

Contribution of Community Water Projects in Preventing Water Crisis: A Study Based on CKD affected Villages in Dehiyattakandia Divisional Secretariat

Riswan, M.

Abstract

The lack of clean water is a major risk factor for poor health and sanitation, and it has major health impacts on rural communities. Safe drinking water is fundamental to health, survival, growth and development. The study is based on data collection through surveys, interview, focus group discussion, and consultation of medical reports at Ampara RDHS and project reports at Ampara NWSDB, and other relevant authorities. Using the secondary information, the paper demonstrates the status of CKD (Chronic Kidney Diseases) in the recent past in all Grama Niladhari divisions in the study community, and it explores Community Water Supply or Rural Water Supply (RWS) projects implemented by the National Water Supply and Drainages Board (NWSDB) with the support from Government and International Organizations in the CKD affected villages, in order to mitigate water crisis in Dehiyattakandia. This study found that the scarcity of safe drinking water was not an outright factor for endemic of CKD, perhaps, the scarcity of safe drinking water was one of the major factors to determine this health implication among rural communities in Dehiyattakandia. Further, this paper argues that prevalent of CKD has been controlled by eradicating water crisis through community participation mechanism implemented by the NWSDB and other stakeholders in the rural water supply projects in the study community. Thus, the CBOs were highly motivated to maneuver rural water poverty reduction at all levels. Hence, the real factor for this CKD also need to be investigated scientifically. However, this study suggests that the awareness programmes and community participation in the rural water supply projects need to be enriched to ensure the availability of adequate safe drinking water and protect rural communities from severe health hazards.

Keywords: *Safe drinking water, water scarcity, community water supply, chronic kidney disease (CKD)*

Introduction

The water crisis is largely a silent one. Every year, millions of people, most of them children, die from diseases associated with inadequate water supply, sanitation and hygiene. Water scarcity and poor water quality negatively impact food security, livelihood choices, and educational opportunities for poor families across the developing world. Chronic Kidney

Diseases of unknown etiology (CKDu) is an unsolved problem which has been spreading over the past decade in Sri Lanka. Many hypotheses have been established pertaining the cause and prevalence of this CKDu issues. The high content of fluoride in ground water, contamination of the water supply with artificial fertilizer used for paddy cultivation, use of aluminum utensils of clay pots for cooking, a

toxin released from blue green algae, Arsenic (As), Uranium (U), are some of identified reasons for CKDu. But the actual cause for this issue has been unknown in the particular community.

Water crisis is a crucial research, particularly in relation to growing concerns about the impact of climate change and population growth. It has been defined as “state of insufficient water to satisfy normal requirements” (Fenwick, 2010) with the growing acceptance of water scarcity as a multi-dimensional problem. The term water scarcity has grown in popularity. Water is an economic good which has a value, mostly rural people have no safe drinking water mainly because they are poor. By drinking contaminated water poor people very often become victims of water borne diseases. Water Borne diseases entail huge medical expenditure, loss of saving for investments, affecting family income leading to deterioration of limited resources, malnutrition and so on. In 2000, The International Water Management Institute predicted that 1.8 billion people would experience absolute water scarcity by 2025 (UNICEF, 2000). More recent predictions suggest that between three and nine billion people will experience water scarcity within the next century (Barker et al. 2000). There is a plenty of evidence on the negative impacts of unsafe water on human health, and its links to poverty. At the global level, estimates suggest that over 1.1 billion people in the developing countries are lack access to adequate quantities of

clean water and over 2.4 billion people live without adequate sanitation. About 3 million people die every year from water borne diseases, mostly children and women. According to WHO report, about 2.2 million people die by the disease of Diarrhoea. 90 percent of them are children, mostly in developing countries (Intizar et al. 2002). The water crisis that humankind is facing today is largely of our own making. It has resulted chiefly not from the natural limitations of the water supply or the lack of financing and appropriate technologies, but rather from profound failures in water governance, i.e., the ways in which individuals and societies have assigned value to, made decisions about, and managed the water resources available to them.

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 Millennium Development Goals (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 Report, 2009). Even though water supply and sanitation coverage had increased in many developing countries including Sri Lanka, there is an uneven progress between rural and urban areas (Hutton and Bartram, 2008 & World Bank, 1998). In the Sri Lankan context, the most of the population is largely rural segments with about 85.3 percent living in rural areas, who suffer without

safe water and proper sanitation, especially in Dehiyattakandiya Divisional Secretariat of Ampara district. 322 people were affected particularly by Chronic Kidney Disease (CKD) in several villages of Dehiyattakandiya (Progress Report of Short Term Implementation Program, NWSDB, 2014). Thus, the community water supply project also implemented to overcome this issue in the study community, but it is expected that the water scarcity may be one of the key factors for increasing health problems or chronic diseases among rural communities. In this backdrop, this paper aims to examine the dimensions of community water supply projects implemented in the CKD affected villages in Dehiyattakandia Divisional Secretariat.

Problem Statement

Water remains as an essential biological need for all living forms. Although it is now universally accepted that water is vital resource for health and sanitation, recent trends in water supply and management seem to ignore this critical relationship. Access to safe and clean drinking water is an indicator of development sort in terms of health, nutrition and societal upgrades. However, majority of rural areas in Sri Lanka as well as in many developing countries are still having lack access to good quality drinking water supply hence perpetuating deepening poverty gap, gender inequalities and the prevalence of water related diseases. Thus, it significantly explores how community water supply project

improved the quality of drinking water and controlled CKD in the study community.

Objectives of the Study

The aim of this study is to examine the dimensions of community water supply projects implemented by the National Water Supply and Drainages Board (NWSDB) in the CKD affected villages in Dehiyattakandia Divisional Secretariat. And it places specific emphasis on the association between water crisis and health outcomes, especially CKD among rural communities in Dehiyattakandia Divisional Secretariat area, Ampara district. Further, this study tries to highlight the mitigation interventions of state and non-state actors and the impact such interventions have had on rural water poverty reduction in the study community.

Methodology

Relevant data for this research have gathered and analyzed using both quantitative and qualitative tools through interviews, frequencies, percentages and cross tabulation.

The secondary data have also been collected from officials such as; Dehiyattakandia Divisional Secretariat, Amapara RDHS, publications, journal articles, e-sources, previously conducted research and reports, and other relevant documents. And data have also been analyzed manually as well as by using computer software MS Excel for data processing and analysis. Descriptive methodology was used to interpret the findings of the study.

The Map of Study Area

Dehiattakandiya Divisional Secretary area, was established some 31 years ago under the Mahaweli Scheme System “C” for community settlement, is situated 228 Km East of Colombo in Ampara District within the limits of northern and western boundaries of Eastern Province. The following map shows the geographical boundaries of the study area.

Dehiattakandiya Divisional Secretary area is approximately 443 sq km in extent. North of Dehiattakandiya it is Dimbulagala Divisional Secretary area and to its Eastern boundary lies on Padiyathalawa Divisional limits of Ampara district and Maduru Oya game reserve. To its South it is Mahiyanganaya Divisional Secretary area of Badulla district while its Western boundary lies on Mahaweli River and Wasgamuwa National Park of Mathale District. There are 46 villages which are called as “Units” or “Hamlets” in Dehiattakandiya Dehiattakandiya Divisional area. Out of that, the CKD affected area were taken into account for this study.

Literature Review

Kirupakaran, S., and S. Thiruchelvam have done a research titled *Coastal Communities' Attitudes towards Conservation of Freshwater Turtle in Ampara District*. This paper explored the attitudes and knowledge of coastal communities towards the freshwater turtle and their views about conserving them in three coastal Divisional

Secretariat divisions namely; Sammanthurai, Karaitivu and Kalmunai in Ampara district. This is basically an empirical research conducted in 2008. A survey for this study was conducted based on 50 randomly selected samples. So, the location of this research is totally covered with coastal community and their psychological view toward freshwater turtle. But, did not attention to the western part of Ampara district on the basis of community water scheme and health problems.

Mimrose et al. (2011) carried out a study on *Assessment of Sustainability of Community Water Supply Project in Kandy District*, which highlighted community water supply project implemented and managed by the government has been considered as a useful strategy to provide access to safe drinking water to rural communities. This study 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 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. This study adopted with assessment tools to ensure the sustainability of community water supply project, especially in Kandy

district. This research linked with the concept of community water supply project on the basis of its sustainability, but did not deal with health problem in the eastern part of Sri Lanka.

Mtilatila et al. (2003) have done a research on *Water, Poverty and Health Problems in the Lake Chilwa area in Malawi*. This study emphasized the relationship between water, poverty and health in Malawi. It was a case study carried out in the Lake Chilwa catchment in southern Malawi. This study based on data collected through survey, interviews and investigation of secondary sources. This research pointed out that there were many health problems occupied in Malawi, this health hazards have been exacerbated by the generally poor hygiene and sanitation recorded in the research area. The paper argues that poor people's access to water remain an important condition for socio-economic development since provision of clean and safe drinking water provides an opportunity to improve their health as well as to reduce their poverty. Thus, this study understood the correlation between water, poverty and health in Malawi, but did not focus on Sri Lankan context on the basis of CKD or community water supply projects.

Sadia Jabeen et al. (2011), the research titled *Health Impact Caused by Poor Water and Sanitation in District Abbottabad*, which carried out in Pakistan. This study used both qualitative and quantitative approaches to assess the health impacts. It

illustrated that the water and sanitation condition in urban as well as in rural community was poor but in rural community it is even worse, and this study explored that the drinking water was contaminated with *E. coli*, Enterobacter, Salmonella and Clostridium. It found that the observation was correlated with prevalence of many water borne diseases especially in rural communities of Abbottabad. So, this study assessed the health impact caused by poor health and sanitation comparatively between urban and rural segments in district Abbottabad, Pakistan, but did not do this research in relation with particularly CKD or community water supply projects.

A study of *Socio Economic Impacts of Chronic Kidney Disease of Unknown Etiology (CKDu) in Wan Ela DS Division in Trincomalee District of Eastern Province*, carried out by Annalingam Rupawathana. This study found that CKDu is a major issue which has many socio economic impacts in society as whole. Further, Weeraratna, C.S. and Aruna Wijeratna have done a research titled *Role of Community Based Organizations in Controlling CKDu*, which elucidated the responsibilities of Community Based Organizations (CBOs) in controlling CKDu in the selected CKD affected districts in Sri Lanka. Thus, these all researchers have been done on the basis of psychological aspect of freshwater turtle, health impact related to poor drinking water and sanitation, community water supply project, Poor

water and socio-economic impacts, role of CBO in controlling CKDu. The views and location of these studies are varies. Meantime, the concept of community water project in the CKD affected villages in Ampara district did not consider with aforesaid literatures. Particularly, Dehiyattakandia has been identified as CKD affected area in Sri Lanka. So, this study tries to fulfill the research gap in the study community.

Results and Discussion

The National Water Supply and Drainages Board (NWSDB), which functions under the Ministry of Water Supply and Drainages, is the principal authority providing safe drinking water and sanitation services in Sri Lanka. Though, NWSDB find it difficult to cover the entire population in Sri Lanka in the view of large investments required to provide such services. Therefore, community water project has been introduced by the government with the support provided by various donor agencies (Mimrose et. al, 2011). The government of Sri Lanka has taken many steps to overcome water crisis in all villages in Ampara district. Particularly, the National Water Supply and Drainage Board (NWSDB) has been implementing rural water supply (RWS) Projects Island wide. The main target of this project is to incorporate community participation in rural water poverty reduction. Thus, the Community-based organizations (CBOs) have been identified in the study area in order to continue rural

poverty alleviation programs. It is very essential to provide safe drinking water supply to the people in Dehiyattakandia Divisional Secretariat as the water poverty and Chronic Kidney Disease (CKD) were highly affected in this area in the recent past.

The result of this study discusses in two ways. Firstly, it emphasizes challenges confronting rural communities due to the scarcity of safe drinking water. Secondly, this study examines the impact of kidney disease among rural communities, and further it discusses the correlation between water crisis and the infection of CKD.

It is very important to notify that how many families from Dehiyattakandia Divisional Secretariat have received the water supply connection yet. Because, it is very easy to understand their level of water poverty. Further, the types of water source and connections were discussed here in order to comprehend the nature of water poverty which experiencing by the rural communities in the CKD affected areas of Dehiyattakandia. The following table shows the aforesaid nature in the study community.

The analysis of data given in the above table, it has known that many water poverty reduction programmes have been implemented in collaboration with CBOs in Dehiyattakandia division. Hence, each and every CBOs are working in all sixteen villages in the study community by using various mechanisms in order to reduce water poverty. In Dehiyattakandia, out of

10685 families in 16 Grama Niladhari divisions, only 6928 families have acquired water supply connection consequently. However, 3757 families were unable to receive water supply connection yet. Further, the water supply is providing through various resources. Particularly, water receive from dam (wewa), lake and Bore Holl, and systematically supplies to the needy household in rural areas. The following chart shows the water collection and supply resources in CKD affected villages in the area of research.

So, it highlights the fact that most of the CBO managed community water supply projects carried out in 14 villages by reserving water from dams, it shows that 88% of water coverage done through dam water. And, Nildiya CBO Vijithapura reserved water from lake in Lihiniyagama village, its coverage is 6% in the study area, and Weeravijaya CBO reserved water from Bore Holl (6% of coverage) in Mawanagama (Muruthagaspitiya) village accordingly. However, it found that all families in the research area could not have the water supply connection. For instant, in Nawamadagama village, only 2001 families have received sufficient access for drinking water, even though there are 3000 families living in the same village. It proves that the water poverty is significantly confronting in these villages. In such a way, 395 families from Ihalagama village, 366 families from Thuwaragala-Kudagala villages, and 316 families from Lihiniyagama

were identified as vulnerable families to have safe drinking water facilities.

Meanwhile, only 50 families from Muwapetikawala-Kadirapura villages and 20 families from Wewmedagama village, have lower rate of water scarcity in the study area. However, the level of water poverty is either high or lower, the water related diseases like; dysentery, diarrhea and CKD were affected in the recent past. Though the Dehiyattakandia has been identified as CKD affected area in Amapara district, thus the National Water Supply and Drainage Board (NWSDB) is continuously operating their activities and facilitate local people and promoting CBOs for the successful '*community water supply*' project, especially among rural area where CKD highly affected.

In this connection, the NWSDB has implemented short term rural water supply programs in Dehiyattakandia Divisional Secretariat, where number of people were affected by CKD, and many mitigation intervention also carried by both government and non-governmental organizations. The detail of CKD affected people and types of water supply scheme are given in the table as follows.

According to the above data, it can be understood that 322 people were affected by CKD up to July 2014. There were 37 people affected due to this disease in Bakmeedeniya Grama Nilahri division where endemic ratio was higher which 0.83 percent is in the total rate of all G.N divisions. In the

next level, 30 people were affected in Paranagama as well as in Redeeala G.N divisions. At the same time, some villages in Sandamadulla G.N division were identified as lower CKD rampant area, where only 4 people were affected by this disease, it covers 0.01 percent of all over the region. In early period, most of the farmers highly affected by this CKD in Dehiyattakandia division, because, the usage of chemical in the paddy field and cultivation lands were identified as major reason for this health problem. So, it was suspected that the usage of chemicals and fertilizers may polluted underground water. Due to this impact, the drinking water crisis may be raised in this region. On the other hand, till 2015, community water coverage also was very poor in Dehiyattakandia and other developing areas in Sri Lanka, but now it has been improved by the government. The government also very keen in implementing community water projects for preventing water crisis as well as water related diseases.

However, the CKD has been identified as a serious health hazard in all villages in Dehiyattakandia Divisional Secretariat. Through the key informant's interview and focus group discussion, they pointed out that 'the chronic kidney disease was a challengeable health problem and it caused socio-economic and psychological hitches which now controlled significantly by various activities carried out particularly by the government with the support of local NGOs and CBOs'. In this backdrop, to

control this wide spread of CKD as well as water crisis, the short term projects were implemented in multidimensional ways in Dehiyattakandia. Specifically, extension of existing water supply scheme, water supply projects, and rural water supply (RWS) project, Bowser supply and so on. Most of the People living in Dehiyattakandiya area basically depend on Ground water sources such as Tube Wells, Dug Wells, and etc. due to the lack of portable pipe born water coverage. According to the findings, there might be a relationship with the consumption of fluoride contaminated water and Chronic Kidney Disease therefore National Water Supply and Drainage Board decided to distribute treated surface water to these CKD prone areas in Dehiyattakandia division (for drinking and cooking requirements) by using Bowers.

The rural water supply projects have been operated with the participation of people in terms of the involvement of CBOs in order to mitigate water crisis and control CKD in the study community. Besides, the question was raised that whether water scarcity causes CKD or not? though, according to the interview had with chemistry, medical practitioners and Sociologist, who highlighted that scarcity of safe drinking water was one the major factors to affect CKD and other water related diseases. Thus, the lack access for having safe drinking water is normally available in the remote villages, it also key factor for endemic

of CKD and other water born infections. Nevertheless, the other factors in relation with health and sanitation, polluted environment (including air and water pollution), land degradation, the impact of modern science and technology, usage of chemicals and fertilizers in the rural cultivation sectors and in the water reservation areas, and lack of awareness among village communities also play a pivotal role to lead water crisis and CKD in the rural communities. So, community water project has been implemented as a key tool to prevent water crisis, and through this task it was expected to control CKD and other water borne diseases. However, the real factors for CKD need to be identified scientifically not only in the study community but also in all parts of the country.

According to the result of many researches carried out by number of Sri Lankan scientist, CKD is thought to be caused by a toxic element(s) or compound(s) in drinking water. Among these toxic compounds are aluminum, arsenic, cadmium, fluoride, toxins released by Blue Green Algae, pesticides etc. however, there is no conclusive evidence to indicate the actual causal factor(s) of CKD (Weerarathna). So, the real factor for this CKD also need to be investigated scientifically. Since the CKD is identified as a major health hazard and also there is few researches carried out in this remote villages in Dehiyattakandia Divisional Secretariat, thus the academics, researchers,

practitioners, scientist, experts and policy makers should do research to identify actual factors for CKD in order to diminish this health problem.

Conclusion

Most important risk factor for poor health is lack of clean water and poor sanitation, and it has major health impacts. In developing countries like Sri Lanka, the rural communities have a great burden of many diseases like CKD and other water borne infections due to inadequate water, sanitation and hygiene. Meantime, the insufficient water resource became water poverty in many rural areas of 14 districts in Sri Lanka. The Ampara district also highlighted as water poverty region and CKD affected district, where the affected ratio has been recorded in Dehiyattakandia Divisional Secretariat, which is taken for this study. This paper aimed at understanding the role of community water projects in preventing water crisis in the CKD affected areas in Dehiyattakandia Divisional Secretariat. It found that the water poverty is not an absolute factor for endemic of CKD, perhaps, scarcity of safe drinking water was one of the major factors to determine this health implication among rural communities in Dehiyattakandia. At present, the situation of water crisis has been eradicated and prevalent of CKD has also been controlled since 2015 due to the initiatives taken by the NWSDB and its community water supply scheme (rural water supply projects). Further, the higher motivation of public

participation as well as the coordinated actions of CBOs also were incorporated with community water project in rural areas in the study community. This study also need to be extended to explore different findings and facts about water crisis and the endemic of CKD.

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Table 1: Method and techniques of data collection

Type of Data	Methods	Techniques/instruments
Quantitative	Desk studies Surveys	<ul style="list-style-type: none"> • Secondary data
Qualitative	Interviews, Discussions	<ul style="list-style-type: none"> • Key informant interviews • Site visit (observation)

Map 1: Dehiattakandiya Divisional Secretariat Area

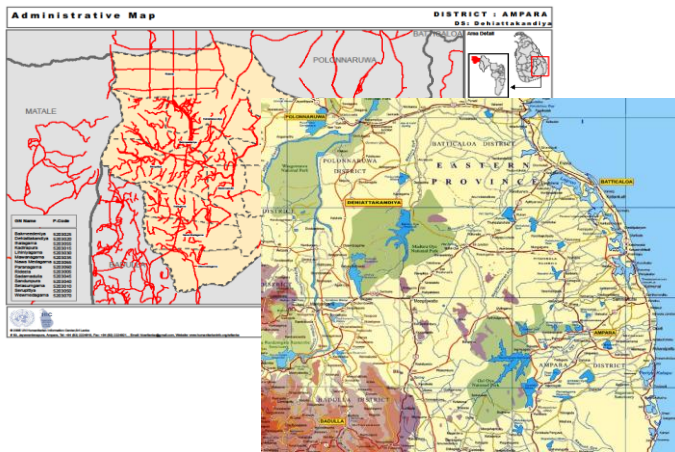
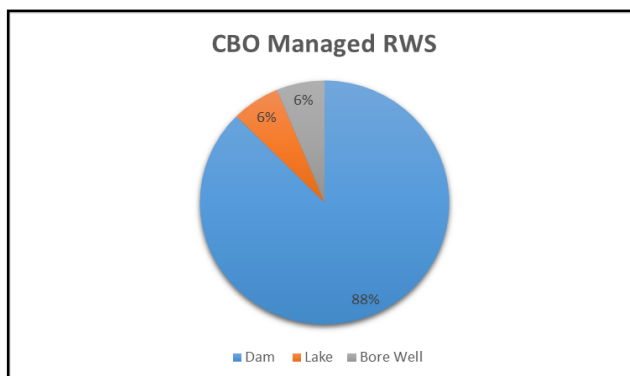


Chart 1

CBO Managed Water Resources in Dehiyattakandia



CBO managed facilities, RWS/NWSDB, Ampara, 2015

Table 2

CBO Managed Rural Water Supply Project in Dehiyattakandia Divisional Secretariat

S. N o.	GN Division	Name of CBOs	House hold	Conn ection	Water Source	Type of Water SS	Treatment Process
1.	Samanalathanna Kadirapura	Parakum CBO	622	454	Samanalathanna wewa	Pumping	Slow sand filter Aerator
2.	Rideeala	Rathmal CBO	534	362	Rathmal wewa	Pumping	Slow sand filter Aerator
3.	Bihirisorowe Kadirapura	Prajasandadiyawa ra CBO	321	185	Mawanawela wewa	Pumping	Slow sand filter Aerator
4.	Sandamadulla	Samadi CBO	513	395	Nagasthalawa wewa	Pumping	Slow sand filter Aerator
5.	Lathpndura Mawanagama	Lathminimuthu CBO	311	208	Bambarawana wewa	Pumping	Slow sand filter Aerator
6.	Nawamadagama	Nawamadagama CBO	3000	2001	Nawamadagama wewa	Pumping	Slow sand filter Aerator
7.	Henanigal North Sandunpura	Prarthana CBO	650	500	Henanigala wewa	Pumping	Treatment chlorine add filter
8.	Bambarawana Sandunpura	Gemunu CBO	650	350	Bambarawana wewa	Pumping	Filter, Chlorinator
9.	Namalgama	Namal CBO	470	274	Namalgama wewa	Pumping	Filter, Chlorinator
10.	Ihalagama	Nilupul CBO	530	135	Pahalagama wewa	Pumping	Slow sand filter Aerator
11.	Muwapetikewala Kadirapura	Minidiya CBO	330	280	Muwapetikewala wewa	Pumping	Slow sand filter Aerator
12.	Wewmedagama	Randiya CBO	700	680	Rathkinda wewa	Pumping	Filter, Chlorinator
13.	Lihiniyagama	Nildiya CBO	566	250	Lake	Pumping	Slow sand filter Aerator
14.	Mawanagama (Muruthagaspitiya)	Weervijaya CBO	188	120	Bore Holl	Pumping	No treatment
15.	Mawanagama	Samurdhi gami isura	500	300	Bambarawana wewa	Pumping	No treatment
16.	Thuwaragala Kudagala	Ekapadda Grameeya Paaniya Jala Samithiya	800	434	Hulanbadana wewa	Pumping	Aerator, Filter
Total			10685	6928			

Source: CBO managed facilities, RWS unit, NWSDB, Ampara, 2015

Table 3

Community Water Supply in the CKD Affected Areas, Dehiyattakandia

No	G.N. Division	Villages	Population	Affected		Method of Water Supply
				No.	%	
1.	Bakmeedeniya	Hungamalgama	4454	37	0.83	SE
		Bakmeedeniya				
		Ranhelagama				
2.	Kadirapura	Kudagala	2302	07	0.30	RWS
		Thuwaragala				
		Sooriyapokuna	2665	16	0.6	
		Pussallawinna				
		Mawanawela	1308	05	0.38	WSS
		Samanalathenna	6099	23	0.38	RWS
		Kadirapura				
		Bihisorowwa				
Mupetikewela						
3.	Nawamedagama	Nawamedagama	3023	26	0.86	RWS
		Wewgama				
4.	Sandunpura	Henanigala North	3286	10	0.3	RWS/SE
		Bambarawana				
		Sandunpura				
5.	Paranagama	Henanigala South	5391	30	0.56	RWS
		Paranagama				
		Kalagama				
6.	Serupitiya	Serupitiya	4370	34	0.78	RWS
		Salpitigama				
		Webadagama				
7.	Wewmedagama	Wewmedagama	3455	23	0.67	RWS
		Diyawiddagama				
8.	Ihalagama	Ihalagama	2915	16	0.55	RWS
		Pahalagama				
		Kudagama				
9.	Mawanagama	Maruthagasipitiya	3474	29	0.83	RWS
		Lahpandura				
		Mawanagama				
10.	Sanmadulla	Sanmadulla	3878	04	0.1	RWS
		Nagasthalawa				
		Uththalapura				
11.	Lihiniyagama	Lihiniyagama	1634	13	0.8	WSS
		Dammannaruwa	2938	15	0.51	RWS/SE
		Wijayapura				
12.	Redeela	Namalgama	4069	30	0.74	RWS
		Rathmalkandura				
		Paragawewa				
		Redeela				
Total			57173	322		

Source: Progress Report of Short Term Implementation Program, NWSDB,2014