard. The water quantity can be improved by the installation of RO (reverse osmosis*)plant or ION(ion treatment) exchange focusing on the feasibility' (06/09/2019).

*RO: *Reverse osmosis is a water purification process that uses a partially permeable membrane to remove ions, unwanted molecules, and larger particles from drinking water.*

It was learned that although the water quality has not at a satisfactory level for the drinking purpose, this scheme has presently been providing 24 hrs water supply that being used for other purposes such as washing clothes, bathing, cleaning, gardening, and so on. Currently, a 20m3 quantity of water is being used per day from the water source (shallow well) of this scheme. This study found out that even though a huge amount of money was invested in implementing this community water supply scheme in Kannahipuram village, it has not been potentially sustainable as this scheme supplied drinking water to the people only for one year (2015 -2016).

The contamination of shallow-well water has led to the drinking water crisis in the study region. The water quality is not in an affordable drinking condition due to the severe pollution of ground water. The water quality was tested by the regional chemist using various means and parameters. The loss of water quality in Kannahipuram village is shown in the following chart 1.

Chart 1: Water Quality Report 2015-2019



Source: Water Quality Analysis Report, CBO, Kannahipuram2015-2019.

According to the above chart, it can be found that the fluorite, iron, sulfate, and water minerals have been rapidly decreasing in the study area. The drinking water scarcity has become a burning issue after this scheme was not able to supply quality drinking water in the study area. To relax this pressing water issues in Kannahipuram village, Allayadivembu Predeshiya Shaba provides bowser supply twice a week for drinking purposes. Moreover, it was revealed that this bowser supply has not been sufficient to fulfill the demand of the total consumers in this area. It was observed that the geographical structure of this area is one of the main reasons for the difficulties of getting ground water from well as many parts of this area is covered with crag and highly elevated. Mostly the well water has already been contaminated in this study area. So, the sustainability is the sweltering issue in this area.

To overcome the sustainable problem, the study advocates adopting the 'compulsion theory of sustainability' introduced by Wills Jenkins. The compulsion theory of sustainability in the rural drinking water project explores the causes of sustainability of rural drinking water supply systems and weaknesses of it. There is many theoretical and empirical literature in sustainability. It is determined by social, economic, and environmental factors. So, they are taken as dimensions of sustainability, according to Wills Jenkins, "theories of sustainability attempt to prioritize and integrate social responses to environmental, cultural problems. An economic model looks to sustain natural and financial capital; an ecological model looks to biological diversity and ecological integrity. A political model looks to social systems that realize human dignity.

Religion has entered the debate with symbolic, critical, motivational resources for cultural change". Thus this study has also been carried out based on Socio-economic, physical, and ecological models. But, it includes the physical prospect management because physicality also plays an important role in constructing the sustainability of water sources. But it does not deal with a religious perspective (Limbu 2017). The physical and ecological construction correlate with seasonal drought in the study area so that the compulsion theory of sustainability will attempt to mitigate the environmental barriers to maintain the sustainability of water sources.

Conclusion

From the above findings and discussion, the Kannahipuram CBO has been functioning very well without detachment of public engagement. When smaller problems are seen in the water supply system, CBO personals maintain immediately from their fund, which is established under the JICA-CBO system. Comparatively, the Kannahipuram CBO operated Drinking Water Supply System is adopted participatory method more effective than the other CBO managed schemes in Ampara district. And it was observed that the participatory approach was applied successfully in this scheme with the participation and dedication of the local people, and the CBO managed water supply project was a well-organized and effective management system that mainly adopted people cantered method in Kannahipuram village. However, the study found that the quality of water source (Shallow Well) in Kannahipuram village is not in a drinkable condition. Hence, there is a great demand and need to improve the quality of water with an appropriate treatment process. But, the main challenge of operating its function is water quality, which needs to be improved. This study revealed that there is a great constraint to overcome this water quality issue faced by the CBO and the consumers in this study area. Hence, installing a RO plant or ION treatment technique can be improved the water quality in the study area.

Note: The key findings of this article were presented at the South Eastern University International Arts Research Session (SEUIARS 2019), organized by the Faculty of Arts and Culture, South Eastern University of Sri Lanka, held on 18.12.2019.

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