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வருடாந்த அறிக்கை - 2015

ANNUAL REPORT - 2015

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நீர்ப்பாசனம் மற்றும் நீர் வளங்கள் முகாமைத்துவ அமைச்சு

MINISTRY OF IRRIGATION & WATER RESOURCES MANAGEMENT

ජල සම්පත් මණ්ඩලය

நீர் வளச் சபை

WATER RESOURCES BOARD

ANNUAL REPORT
2015

Water Resoureces Board
No 2A, Hector Kobbakaduwa Mawatha
Colombo – 07.
www.wrb.gov.lk

Annual Report - 2015
Water Resources Board

1. Introduction

The Water Resources Board was established in 1966 under the Act No. 29 of 1964, as an advisory body to the Minister on all matters concerning the control and utilization of the Water Resources in Sri Lanka.

In 1978, Groundwater Division of the Irrigation Department was transferred to the Water Resources Board and functions of the Board were expanded and commenced the implementation activities.

The Water Resources Board Act was amended and passed by the Parliament in 1999 to enable the Water Resources Board to pay more emphasis on matters pertaining to Groundwater Resources in Sri Lanka.

2. Vision

Adequate access to clean and safe water for all

3. Mission

To advise the government and the people on assessing, conserving, harnessing, developing and frugally utilizing particularly the finite groundwater resources in the country working in close collaboration with the rural society, relevant central and local government departments/ divisions/ authorities/ institutions, national and international organizations, and scientific communities here and aboard.

4. Objectives

i. Carry out research on groundwater resources of the country.
ii. Collection of data on groundwater resources and maintain a groundwater data base.
iii. Carry out hydrogeological surveys
iv. Awareness creation on the groundwater related issues.
v. Assessment of groundwater resources.
vi. Implementation of the activities of the board with the coordination of other institutions
vii. Groundwater development and management.

5. Functions

i. Carry out research on groundwater resources of Sri Lanka
ii. Interpretation of data on groundwater resources development
iii. Carry out hydrogeological surveys to detect groundwater resources
iv. Identification of groundwater potential zones
v. Identification of groundwater sources by using geo scientific methods
vi. Carry out studies for groundwater resources development
vii. Analysis of water samples, chemically, bacteriologically and for heavy metals
viii. Collect and maintain groundwater data and preparation of hydrogeological maps

6. Director Board

i.	Mr. Ashoka Perera	-	Chairman	(2015.02.10 from 2015.04.09)
ii.	Mr. D.R.Ponnamperuma	-	Director	(2015.02.10 from 2015.04.09)
iii.	Mr. Nimal Gamage	-	Director	(2015.02.10 from 2015.04.09)

iv.	Mr. M.G.Sunil	-	Director	(2015.02.10 from 2015.04.09)
v.	Mr. N.R.Suriyaarachchi	-	Director	(2015.02.10 from 2015.04.09)
vi.	Mr. D.D.Ariyaratne	-	Director	(2015.02.10 from 2015.04.09)
i.	Mr. A.C.M.Zulfikar	-	Chairman	(2015.04.09)
ii.	Mr. S.P.Wikkramaarachchi	-	Working Director	(2015.04.09)
iii.	Mr.T.W.M.P.I.Indika Bandara	-	Director	(2015.04.09)
iv.	M.S.Sathish Kumar	-	Director	(2015.04.09)
v.	Mr.K.B.Jayasena	-	Director	(2015.04.09)
vi.	Mrs.J.K.N.Samanmalee	-	Treasury Representative	(2015.04.09)
vii.	Mr.R.M.C.Ratnayake	-	Director	(2015.04.09)
viii.	Mr.T.H.Ashoka De Mel	-	Director	(2015.04.09)

Board Meetings

Five (05) Board meetings were held in the year under review.

6.1. Audit and Management Committee

i.	Mrs.J.K.N.Samanmalee	-	Chairman	-	Treasury Representative
ii.	Mr. S.P.Wikkramaarachchi	-	Member	-	Working Direct
iii.	Mr.T.W.M.P.I.Indika Bandara	-	Member	-	Director
iv.	Mr.R.M.C.Ratnayake	-	Member	-	Director
v.	Mr.T.H.Ashoka De Mel	-	Member	-	Director
vi.	Mr. R.S. Wijesekera	-	Secretary	-	General Manager

6.1.1. Audit and Management Committee Meetings

Four (04) audit and management committee meetings were held during the year 2015.

6.2. Senior Executive Officers – year 2014

i.	Mr. R.S.Wijesekera	-	General Manager
ii.	Mr. G.R.R. Karunaratne	-	D.G.M (Research & Development) (From 2014.01.01)
iii.	Mr P.P.S.R.K. Pathirana	-	D.G.M (Operation) (From 2015.12.01)
iv.	Mr. A.B.M. Chandrasiri	-	Assistant General Manager (Finance)
v.	Mr. M.J. Deshapriya	-	Assistant General Manager (Engineering)
vi.	Mr. M.A. Pushpakumara	-	Assistant General Manager (Administration)
viii.	Mr.R.M.S.Rathnayaka	-	Assistant General Manager (Hydrogeology)

7. Operational Activities Performed in the year 2015

Progress of the Generated Funds

01. Moragahakanda Project – Hand Pump Tube Well Programme

SI No.	Activity	Physical Progress	Financial Progress (Rs. Million)
01.	Hydrogeological Investigations	35 Nos.	0.91
02.	641NosHand pump Tube well Drilling.	41 Nos.	8.69
03.	Installation of India Mark III Hand Pumps	30 Nos.	3.27
04.	Installation of Iron Removal Plants	15 Nos.	1.50

02. Moragahakanda Project – AgroTube Well Programme

SI No.	Activity	Physical Progress	Financial Progress (Rs. Million)
01.	Hydrogeological Investigations	10 Nos.	0.30
02.	Tube well Drilling.	10 Nos.	3.07
03.	Pumping Tests	10 Nos.	1.25

03. Sporadic Activities

SI No.	Activity	Physical Progress	Financial Progress (Rs. Million)
01.	Hydrogeological Investigations	155 Nos.	8.23
02.	Tube well Drilling.	63 Nos.	25.44
03.	Pumping Tests	62 Nos.	5.17
04.	Hand Pump Installation	18 Nos.	2.06
05.	Tube Well Cleaning	20 Nos.	1.39
06.	Chemical Analyzing of Water Samples	952 Nos.	2.10
07.	Bacteriological Analysis of Water Samples	175 Nos.	0.17

Total Financial Progress – 2015 – 63.55 Million

8. Western Province

8.1. Hydrogeological Study on the Coastal Sandy Aquifer Extending from Colombo to Negombo.

Detailed hydrogeological studies of the coastal sandy aquifers extending from Colombo to Negombo have been commenced in 2011. The main aim of the study is to establish groundwater monitoring network with dedicated monitoring test boreholes in order to collect temporal data on groundwater quality changes and water table fluctuation. The test boreholes were expected to construct at most sensitive and vulnerable areas for groundwater deterioration due to over abstraction and industrial and domestic pollution.

The project objectives are to identify, develop, manage, allocate and converse the shallow sandy aquifer as to achieve the maximum benefits without harming the environment.
All the activities specified under the methodology were completed by the end of the year 2014.
Based on the results made by the project, long term monitoring program was started from the year 2015. Water quality of the constructed tube wells and water levels were measured in 4 quarters of the year.

As the quality of water were not showed any significant variation or higher values than the maximum permissible levels of heavy metals or bacteriology, it was not measured those parameters. However for all samples, the normal chemical parameters were measured.

Other than that, water levels of all wells were measured in order to prepare the water level elevation maps.

These water level elevation maps are useful to understand the groundwater flow direction of the area. If there're any kind of contamination in the area these maps will be useful to understand the flow direction of the contaminants.
Summary of water sample collection as follows.

Sampling session	Number of samples
1st quarter	175
2nd quarter	90
3rd quarter	56
4th quarter	72

Based on the results of water quality, water quality distribution maps and water level elevation distribution maps were prepared.

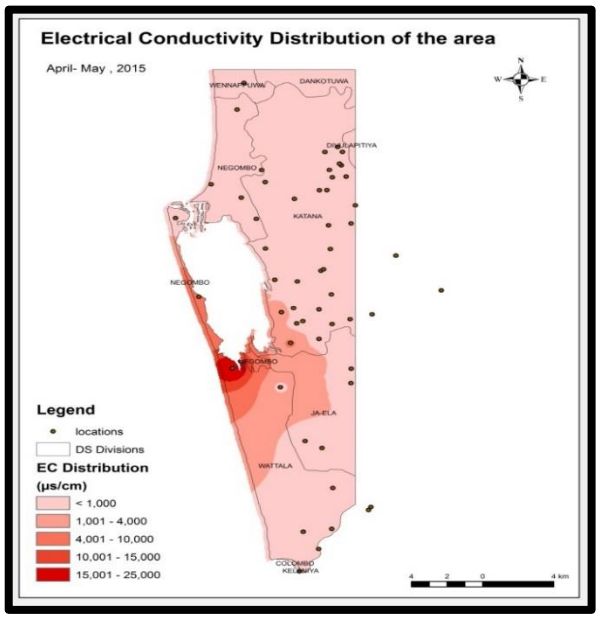


Figure 01: Water quality distribution of the area

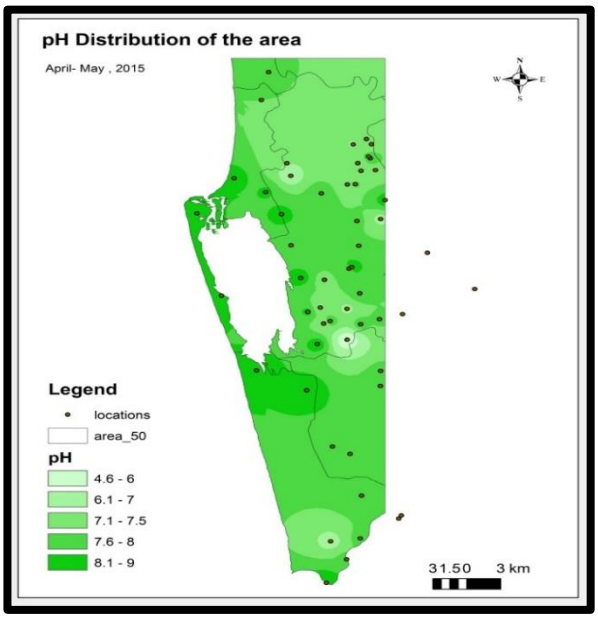
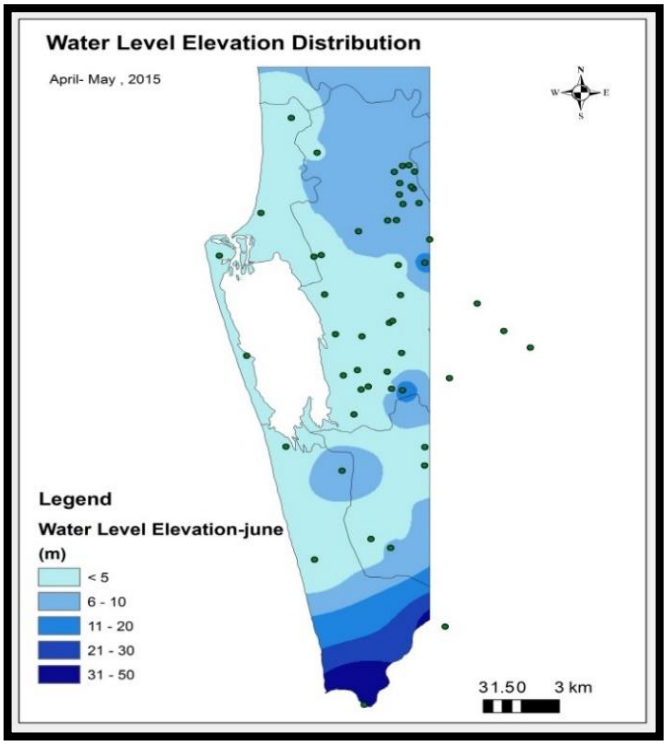


Figure 02: Water level elevation map



8.2 Results and Recommendations.

According to the water quality distribution of the area, there are no any significant change in measured parameters.

However it can be recommend, the monitoring of ground water quality and water levels should be continued more 2-3 years to gather more information to prepare the groundwater flow models.

The Study on the Possible Direct and Indirect Impact of Climate Change on Aquifer System of Sri Lanka

- **Western coastal strip – Colombo to Weligama**

Detailed hydrogeological studies of the coastal sandy aquifers extending from Colombo to Weligama have been commenced in 2013. The main aim of the study is to establish groundwater monitoring network in order to collect temporal data on groundwater quality changes and water table fluctuation with respect to the climate change.

The studies were included following components that are essentially to be followed up in order to achieve its objectives.

- To determination changes of the rainfall pattern of the coastal area.
- To identify salinity level changes in coastal aquifer system of Sri Lanka through a proper Groundwater monitoring network.
- To determination of the fluctuation of fresh water sea water interface.
- To examine potential for introducing regulatory mechanism as well as using other instruments for optimum use of Groundwater.
- To develop comprehensive data base on Groundwater setting out guidelines, norms and criteria for future groundwater development in coastal aquifers.
- To identify locations suitable for artificial recharge to groundwater system.

According to the annual work plans set out to 2015 for the western coastal strip, following project activities were carried out and the progress achieved is given below. Water sampling network has been shown in figure 01.

- Water level monitoring and collection of water sample -We have planned to collect water sample according to the rainy seasons of Sri Lanka. We have measured the water level and collected 195 number of water sample in the coastal strip from Colombo to Weligama for the rainy seasons (May 2015 – 60 samples, September 2015- 60 samples and end of November 2015 – 75 samples).
- Water sample analysis - Collected 75 number of water sample were analyzed for 17 physical and chemical parameters and 120 number of water samples were partially analyzed.
- Hydro-geochemical maps - The hydro-geochemical maps were prepared considering Sri Lanka drinking water standard for pH, Electrical conductivity, Total hardness, Total alkalinity, Total dissolved solids etc. using the analytical data of water samples.

All of the above data are gathered and compiled as a separate report for further analysis.

Hydrogeological survey for siting of 10 tests bore holes, construction of test bore holes, conducting of pumping tests, leveling of well points, water sampling and well monitoring, analysis of pumping tests results, etc. should be completed for the 2016 study program.

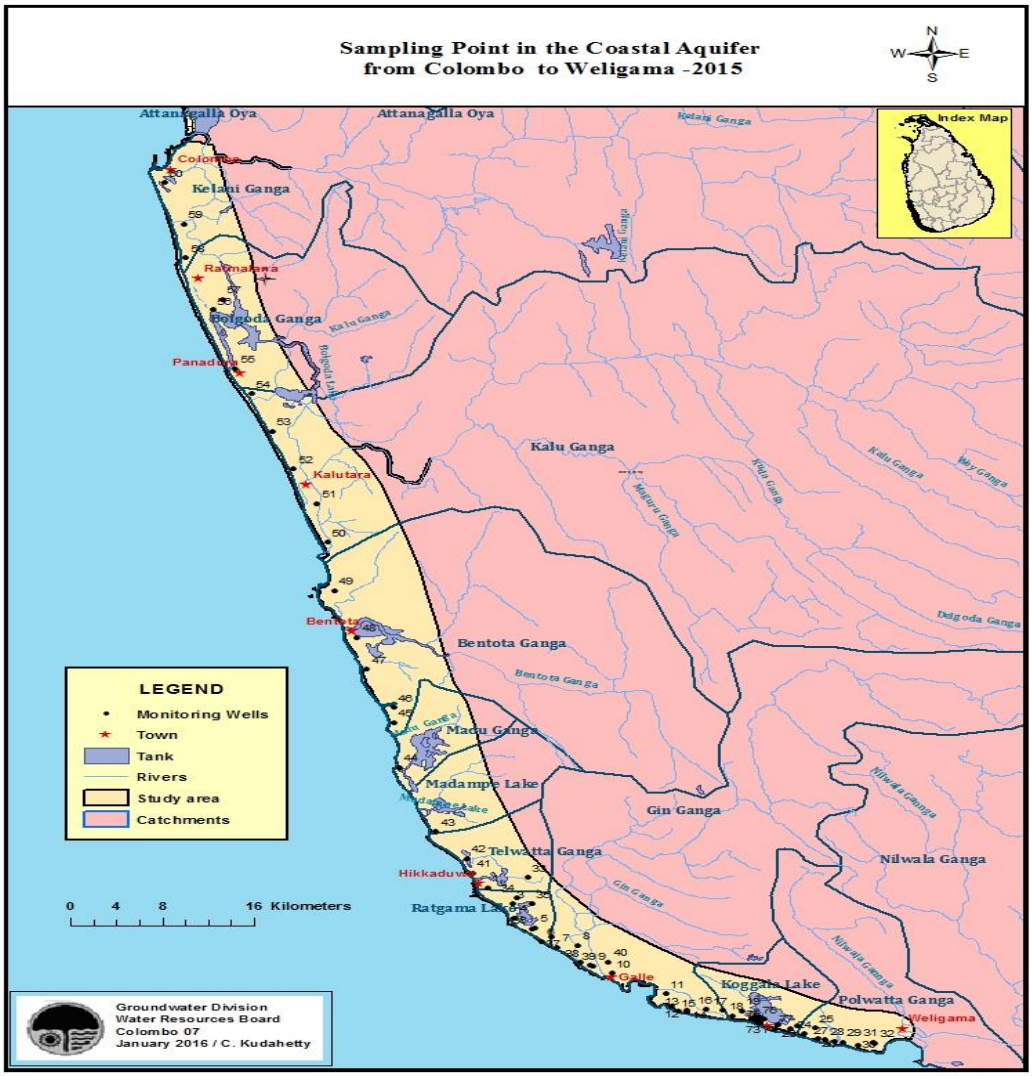


Figure 01: Established groundwater monitoring network from Colombo to Weligama coastal strip

GIS and Computer Unit

8.2. Preparation of GIS maps depicting present groundwater occurrence and quality in Sri Lanka when request for research studies and other duties.

8.3. Administration, maintaining and upgrading of computer network system in the WRB head office and facilitate computer to brows internet and the WRB server through a network system. Mainly following items are maintaining under GIS and Computer Unit: 49 nos. desktop computers, 14 nos. laptops, 34 nos. printers, scanner (A0, A4 sizes) and plotter (A0 size).

All Commercial Activities Conducted in the Western Province for the Year 2015

All activities are mentioned below on monthly basis with income in accordance with the issued invoices

Month	HG Investigations	TW Constructions	TW Cleaning	Pump Tests	WSA	BSA	Pump Supp & Inst.	Const. of TW chamber	Other Activities	Income (Rs.)
January	11	1								661,766.70
February	1			2	1	1			Provision of Data on well logs	201,145.50
March	9				2	1				388,564.75
April	3	1		4	14	2				927,298.60
May	10			1	5	2				782,272.50
June	2			1			1	1	*Transport of machinery & Drilling Crew *Laying of pipes with other works	1,436,263.95
July	1		2	1	6	2				254,787.00
August	4	3	6	3	9	2				2,981,820.75
September	2	6	7	6	4					2,276,694.67
October	5		1	1	2					364,134.75
November	2	2	1	3	2	2			*1st payment of construction of tube well at Panagoda *Pumping test at Panagoda (Balance amount)	1,036,600.22
December	4			3	1					723,072.00
Total	54	13	17	25	46	12	1	1		
									Total Income (Rs.) =	**12,034,421.39**

9. Northern Province

9.1 Establishment of Laboratory

In 2015, There was no any new instrument were added to our laboratory as it was already complete with many instruments like Drying and Sterilizing oven, Bench-top pH meter kit and Bench-top EC meter, Glassware and laboratory safety items were added to already established laboratory of Jaffna office in 2013. So, now we have a complete well established laboratory with the facilities to do chemical and bacteriological tests in it.

Fig 1: Inside views of the Jaffna Laboratory ongoing Projects

9.2 Dam Safety and Water Resources Planning Project

An awareness program was held in 2015 and continue monitoring activities of already established monitoring network. This project has been expanded to the rest of the Peninsula (Valigamam and Wadamarchchi areas) in 2015 with the additional funding from world bank. 15 numbers of test wells have been constructed under this project in 2015.

9.3 Treasury Grant Projects

There is a project under the treasury grant funds.

1. Jaffna well monitoring project

9.4.1 Jaffna Well Monitoring Project

This water quality monitoring project was an ongoing project for the Jaffna Peninsula in 2015. Completed the sampling for four terms including post and pre monsoon periods of

2015 and analyzed. Number of pumping tests has been done to find the aquifer properties. Number of Geophysical investigations has been completed and 30 numbers of test wells have been constructed. Also samples from these tube wells were collected and analyzed. 30 locations of monitoring wells were leveled using DGPS leveling instrument. Also Progress report for 2015 has been prepared and submitted. Monthly monitoring and other activities will be continued in 2016.

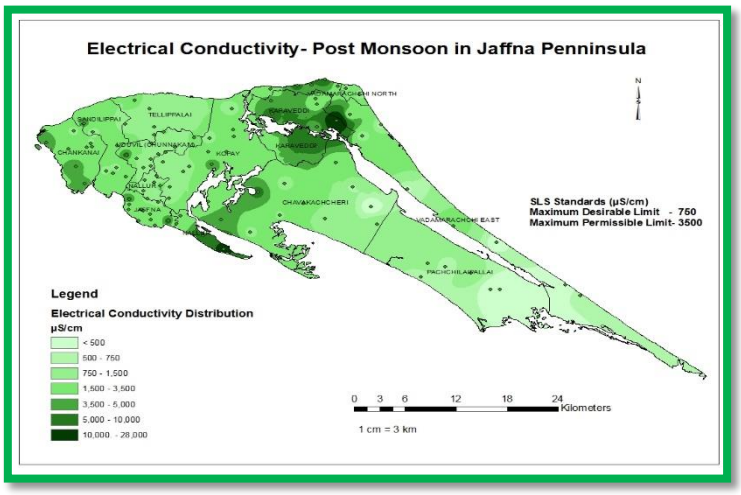


Fig 2 : EC Distribution Pattern in Post Monsoon 2015

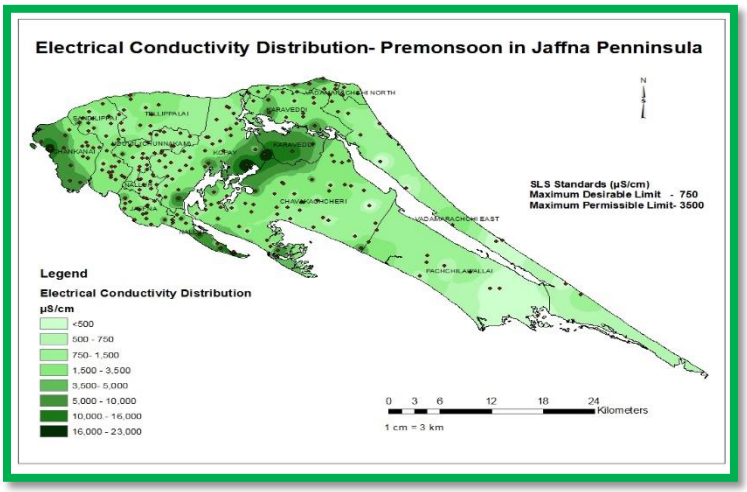


Fig 3 : EC Distribution Pattern in Pre Monsoon 2015

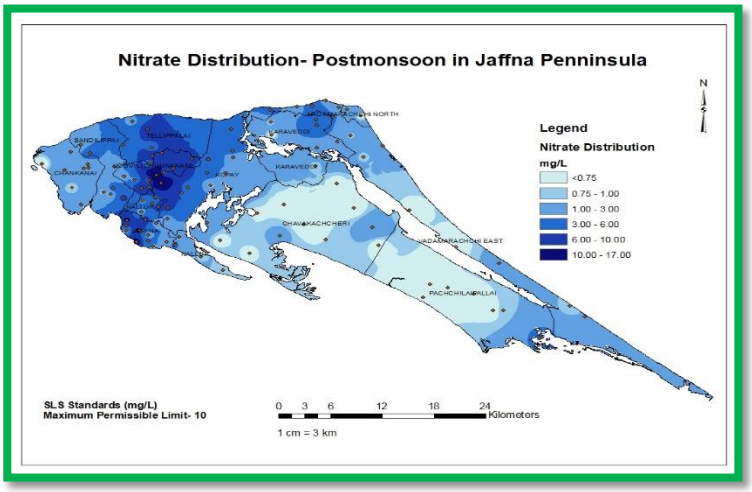


Fig 4 : Nitrate Distribution Pattern in Post Monsoon 2015

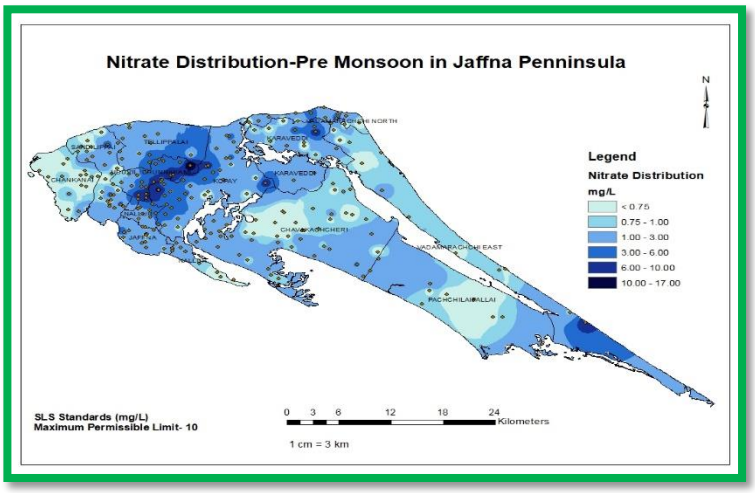


Fig 5 : Nitrate Distribution Pattern in Pre Monsoon 2015

Fig 6 : GA Jaffna, Consultant, AGM(H), WRB Hydrogeologists and other participants in the awareness program held in the GA's auditorium.

An awareness Program on "Outcomes of Hydrogeological studies in Jaffna Peninsula by WRB" was conducted in Jaffna Kachcheri under chairmanship of Government agent of Jaffna. Senior Hydrogeologists, Hydrogeologists and a consultant from WRB head office were participated. All the Divisional secretaries, AGAs and head of the departments of government and Non-governmental organizations were the other participants to the program.

- **STAFF DEVELOPMENT**

The increase in staff is another development for the Jaffna provincial office. This will make the field works easier and considerable amount of field works could be completed in 2015 utilizing this human resources and as well as using new machineries and instruments.

9.5 Commercial Activities

The following table shows the summery of total annual income from each commercial activity.

No	Activity	Amount (Rs)
1	Chemical & Bacteria analysis	339352.56
2	Hydrological Investigations	32051.25
3	Pumping Test	234210.00
	Total	**605613.81**

9.6 Land and Building for office and Laboratory

A 20 perch land has been allocated for Jaffna permanent office by Jaffna Government Agent in Jaffna town area. In the meantime, a temporary space for office and laboratory for WRB has been allocated in old DS office building in Jaffna town.

Furthermore, we have given an important attention for Dengue prevention matter as we did in previous years. Also held number of Dengue prevention day programs such as cleaning in and out environment of office premises. Every Friday morning an hour was allocated for that.

10. North Central Province

10.1. TREASURY GRANT PROJECTS

Water Resources Board has initiated the research projects on Water quality and quantity of different aquifer systems in Anuradhapura, Vavuniya, Kilinochchi, Polonnaruwa and Trincomalee districts under treasury grants. The details of projects conducted in year 2015 are as follows.

10.1.1. Long term groundwater monitoring of Anuradhapura District & conducting training programme on awareness creation about Water Born Health Hazards and conducting water clinics (RS Project)

With the idea of controlling the Chronic Kidney Disease (CKDu) and other water borne diseases that are widespread in Anuradhapura district, water clinics were organized by the Water Resources Research & Training Center in order to make the rural people aware on the water quality and related issues and the monitoring of the established network was continued in year 2015.The study was commenced under treasury grant in year 2011 to identify the water quality distribution in surface water, shallow and deep aquifers in different drainage basins in Anuradhapura district and to make specific recommendations for further studies on water quality distribution including long-term monitoring. From January to December, following activities were completed under this project.

Table 02: Activities carried out during the year 2015 under RS Project.

No.	Activity/Description	No. of items
01	Groundwater monitoring & water Sampling	200
02	Chemical analysis of water samples	200
03	Conducting of awareness programme and water clinics	7
04	Data interpretation & recording	

Seven (07) Water clinics were conducted with distribution of leaflets, presentations, water analysis and distribution of fluoride reducing filters.

Table 03: The details of Water clinics conducted during the year 2015

No	D.S.Division	Location/Village	No of participants Attended	No of water Sample analyzed	No of fluoride filters distributed
01	Rajanganaya	Common Building (Funneral Arrangement Society), Yaya 15,Rajanganaya	106	89	-
02	Kekirawa	Ganewalpola-Hinukkiriyawa Temple	137	174	-
03	Palagala	Pradeshiya Sabha, Palagala	27	56	03
04	Kebathigollawa	Kebathigollawa-Kahatagollewa Common Building	87	101	05
05	Mahawilachchiya	Sri Sudarshanaramaya temple, Bogaha Junction, Mahawilachchiya	36	38	
06	Kahatagasdigiliya	Kahatagasdigiliya-Ambagaswewa temple	60	105	
07	Thalawa	Police Junction, Ihala-Siyabalewa, Eppawala	111	161	
Total			**564**	**724**	**08**

(A)

(B)

Photo 02: (A) Conducting Water Clinics
(B) Sampling & Well Monitoring

10.1.2. Hydrogeological study in Vavuniya and Kilinochchi districts

The research was initiated in year 2013 under Treasury grant. The project objective is to identify groundwater potential of the area and to see the possibility of developing groundwater sources for future drinking water and small scale irrigated agricultural projects.

The specific objectives of the study is to identify aquifer parameters, it is extensions and demarcates the groundwater potential areas within Vavuniya and Kilinochchi districts. It is expected to identify the groundwater sources for small scale irrigated agriculture and for drinking purposes of the people in the district with the intention of up grading the living standards of the people.

From January 2015 to December 2015 following activities were completed under this project.

Table 04: Activities carried out during the year 2015 under Vavuniya - Kilinochchi Project.

No.	Activity/Description	No. of items
01	Carry out Hydrogeological Survey	20
02	Construction of test bore holes	20
03	Conducting pumping tests	10
04	Levelling of monitoring well points	16
05	Water sampling & well monitoring	122
06	Chemical analysis of water samples	122
07	Data interpretation, recording and report	

Table 05: Test wells drilled and pumping test carried out in Vavuniya and Kilinochchi districts during the year 2015

Test Bore hole No.	DS Division	Location	Pump Test Performed
R13/15/TW 13	Vavuniya North	Ilammaradankulam Charch, Omanthai	yes
R13/15/TW 14	Vavuniya South	Purana GallenRajamaha Viharaya, Mahakachchakodiya	-
R21/15/TW08	Vavuniya North	PutthorKovil, Putthor	-
R21/15/TW09	Vavuniya South	Divisional Hospital, Pawakkulama	-
R17/15/TW30	Vavuniya North	V/Kuchchukkulam Bandaravanniyan Vidyalaya, Mankulam	-
R17/15/TW41	Vavuniya North	WRB Land, Omanthai	-
R17/15/TW38	Poonakary	Mr. Kantharupam'sLanda, Veravil, , Kilinochchi	-
R17/15/TW26	Karachchi	Lumbini Viharaya, Kilinochchi	yes
R17/15/TW28	Karachchi	Kn/Tharumapuram G.T.M. School, Tharumapuram, Kilinochchi	-
R17/15/TW27	Karachchi	Kn/Thiruvaiaru Maha Vidyalaya , Iranamadu, Kilinochchi	yes
R17/15/TW33	Karachchi	7SLNS Army Camp, Akkarayankulam, Kilinochchi	-
R17/15/TW34	Karachchi	Kn/Vannerikkulam Maha Vidyalaya, Kilinochchi	-
R17/15/TW37	Karachchi	Konavil G.T.M. School, Kilinochchi	-

R17/15/TW29	Tunukkai	Kokavil Tower Land, Kokavil	yes
R17/15/TW31	Karachchi	573 Brigade Camp, 3 km post, Paranthan	-
R17/15/TW39	Karachchi	Ramanathapuram west G.T.M. School, Vattakachchi	yes
R17/15/TW35	Poonakary	Mukkomban G.T.M. School, Nallur, Poonaryn	-
R17/15/TW32	Karachchi	Primary Health Care Center, Kandavalai, Kilinochchi	-
R17/15/TW36	Poonakary	Kn/Jayapuram Maha Vidyalaya, Jayapuram	yes
R17/15/TW40	Karachchi	Kilinochchi Mosque, Kilinochchi	yes

(A) (B) (C)

Photo 03: A) Leveling of test wells at Vavuniya B) Geophysical Investigation at Vavuniya
C) Tube Well Drilling at Kilinochchi

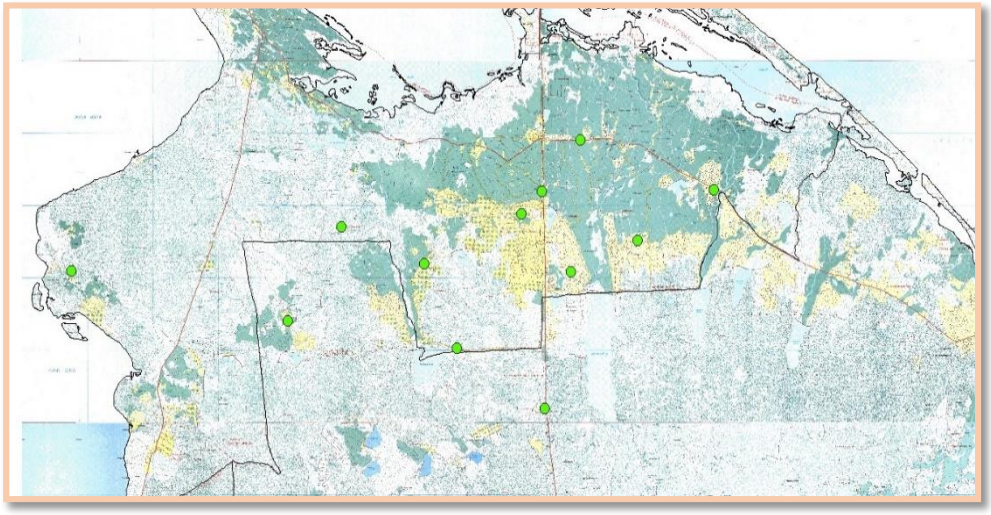


Fig.01: Locations of Test wells of VKP

10.1.3. The study on the direct and indirect impacts of climate changes on coastal aquifer system of Sri Lanka (SICC Project)

The research was initiated in year 2013 in Trincomalee district under Treasury grant. The project objective is to identify the water issues related to the climate change. The specific objectives of the study are determination of the rainfall pattern of the coastal area, identify salinity level changes in coastal aquifer system of Sri Lanka through a proper groundwater

monitoring network, examine potential for introducing regulatory mechanism as well as using other instruments for optimum use of groundwater, develop comprehensive data base on groundwater and identify locations suitable for artificial recharge to groundwater.

From January 2015 to December 2015 following activities were completed under this project.

Table 06: Activities carried out during the year 2015 under SICC Project at Trincomalee.

No.	Activity/Description	No. of items
01	Carry out Hydrogeological Survey	15
02	Construction of test bore holes	15
03	Conducting pumping tests	8
04	Levelling of monitoring well points	15
05	Water sampling & well monitoring	93
06	Chemical analysis of water samples	93
07	Data interpretation, recording and report	

Table 07: Test wells drilled and pumping test carried out in Trincomalee districts during the Year 2015

Test Bore hole No.	DS Division	Location	Pump Test Performed
R21/15/TW13	Verugal	SLNS Main Camp, Lankapatuna	yes
R21/15/TW14	Verugal	SLNS D3 Camp, Lankapatuna	-
R21/15/TW18	Kuchchaveli	Mrs. Selvarasa Dhanalakshmi's Land, Vivananda gramam, Trincomalee	-
R21/15/TW19	Trincomalee	Sangamiththa Buddhist Vishrama Shalawa, Trincomalee	yes
R21/15/TW20	Kuchchaveli	Mr. Nagarasa's Land, Nilaveli Beach Rd	-
R21/15/TW21	Kuchchaveli	SLNS Walagamba, C-I Subsector, Jayanagar	yes
R21/15/TW24	Mutur	5th Regiment Army Camp, PahalaToppur	yes
R21/15/TW16	Mutur	SLNS Gokanna Navy Camp, Kinniya, Trincomalee	yes
R21/15/TW15	Mutur	Police Station, Sampoor	-
R21/15/TW17	Kuchchaveli	Police Station, Nilaveli	yes
R21/15/TW22	Trincomalee	Thissa Pre School, Velgamwehera, Kanniya	-
R21/15/TW23	Trincomalee	STF Camp, Sardhapura, Trincomalee	yes
R21/15/TW25	Kuchchaveli	Kuburupitiya Army Camp, Nilaveli	-
R21/15/TW26	Kuchchaveli	6thVijayaba Regiment, C unit, Wadilikulam	yes
R21/15/TW27	Pulmoddai	Kanijaweli Sinhala maha Vidyalaya, Pulmoddai	-

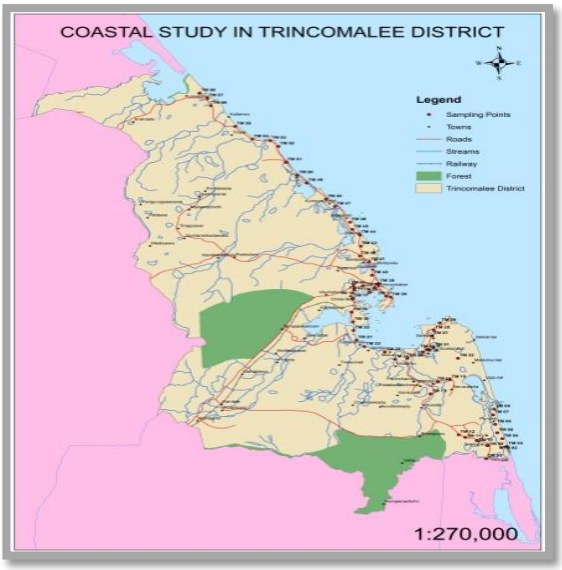


Fig. 02: Locations of Test Wells of SICC Project

10.1.4 Water quality study in CKD prevailing areas in Polonnaruwa & Trincomalee district.

This study was commenced in year 2014 in Trincomalee and Polonnaruwa Districts under Treasury grant. The main objective of this study is to identify the water quality distribution in CKDu affected areas in Polonnaruwa and Trincomalee.

In 2015, a sociological survey was carried out in Dimbulagala, Elahera, Lankapura, Hingurakgoda, Thamankaduwa and Welikanda DS divisions and eighty one (81) water samples were collected for chemical analysis for the parameters such as Cd, As, Pb, pH, Electrical Conductivity, Total Alkalinity, Total Hardness, Calcium, Fluoride etc.. The list of CKD patients in Gomarankadawala DS division in Trincomalee was collected and Ten (10) water sampling and well monitoring carried out in Trincomalee district for full chemical analysis.

Table 08: Activities carried out during the year 2015 under CKD Project at Polonnaruwa & Trincomalee

No.	Activity/Description	No. of items
01	Sociological Survey	91
02	Groundwater monitoring & water Sampling	91
03	Chemical analysis of water samples	91
04	Data interpretation & recording	

10.2 COMMERCIAL ACTIVITIES

In order to fulfill domestic, agricultural and industrial water requirement of people, government and private institutions in Anuradhapura, Polonnaruwa, Vavuniya, Matale , Kandy, Trincomalee and Nuwaraeliya districts, the following activities were completed during the year 2015.

Table 01: Activities carried out during the year 2015.

S.No.	Activity	Units	Income (Rs.)
01	Hydrogeological investigations	19	949,036.00
02	Construction of deep tube wells	05	2,018,716.00
03	Pumping tests	02	69,929.00
04	Installation of hand pumps	04	425,600.00
05	Water sample analysis	140	319,062.00
06	Training program	05	527,925.00
07	Accommodation facilities at Circuit Bungalow		227,408.00
08	Accommodation facilities at Training Centre		60,162.00
Total			**4,642,838.00**

Total income earned by the North Central province for the year 2015 was Rs. 4.64 miillion. The details of the above mentioned activities are as follows.

10.2.1 Carried out detailed hydrogeological surveys to identify the high groundwater potential areas in deep aquifer in order to supply groundwater to supply groundwater for drinking and agricultural activities in private institutions in Matale, Nuwaraeliya, and Anuradhapura and Trincomalee districts.

10.2.2 Carried out detailed hydrogeological, geophysical and geological studies to identify the potential threats and issues to the surrounding environment and groundwater resources due to gravel mining for development activities at Kebithigollewa.

10.2.3 Carried out detailed hydrogeological, geophysical and geological studies to identify the potential threats and issues to the natural spring due to construction of houses and sewerage pits around Ulpathayaya natural spring at Galkiriyagama area.

10.2.4. Conducted pumping tests for deep tube wells in Anuradhapura, Matale and Trincomalee districts to identify the safe pumping rates of the wells without any adverse effect to the surrounding environment.

10.2.5 One hundred and forty (140) water samples that were collected by various projects and institutions were analyzed at the laboratory affiliated to the Provincial Office.

10.2.6 With the funds granted by World Vision Lanka, Palaviya, five (05) numbers of training programmes were conducted on " Qualitative and Quantitative Aspects of Drinking Water " were conducted for grassroot level officers and farmers of Kalpitiya in Puttalam district.

Photo 01: Conducting training programme for officers and farmers of Kalpitiya at Provincial Office

11. North Western Province

The details of the activities commenced during the year of 2015 as given below;

11.1 Carried out detailed Hydrogeological surveys, Tube well drilling, Well cleaning, Pumping test, Hand Pump Installations and Water quality analysis for Development Programms in **Government sector** such as **"Gama Naguma", "Doring Dorata-Gamin Gamata"** to start new miner water supply schemes and to develop existing supplies**.** CECB, NWS&DB, and Wayaba Development Authority like Government Institutes involved with other individual programs conducted in Puttalam, and Kurunegala districts.

The income: Rs. 6,823,464.75 &

11.2 On request made by District Secretariat of Mannar, Detailed Hydrogeological investigations, Construction of nine tube wells, nine hands pump installation and Water Quality analysis were done at Narikadu and Musali resettled villages in Mannar District for their drinking water purposes.

The income: Rs. 3,989,000.00 &.

11.3 Under dry zone urban water sanitation project, Murukkan village in Mannar District - tube wells construction, Pumping tests and water quality analysis were carried out to increase water supply to Mannar town, funded by **SLP Transport and Constructions Works**.

The income: Rs. 4,195,800.00).

11.4 **Under Sri Lanka Red Cross Society** detail Hydrogeological surveys, Tube wells drilling, Installation of Hand Pumps and water quality analysis were carried out to develop drinking & domestic water supply in Mannar and Mulative Districts. **The income: Rs, 1,466,552.00 &**

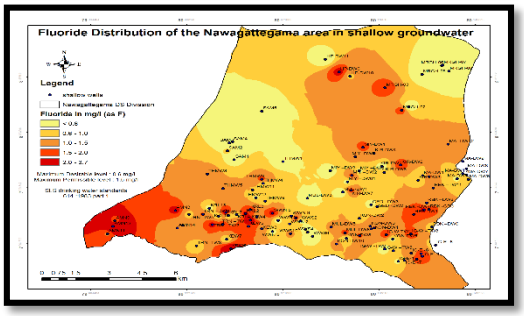


11.5

11.5.1. Detail hydrogeological surveys, Tube well Constructions, Pumping test and Water quality analysis were done for **World Vision lanka Pvt. Ltd to** fulfill drinking water needs in Rideegama DS Division.

11.5.2. The detailed groundwater study was carried out under the world Vision Lanka in Nawagathegama to preparation ground water quality maps to identify ground water issues in the DS Division. For this program 150 water samples were collected from dug wells, tube wells and analyzed using mobile laboratory. Throughout the year this was done twice in March and September. During the second sampling program awareness programs were also conducted for school children in Nawagathegama DS Division.

11.5.3. Agrochemicals are highly used Kalpitiya Peninsula. Researchers were found that these Nitrate and Iron concentrations rapidly increased due to bad agricultural practices. Programme was taken prevention actions to protect the groundwater resources in Kalpitiya area. For that five residential training programs were conducted in Anuradhapura Training Center for community leaders and government officers from Kalpitiya. In addition five Water Clinics and Awareness programmes were conducted in selected GN Divisions to aware the rural community for future protection of groundwater under the funds of World Vision Lanka, Kalpitiya.



Total income for above activities:
Rs. 2,516,582.00 &

11.6 Carried out detail Hydrogeological surveys, Tube wells construction, Well cleaning, Pumping tests and Water quality analysis for the private companies such as Holcim Lanka (Pvt) Ltd, Voice federation, Helanka Plantation (Pvt) Ltd, Fortune Agro industries (Pvt) Ltd, etc. in Puttalam and Kurunegala districts. Also 2-D geophysical surveys had being carried out for OBAYASHI COOPERATION to identify best ground water potentials in Ampara, Samapura area.

The income: Rs. 3,598,092.70 &

11.7 To assess the environmental impact as result of sand and gravel mining, metal quarry and various activities of factories, the Hydrogeological and Geophysical surveys were carried out at the respective lands. Also technical guideline, recommendations to minimize the impact on ground water sources and necessary reports to Central and Provincial Environmental authorities were provided.

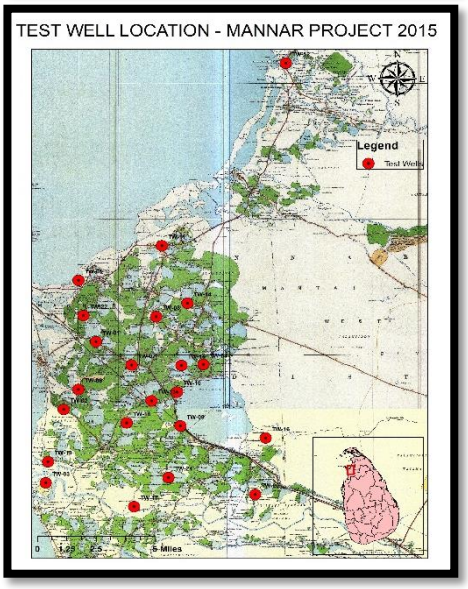
The income: Rs. 1,156,176.00

11.8 On the requests of Community Based Organizations Detailed Hydrogeological Investigations, Construction of tube wells, Water Quality analysis were done in order to improve water supply in ruler areas such as Mahakubukkadawala, Madampe,

11.9 Nawagaattagama, Kalpitiya and Anamaduwa DS Divisions.

The income: Rs. 1,323,757.45 &

11.9.1 Under Hydrogeological study on **Limestone Aquifer system in Mannar** district funded by treasury grant, 40 Hydrogeological Investigations, 23 Test Well Drilling were completed and 02 Pumping tests were performed. 60 water sample analyzed in full chemically and 50 water samples analyzed in partially out 200 collected water samples. Well monitoring programs were carried out in five times throughout the year (2015) in existing shallow groundwater network.



Total Expenditure: (Rs 45,000,000.00)

11.10.1 under the treasury grant projects, **Identify suitable areas for Groundwater Recharge in Sri Lanka (Phase I- Puttalam District)** in Mundalama, Puttalam and Kalpitiya DS Divisions 15 Hydrogeological and Geophysical investigations, 07 Test well drillings were completed, 06 Pumping tests and 26 water samples analyzed out of 196 water samples collected.

Total Expenditure: (Rs 2,331,000.00)

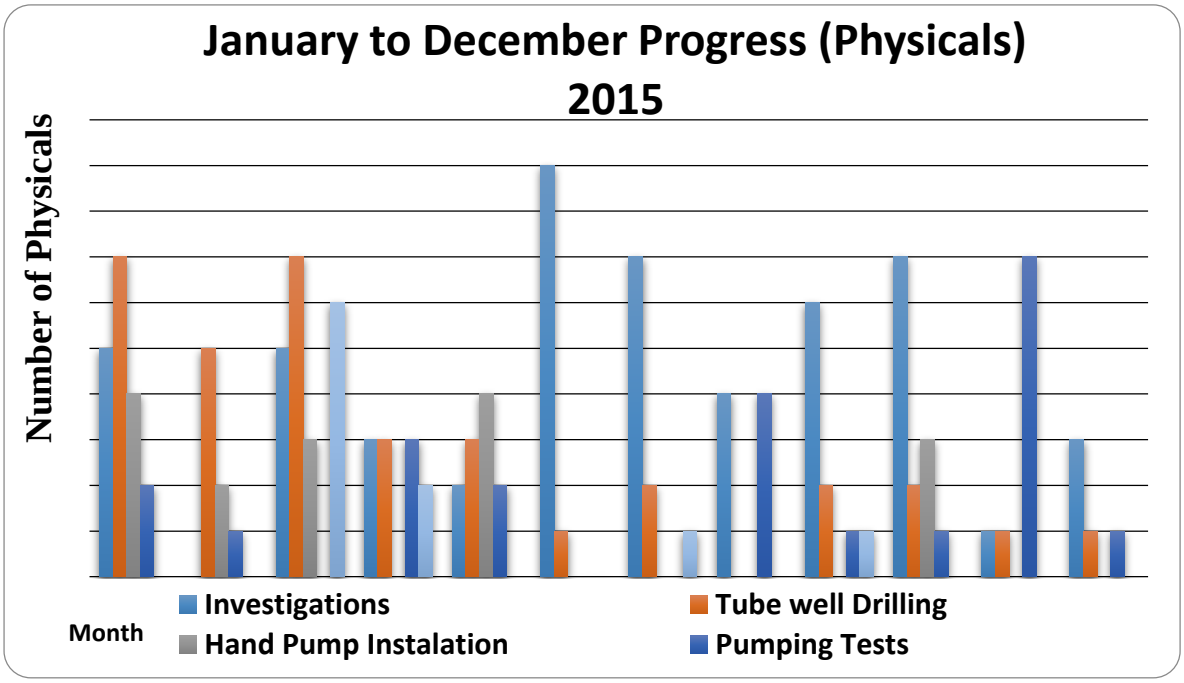
11.11 Under the project, **Water quality study in Chronic Kidney Diseases (CKD) prevailing areas of Kurunegala district** funded by treasury grant, prolpithigama and Giribawa DS Divisions were selected for the studies in 2015. The 79 water samples were collected from dug wells and tube wells (including Community Base Organization's wells, Common wells and Domestic wells) in Polpithigama DS division and the 21 water samples were collected from dug wells and tube wells (only Community Base Organization's wells) in Giribawa DS division for these studies. Full chemical and heavy metals (As,Cd) analysis were completed. Also, Three Hydrogeological investigations, three Tube wells drilling, two Hand pumps installation and two Awareness programs were conducted in Polpithigama and Giribawa DS divisions.

Finally workshop was successfully conducted on 22th December 2015 at Kurunagala with the participation of Hon. Wijith Wijayamuni Zoyza, Minister of Irrigation and Water Management, Secretary of Ministry of Irrigation and Water Management, Chief Secretary North Western Province, Additional District secretaries Kurunagala and Puttalum, Chairmen, General Manager and other office bearers in water Recourses Board, Divisional secretaries and Pradeshiya Saba Secretaries and other office bearers in Kurunagala and Puttalam Districts. There were more than 100 participants in both Government and Non Government Organization those who actively participated to make a one program to Control and Prevent the CKD in North Western Province.

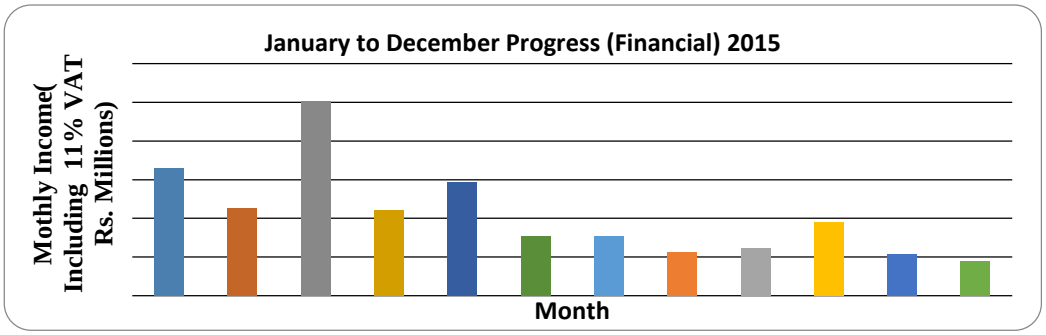
Sharmadana Campaigns were carried out to cleanup and keep the office premises in decent way with the actively participation of officers and other staff attached to provincial office.

Including government and privet party hydrogeological activities carried out in the year 2015 (From January to December) as follows. 52 total number of groundwater investigations, 34 tube well constructions, 22 pumping test were, 01 of well cleaning, 16 Hand pump installation, 238 sample analysis and 10 awareness programs & water clinics were carried out. (Not *including Project and 100days program activities*)

The total income of Provincial office Puttalam of the year 2015 from January to December, is Rs. **25,069,424.90**



Progress report from January to December 2015, Provincial Office Puttalam



	Project Name	Hydrogeological Investigations	Tube Well Drilling	Water Samples Collection	Water Samples Analysis	Pumping tests	Awareness & Water clinic	Well Monitoring
01	Hydrogeological study on limestone aquifer system in Mannar district	40	23	200	Full-60 Partial -50	02	00	5 times
02	Identification of suitable areas for Groundwater Recharge in Sri Lanka (Phase I-Puttalam District)	15	07	196	26	06	00	-
03	water quality study in CKD prevailing areas of Kurunegala district	03	03	100	100	-	03	-
04	Dam Safety and Water Resources Planning Project	ID-15, 2D-06	03	28	00	-	01	-

Month	Groundwater Investigations	Tube Well Drilling	Pumping Test	Awareness & water clinic	100days programme	Well Cleaning	Water Samples Analysis	Hand Pump Installation	Amount (Rs.)	
January	05	07	02	0	0	0	0	04	3,291,155	20
February	00	05	01	0	0	01	0	02	2,253,573	00
March	05	07	00	6	0	00	115	03	5,026,005	70
April	03	03	03	2	-	00	02	00	2,220,330	50
May	02	03	02	0	-	00	07	04	2,947,371	75
June	09	01	00	0	20	00	01	00	1,551,758	70
July	07	02	00	1	33	00	08	00	1,540,685	55
August	04	00	04	0	0	00	01	00	1,129,369	50
September	06	02	01	01	00	00	10	00	1,224,147	00
October	07	02	01	00	00	00	23	03	1,911,241	50
November	01	01	07	00	00	00	05	00	1,075,756	00
December	03	01	01	00	00	00	16	00	898,030	00
Total	**52**	**34**	**22**	**10**	**53**	**01**	**238**	**16**	25,069,424	90

Annual Income of the 2015, Provincial office Puttala without project activities: 25,069,424.90

Hydrogeological study on limestone aquifer system in Mannar district- 4.50 Mn

Identification of suitable areas for Groundwater Recharge in Sri Lanka (Phase I-Puttalam District) - 2.331 Mn

Under Treasury Grant Project activities 2015 & Dam Safety and Water Resources Planning Project.

11.12. Introduction

11.12.1. Background

Only 3% of all water occurring on earth surface is fresh water. Approximately 68% of that is locked up in continental ice-caps and glaciers. Remaining for us to use is only 32% of the world's fresh water. Only a small portion of this water occurs in rivers, lakes and reservoirs. Over 95% of the world's available freshwater resource is groundwater.

Groundwater is an important resource for livelihoods and food security of people, in Sri Lanka. Groundwater contributes to economic development in the country by providing water for irrigation, drinking and for industrial production. The value of groundwater to society should not be judged solely in terms of volumetric extraction. Compared to the surface water, groundwater use often yields larger economic benefits per unit volume, due to its availability at local level, drought reliability and good quality requiring minimal treatment if it is not subjected to contamination. Pressures on groundwater resources over the next 25 years in Sri Lanka will come from demographic increases, agricultural practices and energy demand. Spatial and temporal changes in temperature and precipitation may modify the surface hydraulic boundary conditions and ultimately cause a shift in the water balance of an aquifer. The variations in the amount of precipitation, the timing of precipitation events, and the form of precipitation are all key factors in determining the amount and timing of recharge to aquifers.

Kelani basin is one of the basins in Sri Lanka reported in critical stage. The water supply to the Colombo city and suburbs mainly depend on the Kelani River. It forms wide river terraces in certain locations such as Hanwella, Malwana etc. It contributes to groundwater recharge immensely. However, the quality of shallow groundwater in Colombo city area is highly polluted due to fecal contamination. Most of the industries such as bottle water industries, beverage industries and many of other industries located outside the Colombo city use groundwater to fulfill their water requirements. Lot of studies have been conducted to assess the quality and quantity of groundwater in this basin. Therefore, it is very useful to carry out this study because the findings of this study could be used to plan out the future development activities of the basin.

11.12.2. Scope and Significance of the Project

Despite the significance of groundwater for sustainable development of Sri Lanka, it has not always been properly managed, which often has resulted in depletion and degradation of the resource. The utilization of groundwater in Kelni river basin has not been assessed though this valuable resource use may parts of the basin for different purposes. Recently it was found that the most of the hotels in Colombo district use contaminated shallow groundwater for many hotel activities. A proposed study can produce water quality maps covering the entire basin to identify the level of contamination of shallow and deep groundwater in the basin. This type of data can be easily use for management practices in future.

11.12.3. Project Objectives

The project objective is to assess the groundwater in Kelani Basin qualitatively and quantitatively.

11.12.4. Specific Objectives

Demarcate groundwater zones with respect to the quality and quantity.

11.12.5. Methodology

The following methodology will be used to achieve the objectives and outcomes of the project.

a. Collect and review all available data and information to groundwater resources in the Kelani river basin
b. Collect rainfall data, evaporation data of last 100 years and analyze them
c. Demarcate different aquifer types within the basin
d. Identify the data gaps
e. Selection of test drilling sites to fill the data gaps
f. Test borehole drilling in selected location under phase I

11.12.6. Composition of target beneficiaries/Stakeholders

Designers who are planning small scale water supply schemes, industrial sector, policy makers and other stakeholders.

11.12.7. Relationship of the project to National Priority

Proposed project is related to groundwater conservation and the environmental protection. In view of the emerging threat to water pollution, the project should receive high priority.

11.12.8. Expected Output/Outcomes

a. The final outcome of the study would be the assessment of groundwater resources of the basin qualitatively and quantitatively.
b. Preparation of hydrogeological maps and water quality maps
c. Identification of more sensitive areas and area vulnerable to contamination
d. Identify areas where some restrictions to be imposed on water abstraction
e. Disseminate project outputs

11.13 Phase I Project

The phase I project is the groundwater assessment of upstream in the Kekani river basin.

11.13.1. Phase I Project Area

Phase I project area is the upstream area of Kelani river basin where it begins from Avissawella. Several cities which have been located within the project area are Thalduwe, Getahetta, Dehi-owita, Ruwanwella, Bulathkohupitiya, Yatiyanthota, Kithulgala, Ginigathhena, Deraniyagala, Norwood and Maskeliya.

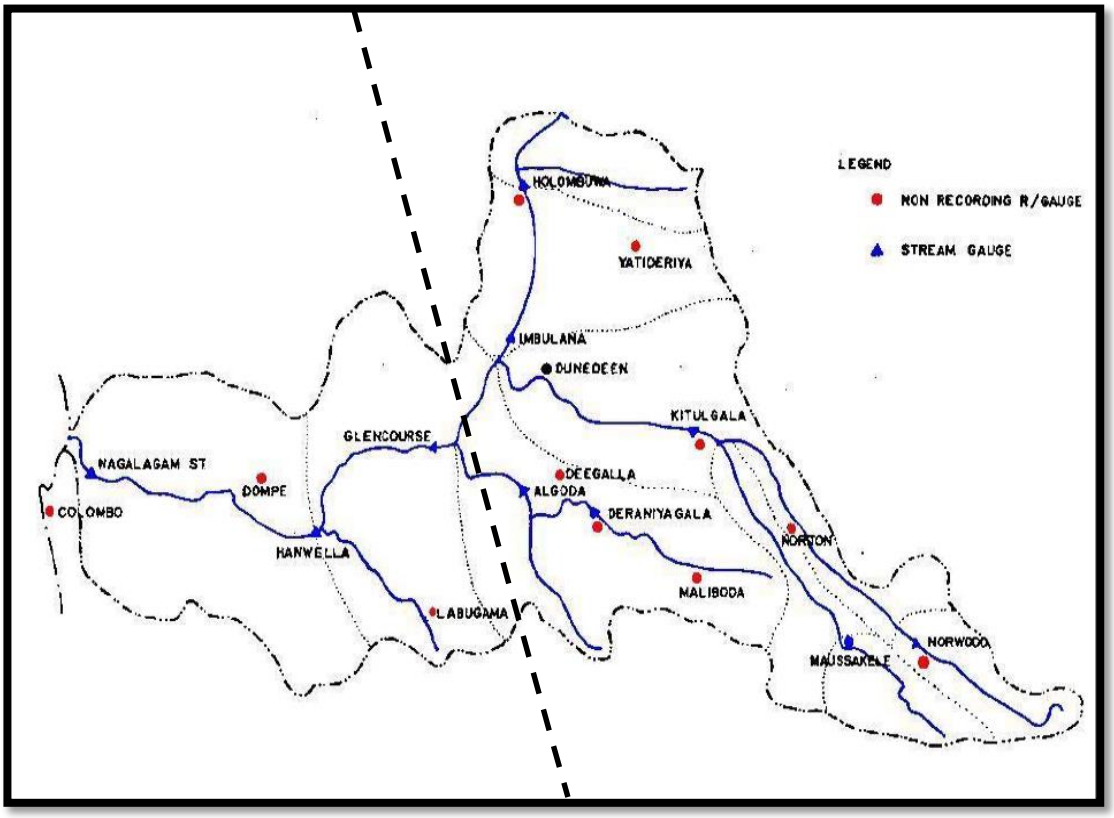


Diagram-01 (Phase I project area falls into the right side of the dashed line)

11.13.2. Geomorphology

The project area is located on an undulating topography where it begins from the sacred Sripada temple located on top of the Samanala Mountain which is about 2245 meters above sea level. Following diagram shows the digital elevation model of the project area. This map is not to scale and it only indicates terrain topography.

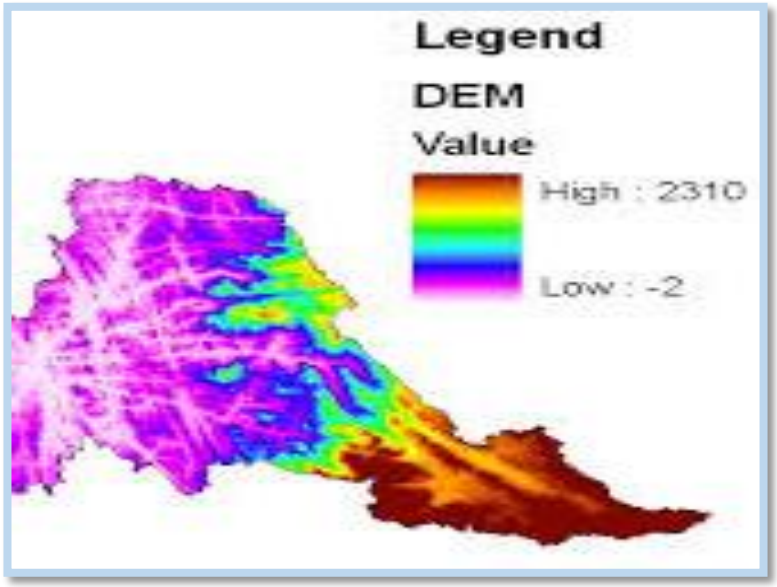


Diagram-02

11.13.4. Geology

The entire Kelani river basin falls into both Highland complex and Wanni Complex but the large extent of phase I project area is located in the Highland Complex. A small part of phase I including the Ruwanwella area belongs to the Wanni Complex. Consequently, phase I project area has different kind of rocks as it belongs to these both complexes.

Structures within the phase I project area which belongs to the Highland complex are dominated by metre-scale layering with an internal fabric showing evidence of ductile deformation, including transposition of layering, coupled with extreme flattening and stretching. The intense tectonic interlayering brings into contact adjacent lithologies that include both granulite-grade metasediments and chanockitic gneisses.

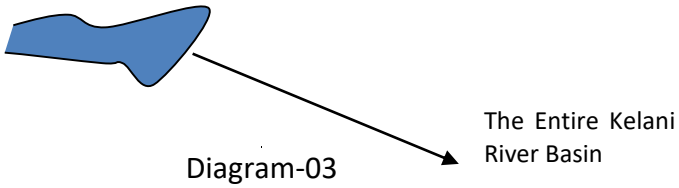


Diagram-03

Rock types and geological structures encountered at the phase I project area are shown in following geological maps.

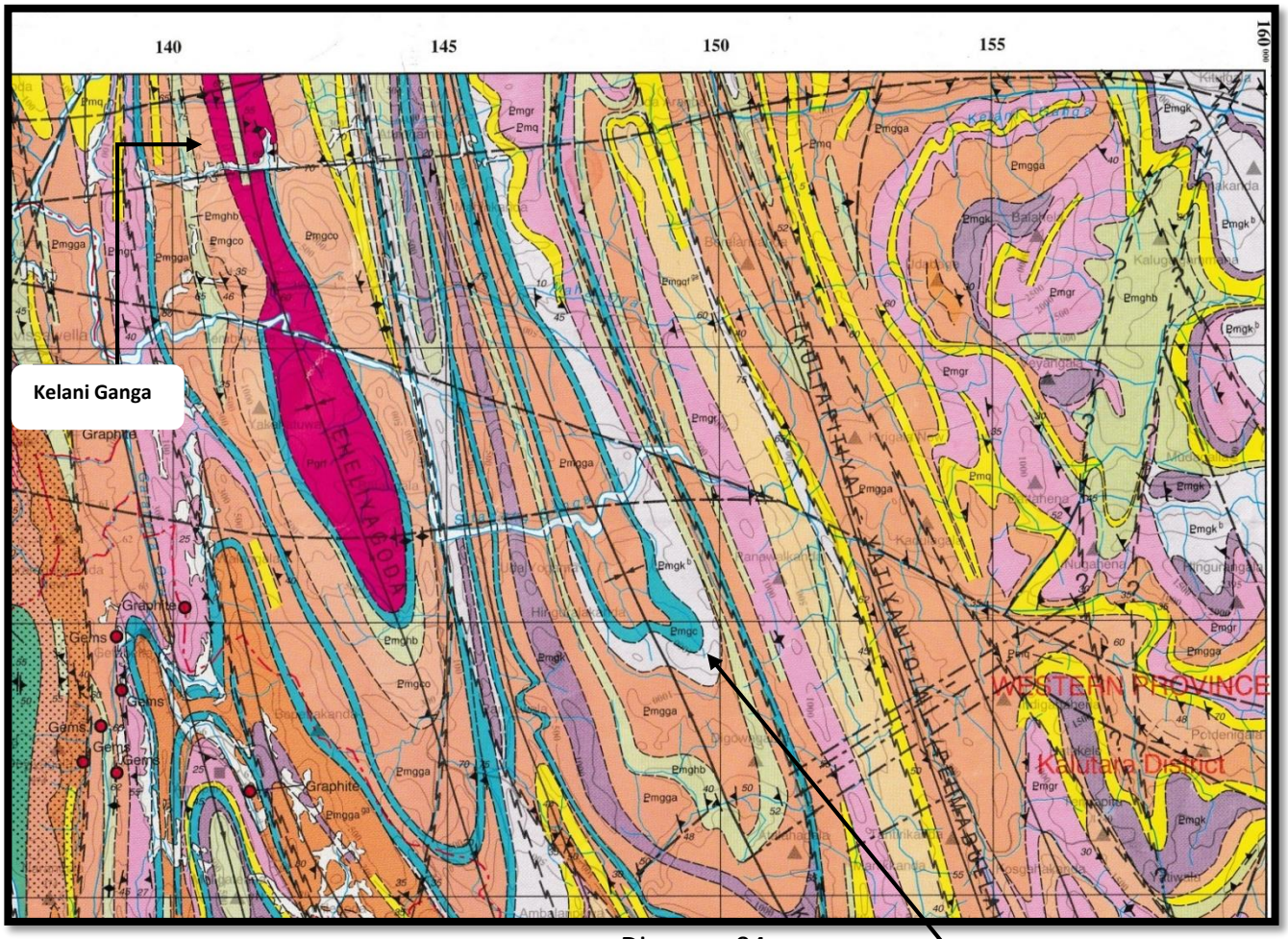


Diagram-04

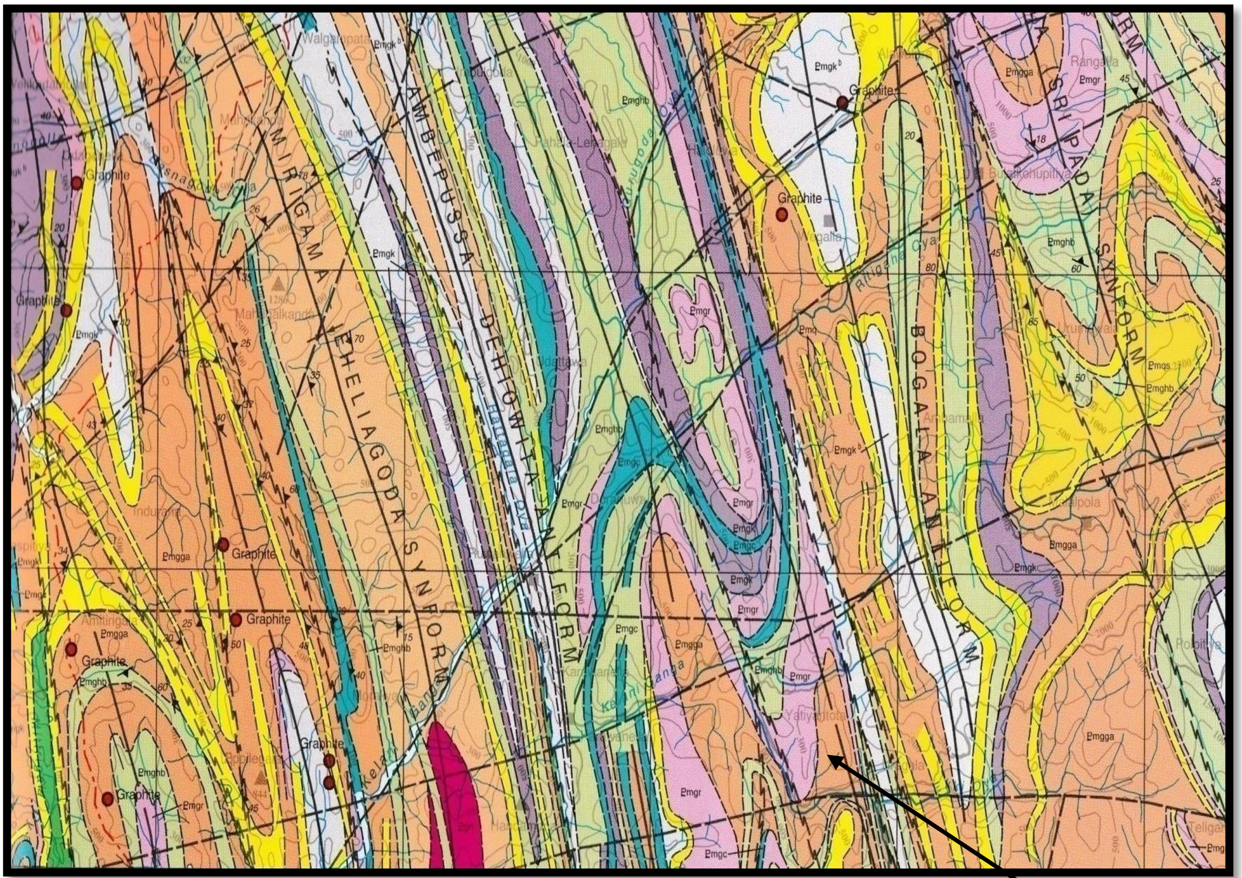
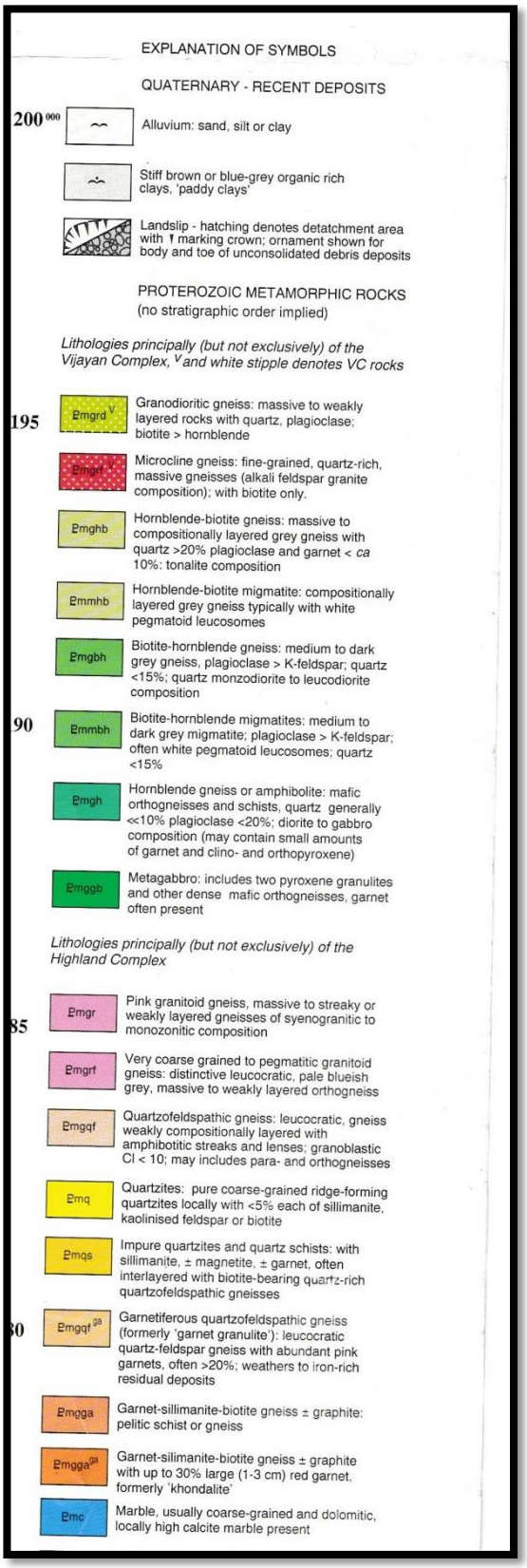


Diagram-05


EXPLANATION OF SYMBOLS
QUATERNARY - RECENT DEPOSITS
200 000
Alluvium: sand, silt or clay
Stiff brown or blue-grey organic rich clays, 'paddy clays'
Landslip - hatching denotes detatchment area with ▼ marking crown; ornament shown for body and toe of unconsolidated debris deposits
PROTEROZOIC METAMORPHIC ROCKS
(no stratigraphic order implied)
Lithologies principally (but not exclusively) of the Vijayan Complex, V and white stipple denotes VC rocks
195
Emgrd V
Granodioritic gneiss: massive to weakly layered rocks with quartz, plagioclase; biotite > hornblende
Emgrf
Microcline gneiss: fine-grained, quartz-rich, massive gneisses (alkali feldspar granite composition); with biotite only.
Emghb
Hornblende-biotite gneiss: massive to compositionally layered grey gneiss with quartz >20% plagioclase and garnet < ca 10%: tonalite composition
Emmhb
Hornblende-biotite migmatite: compositionally layered grey gneiss typically with white pegmatoid leucosomes
Emgbh
Biotite-hornblende gneiss: medium to dark grey gneiss, plagioclase > K-feldspar; quartz <15%; quartz monzodiorite to leucodiorite composition
90
Emmbh
Biotite-hornblende migmatites: medium to dark grey migmatite; plagioclase > K-feldspar; often white pegmatoid leucosomes; quartz <15%
Emgh
Hornblende gneiss or amphibolite: mafic orthogneisses and schists, quartz generally <<10% plagioclase <20%; diorite to gabbro composition (may contain small amounts of garnet and clino- and orthopyroxene)
Emggb
Metagabbro: includes two pyroxene granulites and other dense mafic orthogneisses, garnet often present
Lithologies principally (but not exclusively) of the Highland Complex
85
Emgr
Pink granitoid gneiss, massive to streaky or weakly layered gneisses of syenogranitic to monzonitic composition
Emgrf
Very coarse grained to pegmatitic granitoid gneiss: distinctive leucocratic, pale blueish grey, massive to weakly layered orthogneiss
Emgqf
Quartzofeldspathic gneiss: leucocratic, gneiss weakly compositionally layered with amphibotitic streaks and lenses; granoblastic CI < 10; may includes para- and orthogneisses
Emq
Quartzites: pure coarse-grained ridge-forming quartzites locally with <5% each of sillimanite, kaolinised feldspar or biotite
Emqs
Impure quartzites and quartz schists: with sillimanite, ± magnetite, ± garnet, often interlayered with biotite-bearing quartz-rich quartzofeldspathic gneisses
80
Emgqf gg
Garnetiferous quartzofeldspathic gneiss (formerly 'garnet granulite'): leucocratic quartz-feldspar gneiss with abundant pink garnets, often >20%; weathers to iron-rich residual deposits
Emgga
Garnet-sillimanite-biotite gneiss ± graphite: pelitic schist or gneiss
Emgga gg
Garnet-silimanite-biotite gneiss ± graphite with up to 30% large (1-3 cm) red garnet, formerly 'khondalite'
Emc
Marble, usually coarse-grained and dolomitic, locally high calcite marble present

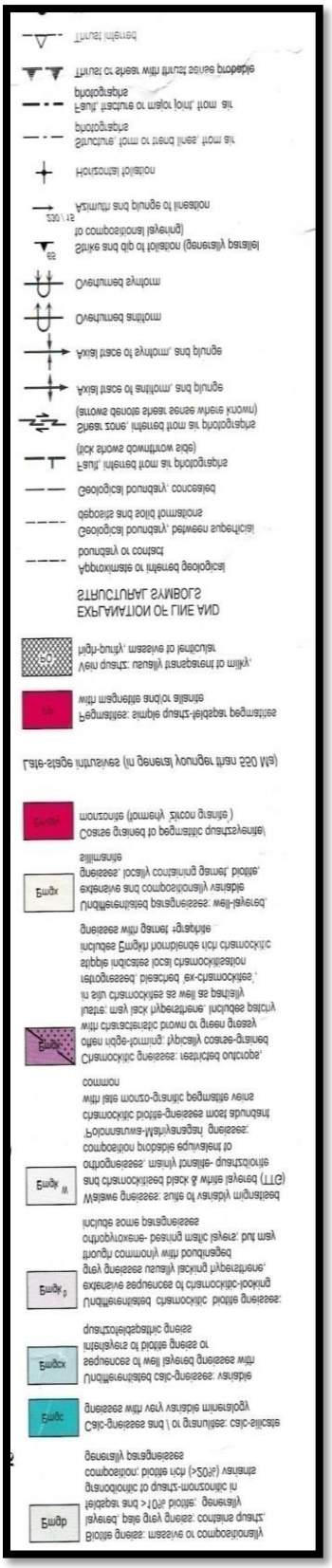


Diagram-06

11.14. Geophysical Surveys

11.14.1 Schlumberger Electrode Configurations

Geophysical surveys were conducted using electrical resistivity method to determine aquifer characteristic in subsurface. Even though there were several electrode configuration methods employed in the electrical resistivity method, the Schlumberger electrode configuration was used in this study.

A Vertical Electrical Sounding (VES) is typically carried out in Schlumberger array, where the potential electrodes are placed in a fixed position with a short separation and the current electrodes are placed symmetrically on the outer sides of the potential electrodes. After each resistivity measurement the current electrodes are moved further away from the centre of the array. In this way the current is stepwise made to flow through deeper and deeper parts of the ground. The positions of the current electrodes are typically logarithmically distributed with at least 10 positions per decade. For large distances between the current electrodes, the distance of the potential electrodes is increased to ensure that the measured voltage is above the noise level and the detection level in the instrument.

The study used current electrode spacing of 1/2AB=60m, in which the potential electrode separation MN has maintain its order of increment. The research was carried out to study the subsurface geologic condition and the hydrological condition of the phase I project area with the following objectives:

To identify the thickness, resistivity value of sub-surface layers; to determine the hydrological conditions of the area and to identify suitable places for test borehole locations within the study area.

11.14.2 Identification of Sites for Construction of Test Boreholes

Inspections were carried-out at several sites to identify places for the vertical electrical soundings. After analyzing of electrical resistivity data collected from the vertical electrical soundings, decisions were made to locate sites for construction of test boreholes. The 09 nos. of sites identified to carry-out the vertical electrical soundings were as follows.

a. **Kelani Valley Land, Thunkinda**
b. **Siriwardena Maha Vidyalaya, Yatiyanthota**
c. **Rajasinghe National School, Ruwanwella**
d. **Sri Saman National School, Deraniyagala**
e. **Ingiriyawatte Maha Vidyalaya, Ingiriyawatte**
f. **Pelallegama Vidyalaya, Theligama**
g. **Kalyani Maha Vidyalaya, Kithulgale**
h. **Seelanande Vidyalaya, Yak-ella, Bulathkohupitiya**
i. **We-oya Vidyalaya, Malalpola**

Geophysical surveys were conducted at 08 nos. of sites from above 09 nos. of sites as well as 02 nos. of sites, Siriwardena Maha Vidyalaya and Sri Saman National School, were identified for construction of test bore holes.

11.14.3 Modeling of Electrical Resistivity Data

Electrical Resistivity values with depths were modeled using 02 nos. of computer software such as 1X1D and VES-1P 1D.

Following diagrams 07 and 08 show model of vertical electrical Sounding -01 using VES-1P 1D conducted at Sri Saman National School.

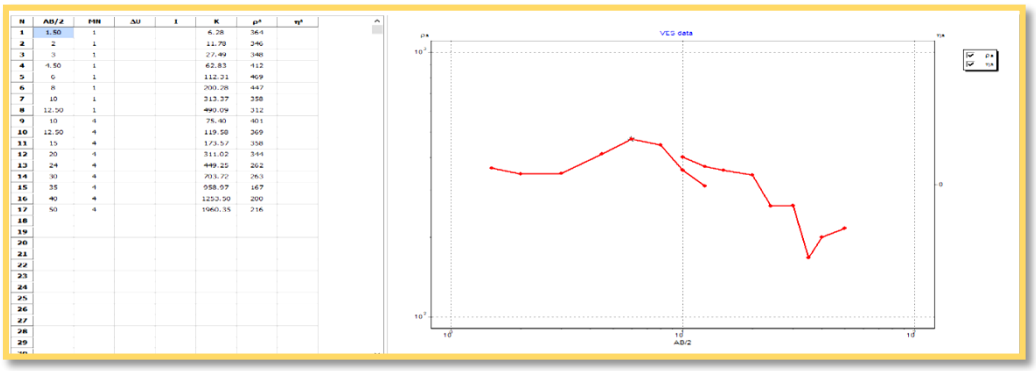
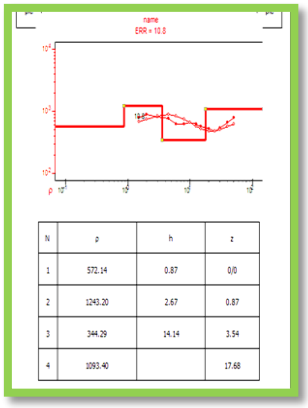


Diagram-07



N	ρ	h	z
1	572.14	0.87	0/0
2	1243.20	2.67	0.87
3	344.29	14.14	3.54
4	1093.40		17.68

Diagram-08

Following diagrams 09 and 10 show model of vertical electrical Sounding -01 using 1X1D conducted at Sri Saman National School.

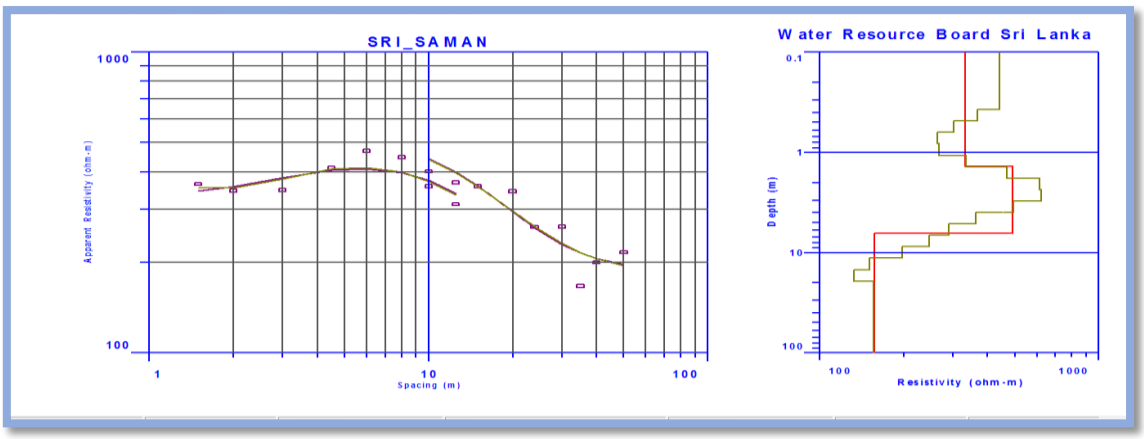


Diagram-09

Surface Elevation: 0.0000 Fitting Error: 11.005

Use Depth Instead of Thickness Units: (meters)

#	Rho	Fix?	Thick	Depth	Elev	Fix?
1	331.96		1.3737	1.3737	-1.3737	
2	492.00		5.0646	6.4384	-6.4384	
3	157.00					
4						
5						
6						
7						
8						
9						
10						
11						

Diagram-10

Following diagrams 11 and 12 show model of vertical electrical Sounding -01 using VES-1P 1D conducted at Sri Saman National School.

N	AB/2	MN	ΔU	I	K	ρa	ηa
1	1.50	1			6.28	112	
2	2	1			11.78	68	
3	3	1			27.49	65	
4	4.50	1			62.83	68	
5	12.50	1			490.09	71	
6	12.50	4			119.58	80	
7	15	4			173.57	77	
8	18	4			251.33	62	
9	20	4			311.02	76	
10	25	4			487.73	97	
11	30	4			703.72	110	
12	35	4			958.97	110	
13	40	4			1253.50	125	
14	45	4			1587.29	154	
15	50	4			1960.35	170	
16	60	4			2824.29	220	
17							
18							
19							
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21							
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26							
27							
28							
29							
30							

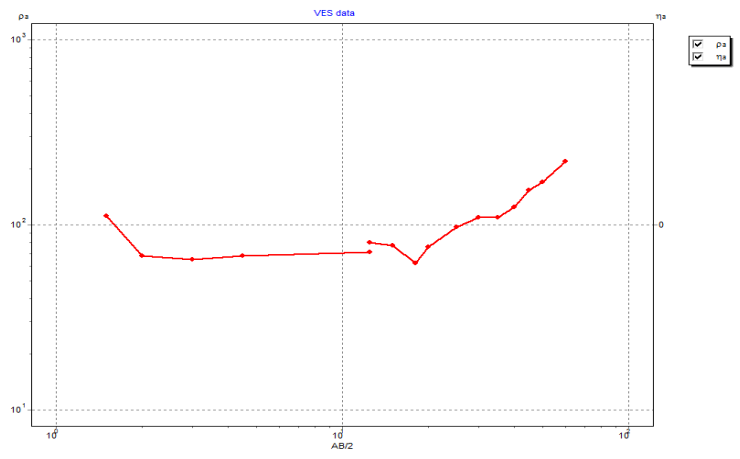
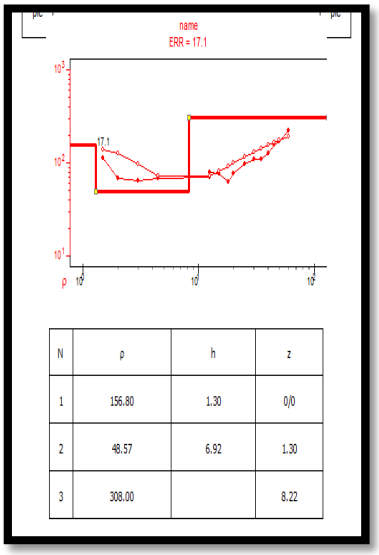


Diagram-11



N	ρ	h	z
1	156.80	1.30	0/0
2	48.57	6.92	1.30
3	308.00		8.22

Diagram-12

Next diagrams 13 and 14 show model of vertical electrical Sounding -01 using VES-1P 1D conducted at Sri Saman National School.

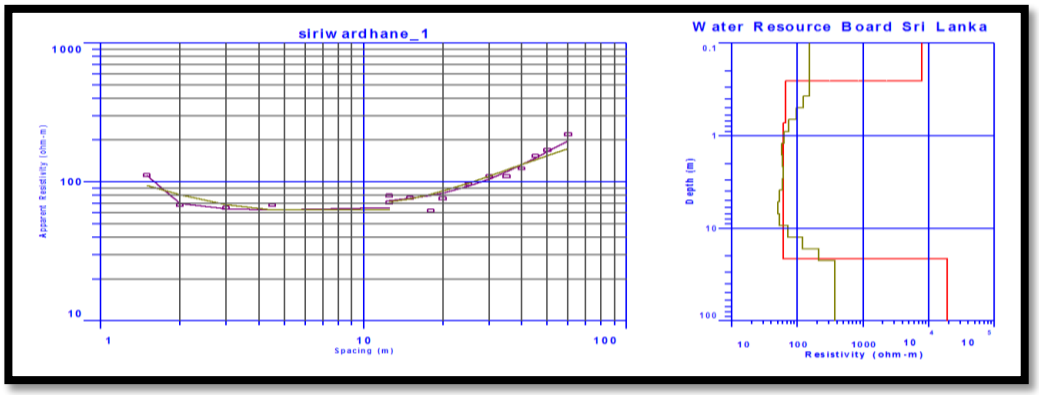
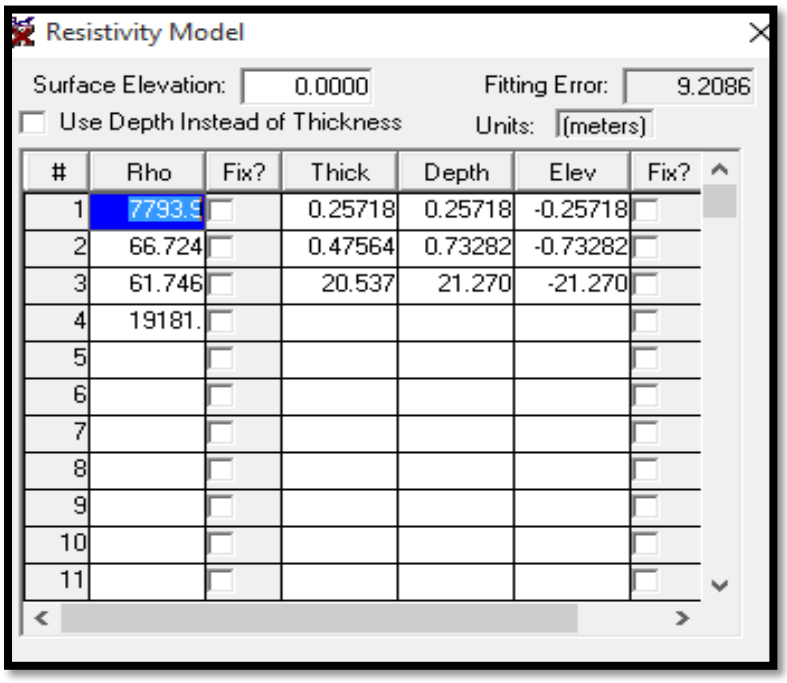


Diagram-13



#	Rho	Fix?	Thick	Depth	Elev	Fix?
1	7793.9		0.25718	0.25718	-0.25718	
2	66.724		0.47564	0.73282	-0.73282	
3	61.746		20.537	21.270	-21.270	
4	19181.					
5						
6						
7						
8						
9						
10						
11						

Diagram-14

11.5. Water Sample Collection

11.5.1. Location of Dug Wells and Shallow Tube Wells

100 nos. of water samples obtained from shallow dug wells and shallow tube wells were collected covering the entire phase I project area. In addition, depths to static or dynamic water levels and total depth of each well were measured and recorded. At present, 10 nos. of water samples obtained from the dug wells were analyzed for all chemical parameters except heavy metals at the laboratory of Water Resources Board. Locations of 100 nos. of dug wells and several shallow tube wells were marked on the satellite images using the 'Google earth' internet software.

11.5.2. Water Quality

According to the 10 nos. of chemical test reports, all chemical parameters are agreeable with drinking water standards set out by World Health Organization. However, it is unable to make decisions without a spatial analyze of all water quality parameters covering the entire project area.

Details of the wells and satellite images indicating locations of the wells are shown in Appendices A and B respectively. Chemical test reports are included into the Appendix C.

11.6 Conclusion

For detailed assessment of groundwater qualitatively in the phase I project area, it is needed to collect more than 150 nos. of water samples and has to be analyzed them for chemical parameters. In addition, water samples collected at the identified locations should be analyzed for heavy metals. Microbiological tests for the specific areas have to be conducted. Hydrochemical maps for spatial distribution of water quality parameters can be prepared using GIS software.

Geophysical surveys should be conducted to identify locations for construction of test bore holes. For quantitative assessment of groundwater in the project area, long term pumping tests should be conducted at the constructed test boreholes to determine aquifer parameters. For a quantitative assessment, it is needed to construct at least 10 nos. of test boreholes for long term pumping tests. In addition, qualitative evaluations of groundwater occurred in deep aquifers can be carried-out after analyzing of water samples for microbiological and chemical parameters including heavy metals. Geophysical logging also can be conducted at the test bore holes to study hydrogeological characteristics of deep aquifers with different kind of geological strata.

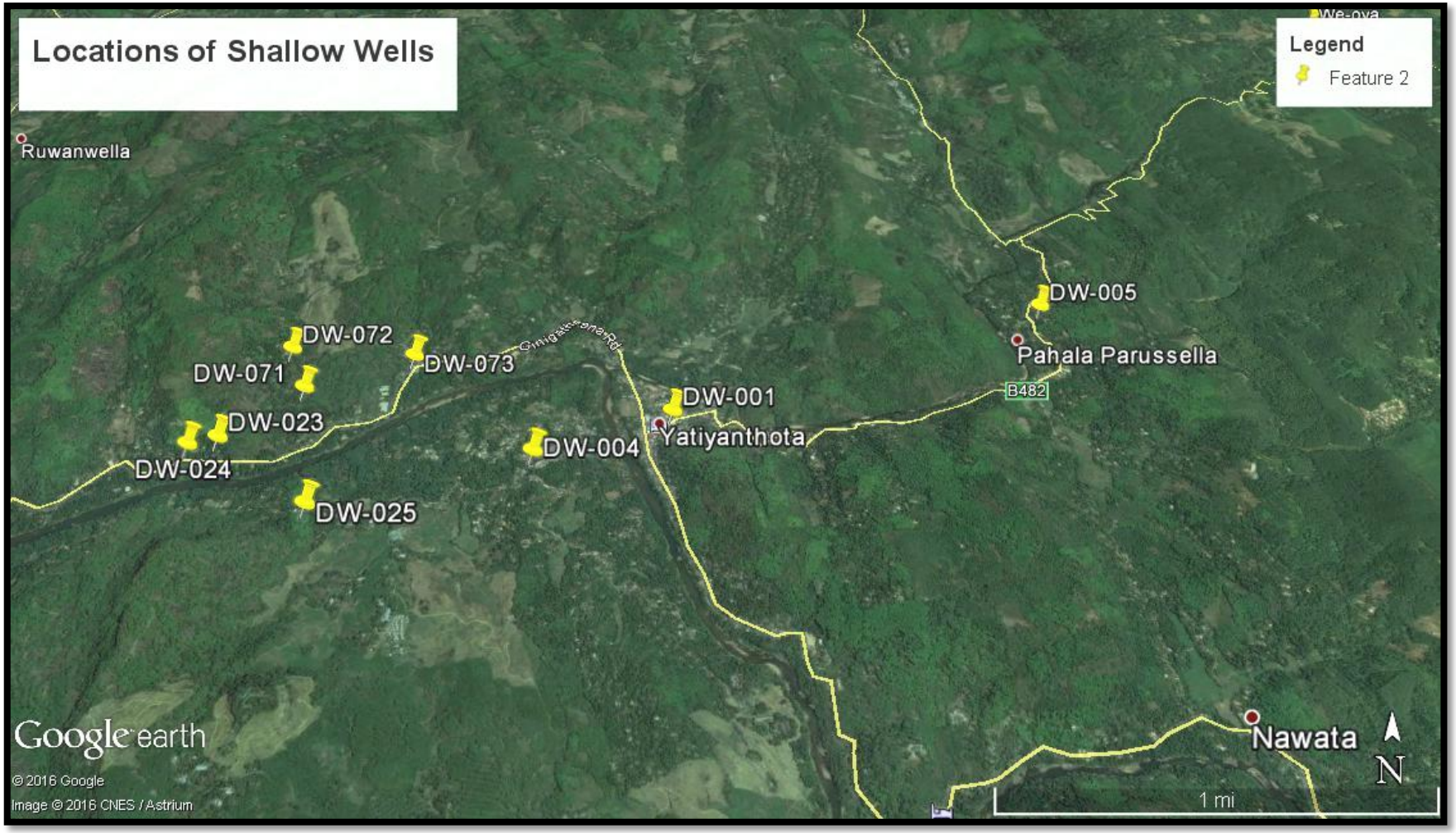
Hydrogeological data collected during the year 2015 is enclosed with this report and further analysis of these data should be carried-out with the remaining work to be continued in 2016.

Appendix A

Well No	coordinates N	E	Water level(m)	Depth(m)
DW01	7^{6} 1.752	80^{0}17.753	0.90	2.10
DW02	6^{0} 59.229	80^{0}15.842	2.15	6.85
DW03	6^{0} 57.921	80^{0}15.371	2.30	5.72
DW04	7° 1.612	80° 17.410	1.45	5.38
DW05	7° 2.128	80° 18.757	3.30	6.65
DW06	6° 59.737	80° 24.308		
DW07	6° 55.545	80° 20.491	overflow	1.40
DW08	6° 58.508	80° 29.440		
DW09	7° 1.425	80° 15.875		
DW10	6° 58.252	80° 15.916		
DW11	6^{0} 57.659	80^{0}13.267	2.70	5.90
DW12	6^{0} 57.943	80^{0}13.179	3.30	5.20
DW13	6^{0}58.365	80^{0}13.163	2.30	3.30
DW14	6^{0} 57.528	80^{0}13.401	0.50	3.30
DW15	6^{0} 57.745	80^{0}13.764	Off flow	1.00
DW16	6^{0} 57.887	80^{0}14.576	4.10	6.00
DW17	6^{0} 57.908	80^{0}15.552	1.60	2.60
DW18	6^{0} 57.038	80^{0}17.747	Off flow	2.80
STW19	6^{0} 59.949	80^{0}22.010		0.635(25”)
DW20	6^{0} 59.748	80^{0}24.985	4.30	6.40
DW21	6^{0} 59.623	80^{0}25.027	0.127(5”)	0.457(18”)
DW22	7^{0} 01.031	80^{0}24.940	1.50	3.00
DW23	7^{0} 01.646	80^{0}16.622	0.01(0.4”)	0.051(2”)
DW24	7^{0} 01.623	80^{0}16.553	2.30-0.70	4.10-0.70
DW25	7^{0} 01.428	80^{0}15.892		
DW26	6^{0} 56.390	80^{0}12.803	1.20	4.20
DW27	6^{0} 56.086	80^{0}13.001	3.80	5.50
DW28	6^{0} 55.945	80^{0}13.005	3.40-0.65	7.15-0.65
DW29	6^{0} 55.768	80^{0}13.011	0.90-0.80	5.40
DW30	6^{0} 55.455	80^{0}13.220	0.5	4.00
DW31	6^{0} 55.128	80^{0}13.315	4.80	7.70
DW32	6^{0} 54.745	80^{0}13.536	5.85	5.35
DW33	6^{0} 54.359	80^{0}13.690		
DW34	6^{0} 54.009	80^{0}13.766	1.80	3.75
DW35	6^{0} 53.689	80^{0}13.875	Off flow	1.00
DW36	6^{0} 53.500	80^{0}14.141	1.80	4.85
DW37	6^{0} 53.487	80^{0}14.734	3.90-0.85	5.20-0.85
DW38	6^{0} 52.430	80^{0}16.852	2.10	5.15
DW39	6^{0} 53.190	80^{0}16.626	2.50-0.80	5.80-0.80
DW40	6^{0} 53.588	80^{0}16.422	5.10	7.10
DW41	6^{0} 54.142	80^{0}16.507	2.45	3.80
DW42	6^{0}54.717	80^{0}16.482	2.30	4.00
DW43	6^{0} 55.148	80^{0}16.450	1.80	4.40
DW44	6^{0} 57.258	80^{0}16.091	1.00	6.10
DW45	6^{0} 57.843	80^{0}15.843	6.60	8.65
DW46	6^{0} 57.080	80^{0}13.666	3.10-0.75	5.60-0.75
DW47	6^{0} 57.102	80^{0}13.912	4.95	8.65
DW48	6^{0} 57.107	80^{0}13.947	3.65-0.85	6.20-0.85

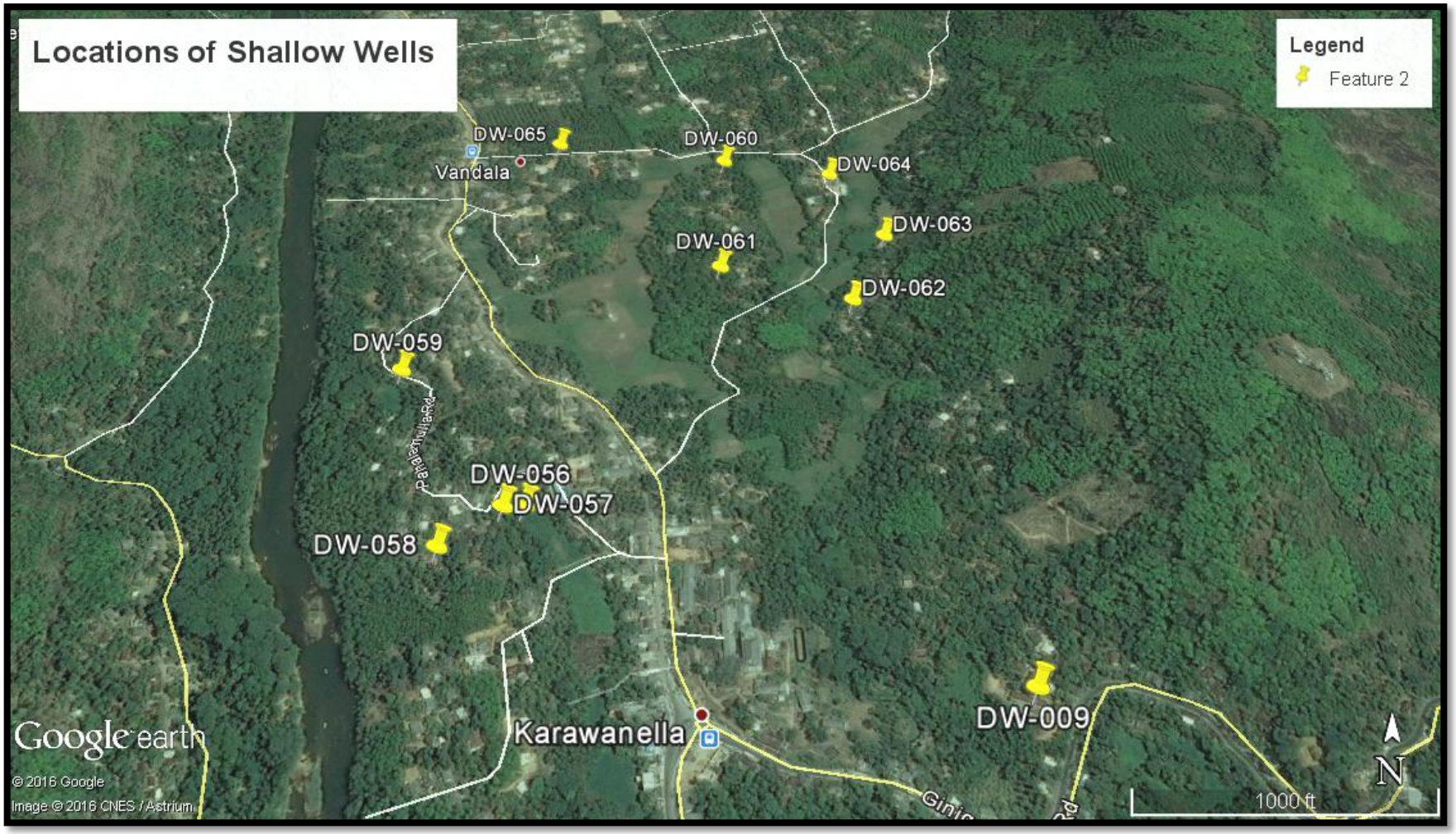
DW49	6^0 57.364	$80^0$13.961	2.40	4.50
DW50	6^0 57.308	$80^0$14.117	0.65	5.05
DW51	6^0 57.194	$80^0$14.244	Over flow	2.95
DW52	6^0 57.194	$80^0$14.244	Over flow	0.025(1”)
DW53	6^0 56.896	$80^0$13.784	3.40-0.65	5.50-0.65
DW54	6^0 56.726	$80^0$13.922	0.50	2.95
DW55	6^0 56.381	$80^0$14.260	3.65	5.60
DW56	$7^0$01.560	$80^0$15.564	4.10	6.90
DW57	7^0 01.559	$80^0$15.550	8.30	10.00
DW58	7^0 01.527	$80^0$15.512	Over flow	1.60
DW59	7^0 01.691	$80^0$15.459	Over flow	0.70
DW60	7^0 01.963	$80^0$15.694	1.40	3.20
DW61	7^0 01.814	$80^0$15.691	5.20	7.90
DW62	7^0 01.773	$80^0$15.799	Over flow	1.70
DW63	7^0 01.849	$80^0$15.825	5.30-0.70(P.W.L)	5.30
DW64	7^0 01.944	$80^0$15.786	2.80	4.10
DW65	7^0 01.984	$80^0$15.547	5.00 (P.W.L)	7.10
DW66	7^0 01.963	$80^0$20.411	6.50	7.60
DW67	7^0 06.235	$80^0$20.158	3.40	6.10
DW68	7^0 05.944	$80^0$19.640	2.30	2.90
DW69	7^0 05.759	$80^0$19.148	3.80(P.W.L)	4.70
DW70	7^0 05.222	$80^0$18.380	2.20	4.60
DW71	7^0 01.830	$80^0$16.793	2.90	4.10
DW72	7^0 01.963	$80^0$16.732	2.30	4.00
DW73	7^0 01.954	$80^0$17.057	0.40	2.10
DW-74	7^0 04.959	$80^0$15.185	2.70	5.90
DW-75	7^0 00.805	$80^0$17.725	3.50	6.20
DW-76	7^0 01.447	$80^0$17.319	1.30	2.30
DW-77	7^0 03.981	$80^0$16.753	0.50	3.30
DW-78	7^0 04.339	$80^0$16.404	Off flow	1.00
DW-79	7^0 04.217	$80^0$16.119	3.10	6.50
DW-80	7^0 04.003	$80^0$15.848	1.60	2.60
DW-81	7^0 03.811	$80^0$15.443	Off flow	2.80
DW-82	7^0 04.107	$80^0$15.239	0.90	2.10
DW-83	7^0 04.469	$80^0$15.296	2.15	6.85
DW-84	7^0 03.027	$80^0$15.444	2.30	5.72
DW-85	7^0 02.319	$80^0$15.350	1.45	5.38
DW-86	7^0 01.141	$80^0$17.517	3.30	6.65
DW-87	7^0 01.293	$80^0$17.721	1.20	4.60
DW-88	7^0 01.075	$80^0$17.816	2.80	4.10
DW-89	7^0 01.432	$80^0$17.384	1.90	4.10
DW-90	7^0 01.549	$80^0$17.335	0.40	2.15
DW-91	6^0 59.187	$80^0$15.683	2.40	5.95
DW-92	6^0 59.138	$80^0$15.244	3.30	6.10
DW-93	6^0 59.508	$80^0$15.954	1.30	2.30
DW-94	6^0 59.631	$80^0$16.396	0.50	3.30
DW-95	6^0 59.453	$80^0$16.729	Off flow	1.00
DW-96	6^0 59.534	$80^0$15.778	3.10	6.50
DW-97	6^0 59.531	80^0 26.993	1.60	2.60
DW-98	6^0 58.653	80^0 27.262	1.30	4.50
DW-99	6^0 58,269	80^0 27.207	0.40	2.60
DW-100	7^0 01.722	$80^0$17.911	2.80	6.05

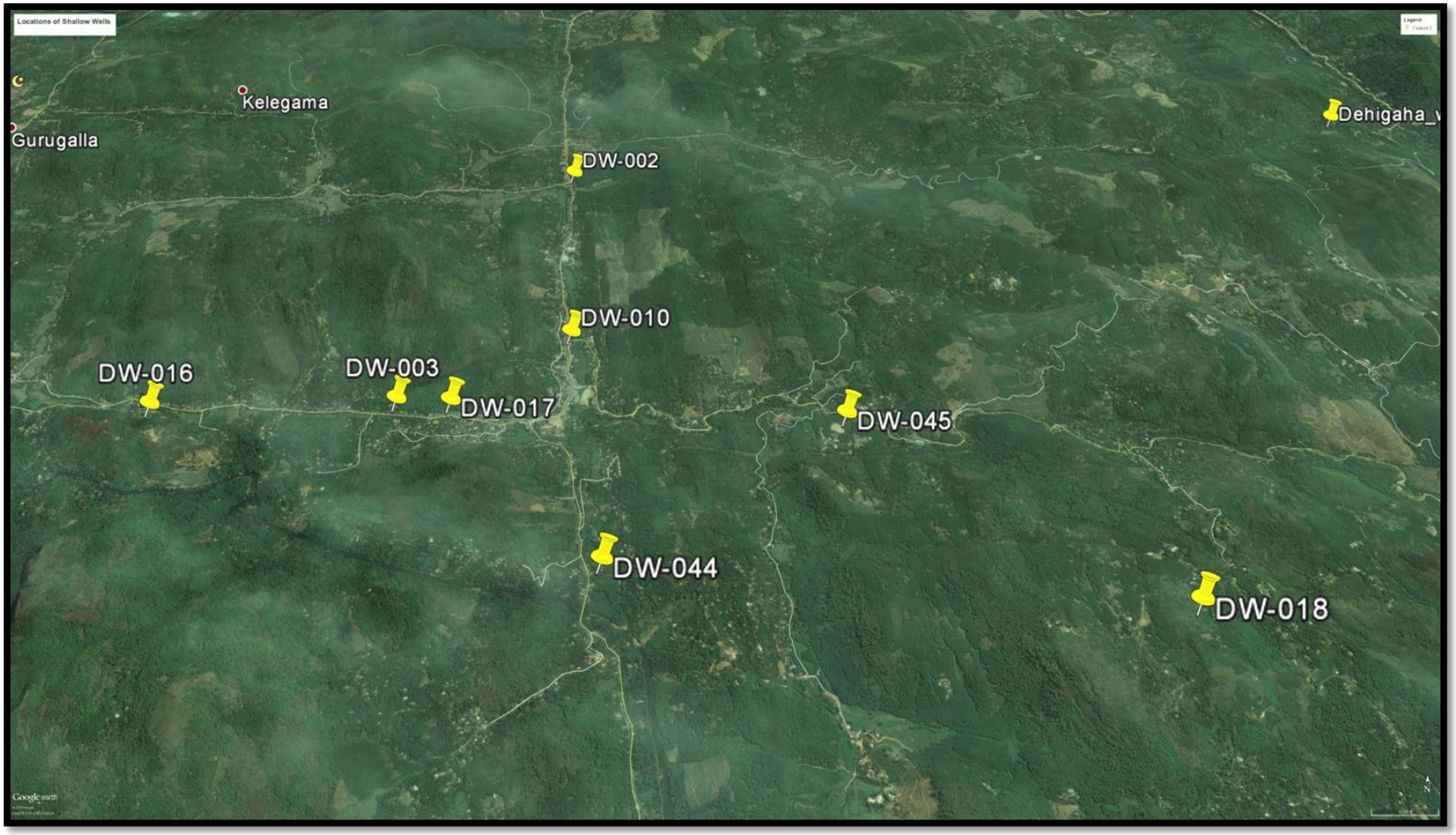
Appendix A



Satellite Image – 01

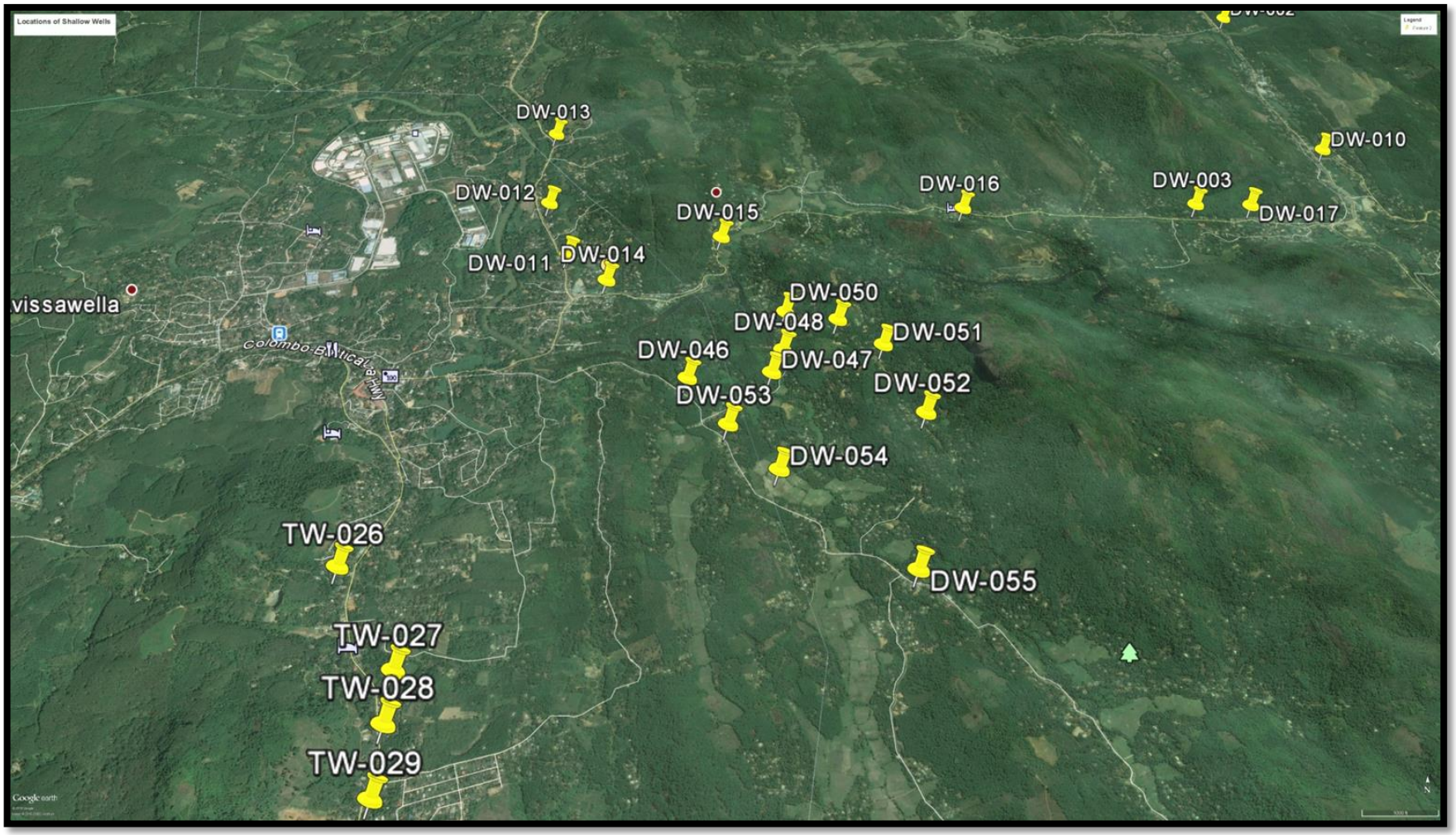
Satellite Image – 02

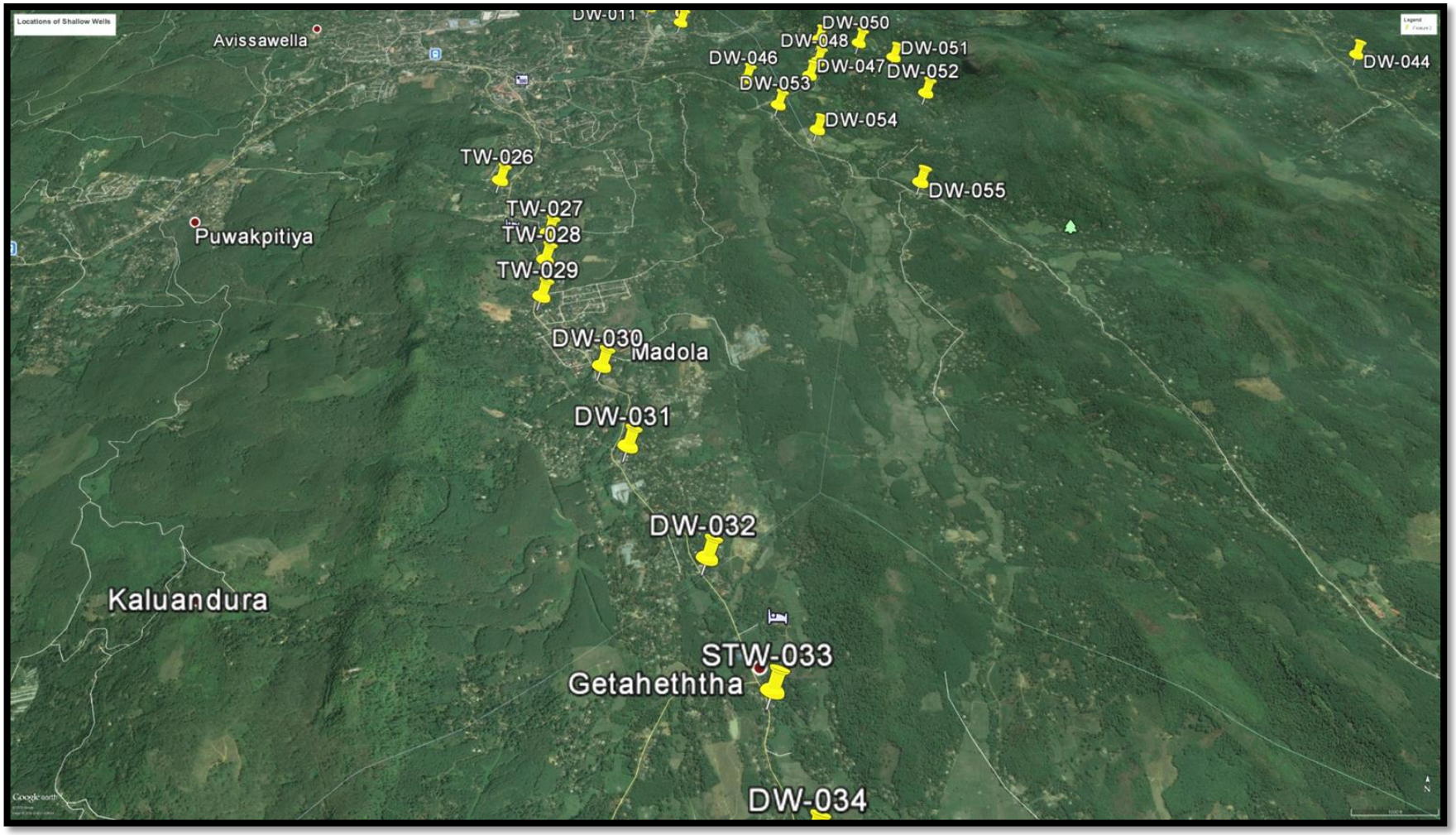




Satellite Image – 03

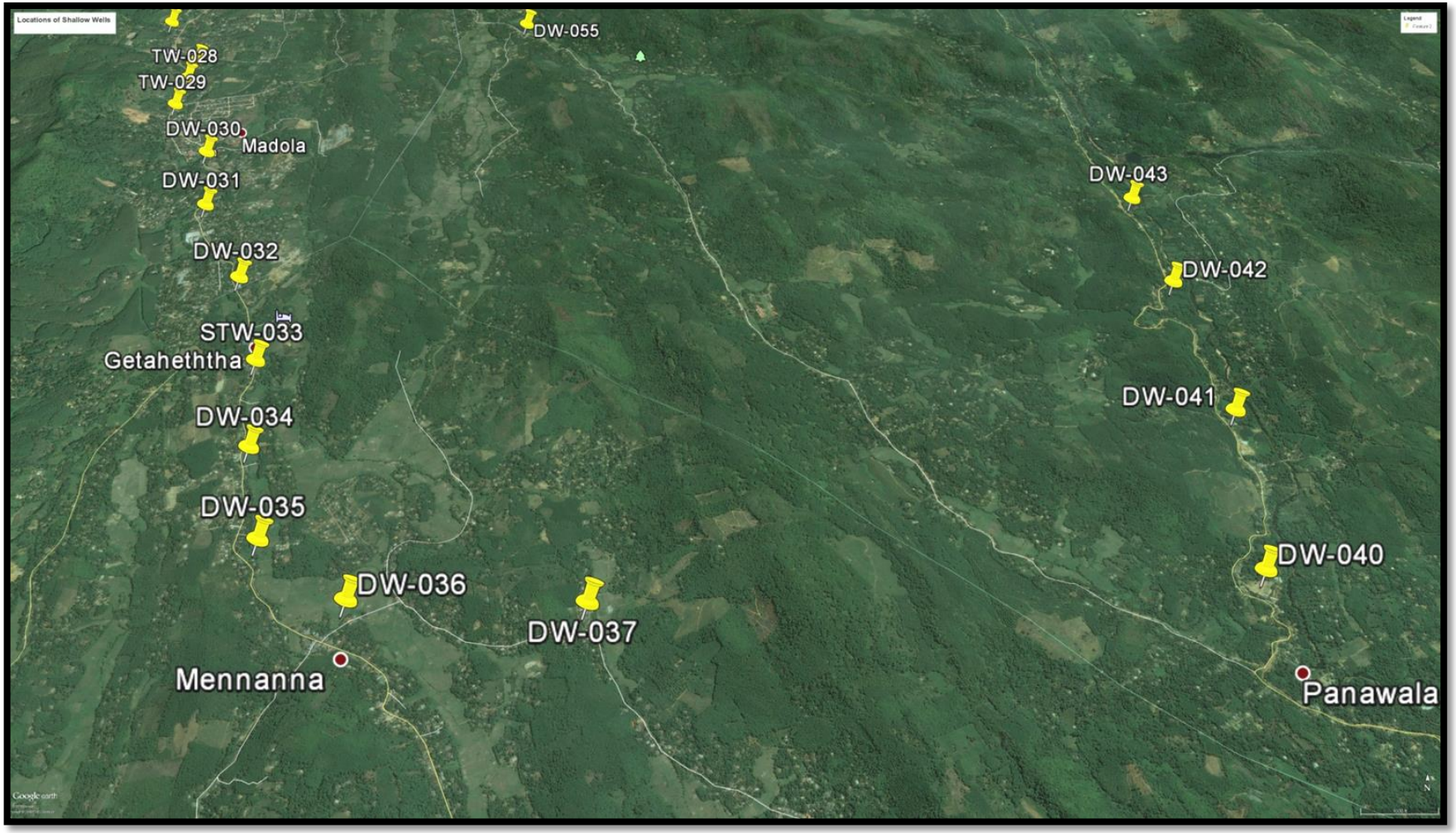
Satellite Image – 04





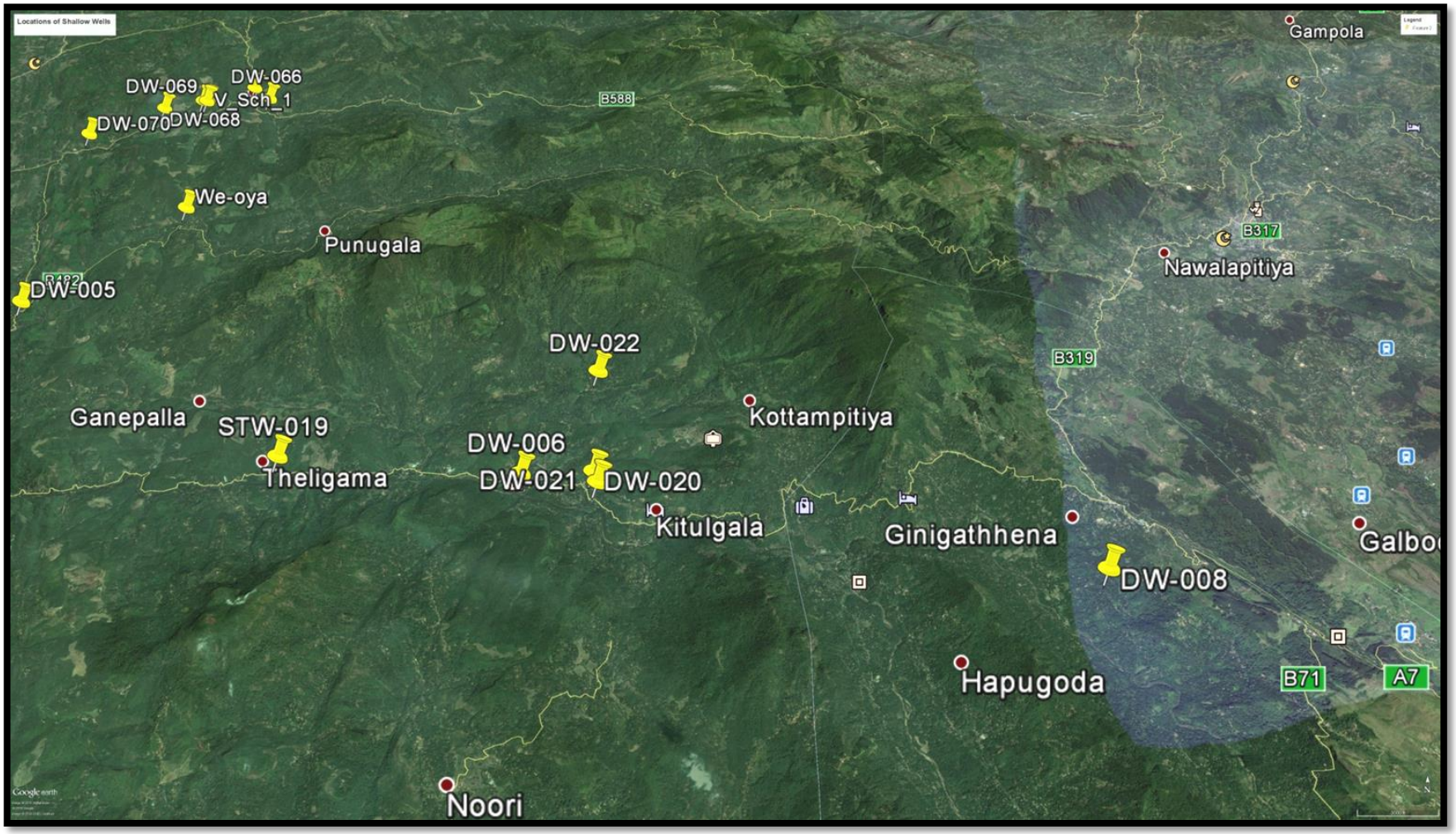
Satellite Image – 05

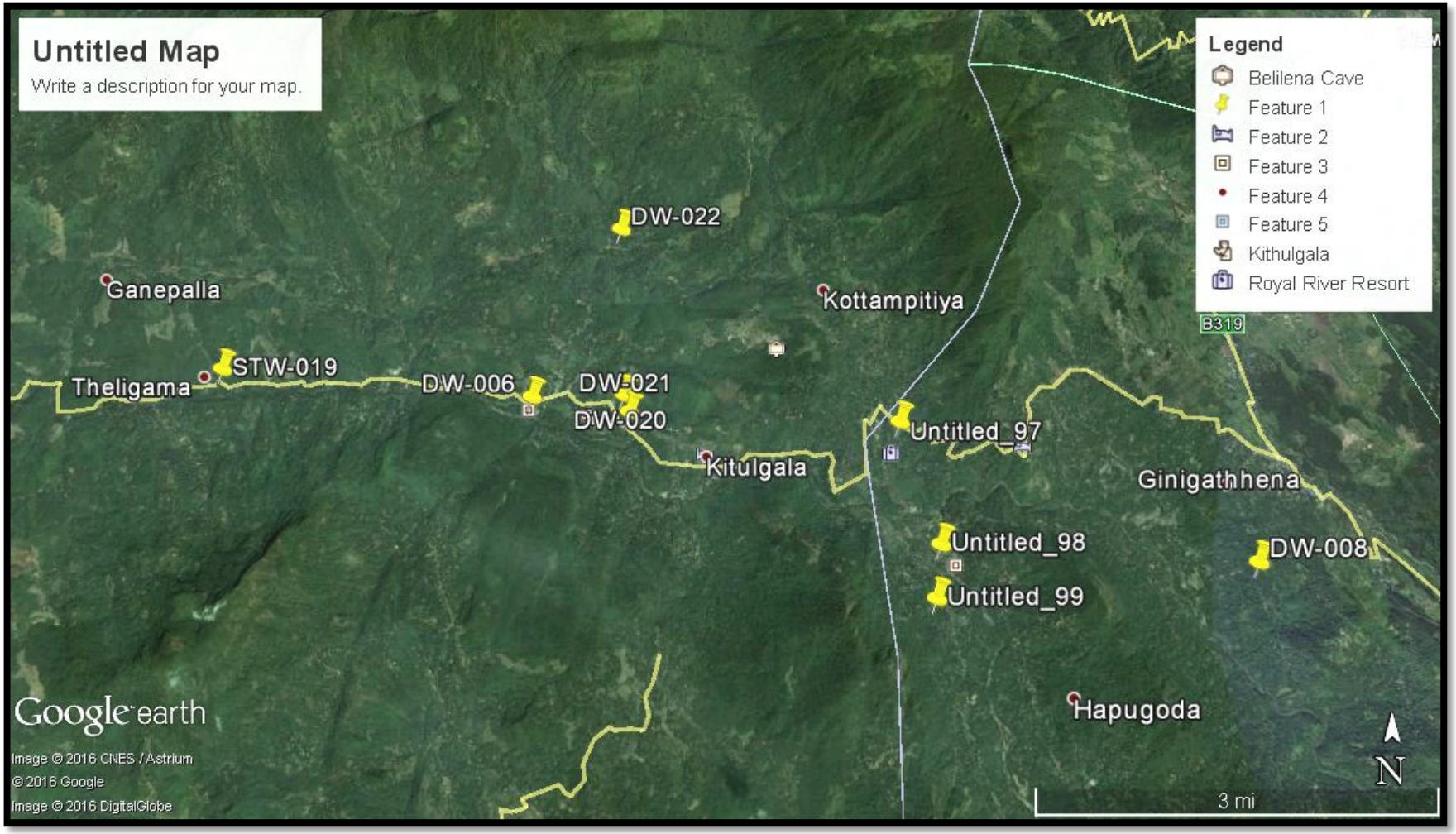
Satellite Image – 06



Satellite Image – 07

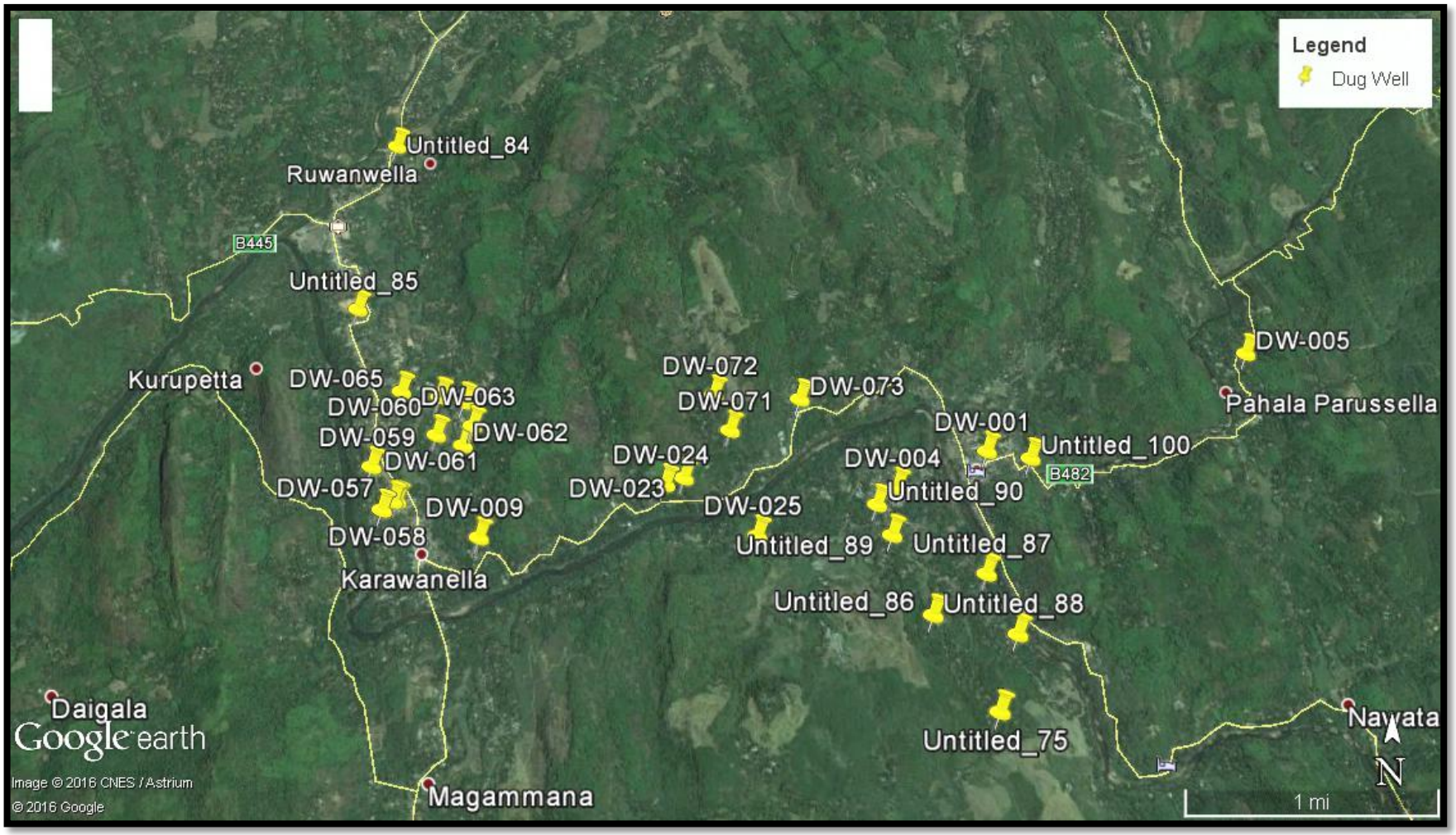
Satellite Image – 08

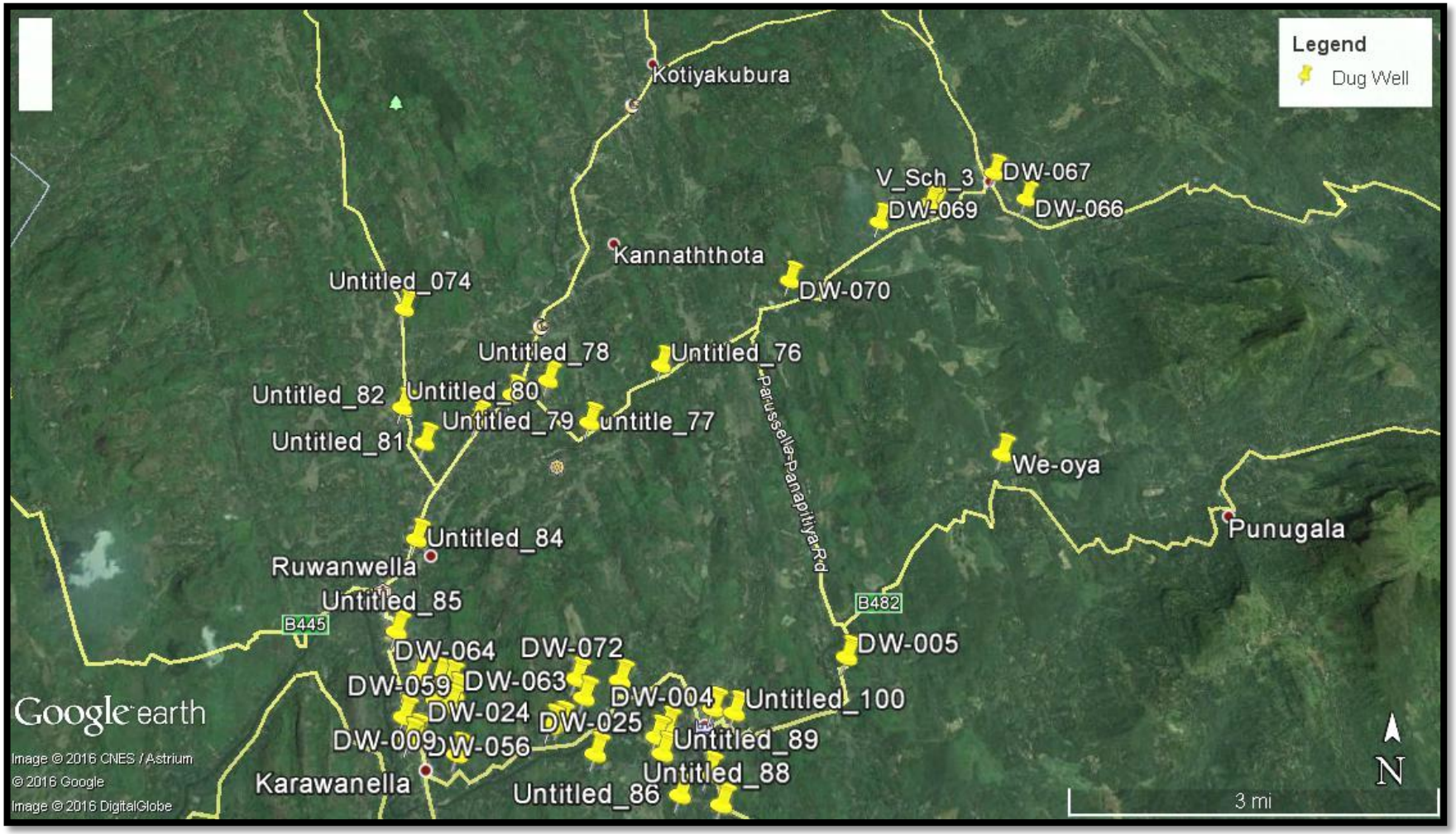




Satellite Image – 09

Satellite Image – 10





Satellite Image – 11

12. Uva Province

The Uva province office is situated at the Niwasa Road, Moneragal. Southern and Uva province works were covered by the Moneragala province office during the year 2015. Overall activities were conducted from Moneragala province office is as follows.

A. Hand pump repair works in Moneragala, Hambantota and Badulla districts under Treasury grant.
   1. Hand pump repair works : 100
   2. Tube well cleaning works : 50

B. DSWRPP funds in Moneragala and Badulla District
   1. Water sample collection for full analyze : 100
   2. Ground water investigation : 4
   3. Awareness programme was conducted in Badulla GA office for Selected AGA divisions such as Meegahakiwla, Kandakatiya, Redimaliyadda and Mahiyanganaya.

C. Under Hydrogeological study in:
   Ground water Development and Assessment in Krindioya Basin Area funded by treasury grant, 10 Hydrogeological Investigations, 10 Test Well Drilling were completed and 03 Pumping tests were performed. 54 water sample analyzed in full chemically. Details of the constructed wells are as follows.

Water sample collection under kirindi oya project

Tube well drilling under kirindi oya project

	DS	GN	Village	Location
1	Damana	Pannalgama (W25A)	Kurudu Watha Pannala gama	Kurudu Watha Pannala gama
2	Damana	Pannal gama (W25A)	Ranaviru Gammanaya Pannala gama	Ranaviru Gammanaya
3	Damana	W24D, Niththa Ambanoya wasama	135 Niththa Madawala Landa	135 Niththa Madawala Landa
4	Mahaoya	144 A Kakirihena	Kakirihana	Kakirihana
5	Mahaoya	Bogamuyaya	Bogamuyaya	Bogamuyaya
6	Sewanagala	Muthuminigama	Muthuminigama	Near Muthiminigama yogashrama temple
7	Monaragala	Kotigalhala	Kotigalhala	Sri Sambodi Vihara Serasarya
8	Monaragala	Sirigala	Sirigala	Sirigala Charch

9	Madagama	Polgaapitiya	Bakinigahawela , Thimbiyagasara	Thimbiyagasara
10	Madagama	11th mile post	11thmile post, madagama	Dimbiyagas ara
11	Monaragala	Hindikiwla	Hindikiwla, Nakkala	Hindikiwlaa
12	Monaragala	Hulandawa - South	Tisapura - Hulandawa	Hulandawa South
13	Monaragala	Marawa	Marawa	Marawa, Hulandawa North
14	Monaragala	Wallawaya	Wallawaya	W.M Wijasinha land
15	Manthottama	Ampara	Manthottama	Manthottama Mahavidyalaya
16	Monaragala	Siyabalanduwa	Gurugammanaya	Gurugammanaya
17	Buttala	Buttala	Gangeyaya	Gageyaya Mahagodayaya Buttala

D. Tube well construction works under CKD project.

1. Construction of new tube wells (including investigations and Water sample analyze): 17

No	DS	GN	Village	Location
1	Damana	Pannalgama (W25A)	Kurudu Watha Pannala gama	Kurudu Watha Pannala gama
2	Damana	Pannal gama (W25A)	Ranaviru Gammanaya Pannala gama	Ranaviru Gammanaya
3	Damana	W24D, Niththa Ambanoya wasama	135 Niththa Madawala Landa	135 Niththa Madawala Landa
4	Mahaoya	144 A Kakirihena	Kakirihana	Kakirihana
5	Mahaoya	Bogamuyaya	Bogamuyaya	Bogamuyaya
6	Sewanagala	Muthuminigama	Muthuminigama	Near Muthiminigama yogashrama temple
7	Monaragala	Kotigalhala	Kotigalhala	Sri Sambodi Vihara Serasarya
8	Monaragala	Sirigala	Sirigala	Sirigala Charch
9	Madagama	Polgaapitiya	Bakinigahawela , Thimbiyagasara	Thimbiyagasara
10	Madagama	11th mile post	11thmile post, madagama	Dimbiyagas ara
11	Monaragala	Hindikiwla	Hindikiwla, Nakkala	Hindikiwlaa
12	Monaragala	Hulandawa - South	Tisapura - Hulandawa	Hulandawa South
13	Monaragala	Marawa	Marawa	Marawa, Hulandawa North
14	Monaragala	Wallawaya	Wallawaya	W.M Wijasinha land
15	Manthottama	Ampara	Manthottama	Manthottama Mahavidyalaya
16	Monaragala	Siyabalanduwa	Gurugammanaya	Gurugammanaya
17	Buttala	Buttala	Gangeyaya	Gageyaya Mahagodayaya Buttala

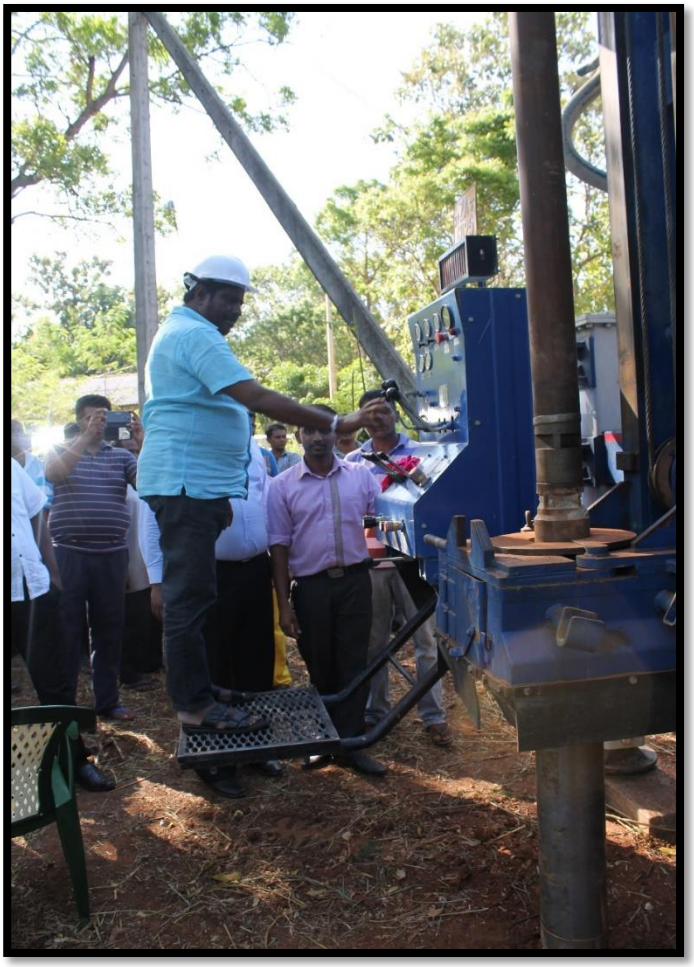
2. Three number of awareness and water clinics programme were conducted in Siyambalanduwa, and Bibila AGA division area to aware the rural community.
3. RO plant installation at Thammannewawa, Bandagiriya, Hambanthota

E. 100 Day perogramme in Moneragala and Ampara district

Detail Hydrogeological surveys (143), Tube wells drilling (63), Installation of Hand Pumps and water quality analysis were carried out to develop drinking & domestic water supply in Moneragala district under 100 day program details of the constructed wells are as follows.

1	R03/15/10	Dewniyankumbura
2	R03/15/11	Baduluketiya
3	R03/15/12	Kolongolla
4	R03/15/13	Galamuna
5	R03/15/15	mahathenna South
6	R03/15/16	Waguruwela
7	R03/15/17	Palle Aruwa
8	R03/15/18	Nelumgama
9	R03/15/19	Saripuththaramaya Medagama
10	R03/15/20	Ambakola walauwa buttala
11	R03/15/21	Diggala Kadayanna
12	R03/15/22	Rahathangama
13	R03/15/23	Pallawatta
14	R03/15/24	Minindoru Kuliara
15	R03/15/25	KithulkoteBawana Madyasthanaya
16	R03/15/26	Bakinigahamulla Junction
17	R03/15/27	Bakinigahamulla Polwatta
18	R03/15/28	Mananpitiya
19	R03/15/29	Harabokka
20	R03/15/30	Miyankandura
21	R03/15/31	Koongalla
22	R03/15/32	Meegahawagura Near Mosque
23	R03/15/33	Meegahawagura Nishan Land
24	R17/15/05	Gangarama Visrama Salawa
25	R17/15/06	Kataragama Visrama Salawa
26	R17/15/19	Maura Pre School Iwela
27	R17/15/20	Dehiwalalanda Kodayana
28	R17/15/21	Sengamuwa

29	R17/15/22	Pitathalawa Village
30	R17/15/23	Galwala Alumadu
31	R17/15/24	Dharakinakanda Asapuwa
32	R20/15/01	Rathupasketiya Village Bibile
33	R20/15/02	W.R.B.Office Monaragala
34	R20/15/03	Pallearawa Village
35	R20/15/04	Sri Paramarama Rajamaha Viharaya
36	R20/15/05	Ambagolla
37	R20/15/06	Dambagolla
38	R20/15/07	K.M.P.Piyasena Diggalhena
39	R20/15/08	Weherayaya
40	R20/15/09	Maranadara Samithi Salawa Gonagamara
41	R20/15/10	Madagama
42	R20/15/11	Gaminipura
43	R20/15/12	Nelumsirigama
44	R20/15/14	Indigahalanda
45	R20/15/15	Abhayalanda Near Mr.Sarath house
46	R20/15/16	Punchiwewa Temple
47	R20/15/17	Nelumwewa
48	R20/15/18	Sandya Kumuduni Land
49	R20/15/19	H.M.Wasantha Piyasiri Land
50	R20/15/20	Kahakurullanpelessa
51	R20/15/21	Vijitha Kumara Land Alithwewa
52	R22/15/03	Sethapuma wewa Junction Anapallama
53	R22/15/04	Raathri wewa Maligawila Buttala
54	R22/15/05	Medagama Bibila
55	R22/15/06	Muwanpelassa Junct.Gaminipura Thanamalwila
56	R22/15/07	Samagipura tharuna Janapada Vidyalaya
57	R22/15/08	Katharagama Devalaya Katharagama
58	R22/15/09	Balahoruwa Kuda Oya Anandapura
59	R22/15/10	Balahoruwa
60	R22/15/11	Okkmpitiya Samagipura
61	R22/15/12	Mal Dam Abe
62	R22/15/13	Near Chali Kade Ambagastenna
63	R22/15/14	Kurunduwattha Ambagastenna



Tube well drilling start at thanamalvila
under 100day programe by
Hon. Minister Gamini Vijith Vijayamuni Soiza

2. Following Project office in Monaragala district were opened under 100day program

1. Bibila
2. Siyabalanduwa
3. Wallawaya
4. Buththala
5. Thanamalvila
6. Sewanagala

Rathupaskatiya water project


Office opening Buththala and Thanamalvila

2. Following water supply schemes were started under 100day programme

    1. Rathupaskatiya (completed)
    2. Gonaganara (Partly completed)

C. Project (Establishment of Groundwater Monitoring for Sri Lanka project, water supply scheme sites data were collected in Sothern province and Uva Province.)

    1. Data collection works of water supply schemes
        a. Habantota District : 56 sites
        b. Moneragala District : 31 sites
        c. Nuwaraeliya District : 03 sites
        d. AmparaDistric : 06 sites

    2. Construction of two no of tube wells for study purposes in Habmantota District

Commercial Works

Following Geophysical surveys and Hydrogeological studies have been completed during the year 2015 from the provincial office Moneragala covered by Uva and Southern provinces

1. Detail groundwater surveys were done to full fill the water requirement of proposed Uma oya Dam site at Dybaara. One no. of location was selected for tube well drilling.
2. Pumping test program was carried out and reports were submitted to Ekamuthu community based organization for drinking water supply project at Dedduwawala.
3. According to request made by the Director, Department of National Zoological Gardens, hydrogeological and geophysical investigations were carried out to find a suitable location for proposed Ridiyagama safari park.
4. A ground water investigation, construction of deep tube well and pumping test were conducted to supply water to Uma oya resettlement site at Dybaara, Walimada.
5. Ground water investigation works were carried out and report was submitted to Mahiyanganaya Dole lanaka (pvt) Ltd for selection of suitable sites for water supply of Banana cultivations.
6. Three no of 48 hours Pumping tests were carried out at Dole Lanka farm, Buththala report was submitted to the client.

7. One no of 6 hours Pumping test at panangala and two no of yield test at Henakanda ulpatha, Galagedarawaththa were done and reports were submitted to the client.
8. one no of 24 hours Pumping tests were carried out to determine the subsurface characteristic at Ridimaliyadda Mahaweli Authority regional office and report was submitted to the client

Pumping test at Ridimaliyadda Mahaweli authority regional office

9. A groundwater investigation and construction of deep tube well were done for water supply to hotel site at Blackpool, Nuwara eliya.
10. A ground water investigation and well construction works were completed and report was submitted to Veterinary hospital at Meegahakiwla.
11. Ground water investigation works were carried out and report was submitted to Kumbalwela Pradeshiyasaba.
12. Ground water investigation works were carried out and report was submitted to Galauda hospital funded by Uva Palathasaba.
13. Ground water investigation works were carried out at Meegahakiwla Agrarian services center and kandakatiya Agrarian services center and report was submitted to the clients.
14. Ground water investigation works were carried out at wandama, Buththala and report was submitted to SL agro pvt (Ltd).
15. Ground water investigation works were carried out at Karamatiya, Meegahakiwla and report was submitted to the Meegahakiwla Pradeshiyasaba.
16. Ground water investigation works were carried out at Bambarakanda and report was submitted to the clients.

17. Ground water investigation works were carried out at Weheragalathanna, heeloya; water shortage due to tunnel excavation under uma oya project.

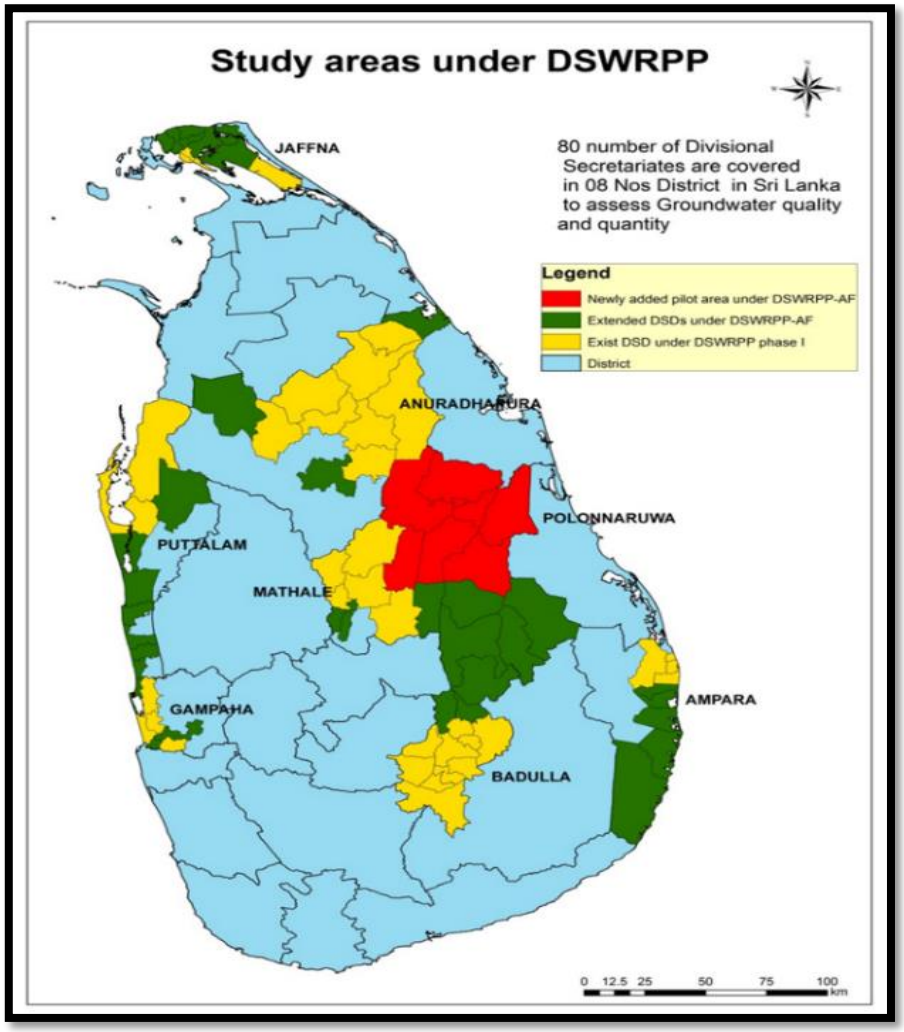
13. Laboratory

The water samples collected from various projects and private parties were analyzed by the laboratory of the Water Resources Boards and the year under review, 1252 samples were analyzed chemically 18 samples were analyzed bacteriologically. 270 samples were analyzed for heavy metals.

Fig : 1 Chemical Laboratory

Fig 2 : Microbiology Laboratory

Dam Safety and Water Resources Planning Project (DSWRPP), Component-2



15.1 **Executive Summary**

15.2 Project Objective and Purpose

15.2.1 Introduction

The spatio-temporal assessment of hydrogeological condition and water chemistry of the groundwater resources of the country has not been addressed by a systematic approach due to various reasons during the past few decades. However the study on present status, threats, impact on these resources and subsequent establishment of a well representative surveillance groundwater monitoring network are of vital importance in long term groundwater resources management and in implementation of remedies. In this context, 07 Pilot areas covering 37 Divisional Secretariats of seven districts in seven provinces identified by WRB and activities related to the establishment of groundwater monitoring program was initiated in 2010 under the Ministry of Irrigation and Water Resources Management. Water Resources Board (WRB) was entrusted to carry out this project as a sub-component of component-2 of the Dam Safety and Water Resources Planning project (DSWRPP).

The identified pilot areas are selective DSD's of Jaffna, A'pura, Mathale, Puttalam, Gampaha and Ampara Districtsconsidering certain issues recorded and reported with respect to water quality and Quantity. The main noted issues were: excess application of fertilizer and pesticide, over abstraction of water resulting sea water intrusion, poor sanitary facilities and high concentration of Fluoride. Further, agro wells are highly pumped and also no proper criteria of construction and management. All the above causes were taken into consideration during the process of establishing the network. Awareness programs, three national level workshops, school level programs were conducted to gather different opinion to fulfill the objectives.

Specific approach was formulated to achieve outputs based on the issues identified and objectives of each pilot area. The study was focused more towards water chemistry in the pilot areas except Mathale pilot area which addresses on the focal problem of groundwater depletion due to over abstractions. The main work components of these assessments were i.) aware the community and stake holders on present situation, ii.) identify groundwater flow regime and iii.) Determine the spatio-temporal water quality distribution through detail water quality analysis from the shallower & deeper aquifer systems during dry period as well as wet period. Awareness programs, Preliminary field investigations, base map preparations, water sampling, groundwater level monitoring, in-situ water quality testing, 1-D & 2-D Geophysical surveys, test bore hole constructions, pumping tests, water quality analysis (physical, chemical, heavy metal, bacteriological and pesticides), DGPS levelling of monitoring points, result analysis and interpretation/ processing work are some of the principal activities included in the entire methodology. The establishment of monitoring network was finalized for each respective pilot areas based on the output of these activities.

The entire Jaffna peninsula is underlained by Miocene limestone formations of karstic nature. The study reveals the high NO_3 (12-30 ppm) content in Kondavil lateritic formation where the major water supply scheme is existed. Elevated levels of NO_3 could also be detected at certain areas of the region. This is an alarming threat since the hazardous waters are distributed to the entire Jaffna and Nallur areas. High EC and high Cl content in groundwater are associated at the margins of lagoonal boundaries which characteristically reflect the hydrogeological set up of lacustrine deposits. The high mineral enrichment is encountered in these areas may due to lagoon deposits or possibly a threat indicating of saline water intrusion especially along the Karaveddi-Chavakachcheri DSD boundary.

The water chemistry in the selected DSD's of Mathale district (Dambula, Naula, Galewela, Laggala-Pallegama and Pallepola) are in desirable levels except few locations of high EC, total hardness, Iron, Fluoride. Domestic and agricultural uses are the main groundwater abstractions

identified in the area. The groundwater flows dominantly along NW, SE and SW direction which controlled by the geomorphology and structure of the region. The assessment of groundwater depletion due to over abstraction is in progress at selected thirty three locations of the monitoring network by spatiotemporal groundwater level monitoring.

The several localized zones of high phosphate, fluoride, nitrate and heavy metals and low pH were identified by the groundwater quality analysis in the Gampaha Pilot area. The impact on groundwater due to industrialization is not yet emerged as an alarming issue; however surveillance monitoring is required to identify any future threats. The sea water intrusion at the deeper levels was identified at the coastal stretch of Pamunugama to Negombo by exploratory borehole drilling.

Ampara is one of highest agricultural areas in the country and therefore extensive agriculture has a major impact on groundwater resources. The study reveals contaminated groundwater sources at high agricultural areas of Sammanthurai, Karathivu, Addalachchena, Ninthavur, Irrakkamam and Navithanveli DSD's in respect to Fl, PO4, Cd, Mnpollution and also give some indication of the presence of As. This indicated the influence on groundwater due to heavy agricultural activities in the region with the extensive application of pesticides and weedicides. In urbanized areas, point sources of high NO3 contamination were identified due to poor sanitation and partly attributed to high permeable formations encountered in the area. The possible seawater intrusion is envisaged by high salinity along the coastal stretch of Ninthavur and Navithanveli. However, high salinity zones at Malwatta and Deegavapiya may result due to inherited formation characteristics.

The pilot area comprised off Puttalam, Vanathavillu and Kalpitiya DSD's have identified a threat due to excessive application of fertilizers. This was confirmed by the high levels of NO_3 and PO_4 in groundwater of Kaltpitiya area. In most of groundwater sources of the Vanathavillu area were encountered with high PO_4 contamination which exceeded the maximum permissible level of drinking water standards. The occasional isolated zones with high EC, TH, NO_3& SO_4 were also identified in the Vanathavillu area. The groundwater quality in Puttalam, Vanathavillu and Kalpitiya areas are shown predominantly of Na-K-Cl type with mixing towards Ca-Mg-HCO_3 type. Geophysical exploration cum test borehole drilling reveals the high complexity of hydrogeology and hydro-geochemistry of the limestone formations in the region.

The High Fluoride content in ground water is identified in many of DSD's of Anuradhapura District and it highly varies with spatially as well as temporally within the region. However, the areas of Asirikgama ,Kukulawa, Andaragollawa, Mahakumbukwewa, Kahatagollwa, Moraoya and Manaketiya are identified as hazardous zones with high fluoride enrichment in groundwater.

High Total Alkalinity in ground water is also identified in certain localized zones of Alayapathuwa, Gambirigaswewa, Parasangaswewa, Sangilikanadarawa, Pulleliya, Thammanwa, Pihimbiyagollawa areas etc. The high Nitrate and Phosphate levels were identified in Asirikgama and Habagama Areas respectively. The wastes disposal and gravel mining at potential recharge zones of quartzite ridges should be properly managed and selected monitoring points at strategic points on the surveillance monitoring approach to identify any emerging threats.

The Badulla Pilot area was selected based on the importance of potential recharge zone for the most of the river basins in the country. Test boreholes (cum hand pump tube wells) provides the spatial water chemistry in the region and analysis results indicated there is no major threat in context to groundwater quality.

The activities of extended DSD's of initially selected pilot areas were started in DSWRPP phase-II and the establishment of new monitoring locations on these extended areas are in operation. The final phase of the project progress. This report outlines the summary of all the activities performed in each pilot areas studied in the component of DSWRPP in phase-I & Phase-II.

15.2 Project objective and Purpose

15.2.1 Introduction

The status of groundwater situation in Sri Lanka has been under threat over the past three decades with the rapid development of industrial ventures and its effluent discharge, and extensive application of fertilizer and pesticides in agricultural activities. Apart from the impact on groundwater quality, extraction of high volume of water has resulted in rapid water level decline causing saline intrusion to the fresh water lenses in the coastal belt that surrounds the island. Further, the sea water level rise as a result of climate change is another important issue to be addressed that also has a significant impact on settlements located along the coastal belt. Some activities have caused groundwater to be polluted with high content of nitrate, phosphates, and heavy metals such as, Cd and Cr and other minerals dissolved in water. Given the above facts, Water Resources Board of Sri Lanka embarked on a project under the Dam Safety and Water Resources Planning Project (DSWRPP) where thirty seven divisional secretariats in seven provinces were selected to establish groundwater monitoring networks to identify change of water quality and rapid decline of water levels over the hydrologic year. Further an emphasis was made on natural factors such as the influence of the geological formations and structures that also contribute to the variation of quality of groundwater.

The issues to be considered are many that include:

- Unsustainable use of shallow groundwater by agro wells for irrigation
- Water quality problems due to presence of excess chemical constituents
- Salinity intrusion problems
- Uncontrolled abstraction of groundwater for urban water supplies and industrial purposes
- Contamination of groundwater from industries, sewerage, agriculture, and waste dumping sites
- Heavy sand mining in certain parts of the country that makes the water quality to deteriorate causing hardships to people living around.

1.2 Expected Output

Establishment of a groundwater monitoring network in the identified areas on pilot scale to monitor groundwater quality variations and rapid decline of water levels.

1.3 Scope of Work

- Study the critical areas identified by the Water Resource Board (WRB) (approximately 4656 Sq. km in 37 DS Divisions) where groundwater issues such as pollution and over extraction are reported(Fig-1)
- Compile well documented and well organized information on the status of groundwater (GW) resources in the identified DS divisions.
- Systematically monitor and analyze groundwater quantity and quality in the pilot areas for a period of at least 3 years in order to confirm the monitoring points to be included in the monitoring networks.
- Create a program to disseminate the knowledge obtained during the process of finalizing the monitoring network and also the valuable data that can be used as secondary information for researches. Assessment of existing data in the Water Resources Database.
- Creating awareness among the stakeholders in the pilot areas.

- Conducting a national level workshop to obtain views on issues related to Groundwater Management.
- Evaluation of geological, hydrogeological, and hydrological settings of the pilot areas.
- Construct new wells where the information gaps exist.
- Identification of monitoring points to establish GW monitoring network and construct new wells where the information gaps exist.
- Carrying out GW sampling and water level measurements for the purpose of monitoring water quality and quantityat different frequencies.
- Restructuring WRB database to accommodate easy assimilation and dissemination of data and information.
- Initiation of Groundwater modeling programs in Sri Lanka.
- Procurement of laboratory and field equipment to enhance the capacity of WRB.
- Necessary training where appropriate.

Table 1 and fig. 1 show issues identified and respective areas concerned. Thirty seven (37) divisional secretariats were chosen in eight Districts covering seven provinces in Sri Lanka.

Table -1 Pilot areas and issues identified

PROVINCE	District	Divisional secretariats	Issues	District and Area (Km^2) (Approximately)
North	Jaffna	Jaffna Town, Nallur, Tennumarachchi, South island.	Bacteriological and Extensive Agriculture pollution	Jaffna peninsula
North Western	Puttalam	Puttalam,Vanathawillu and Kalpitiya	Extensive Agriculture , Salinity intrusion	Puttalam 1180
Central	Matale	Dambulla,Gelewela, Laggala- Pallegama, Naula, Pallepola	Over extraction of water from Agro wells	Matale 1200
North Central	A'pura	Medawachchiya, Nuwaragampaltha (central), Kebithigollawa Rambawewa, Horowpathana Kahatagasgogiliya Padaviya Galenbindunuwewa	Kidney disease	Anuradhapura 1990
Western	Gampaha	Gampaha, Ja-ela, Wattala, Biyagama, Katana	Industrial pollution	Gampaha 376
Eastern	Ampara	Samanthurai, Ninthaur, Karathive, Adallachchnai	Extensive Agriculture	Ampara
Uva	Badulla	All the DS divisions	Agriculture and sanitary issues	Badulla

Concept

Two aspects were considered in establishing the monitoring network that include:

1. Groundwater quality assessment where the main task was to assess the status of groundwater quality over time due to various anthropogenic activities such as the use of pesticide and agrochemicals. Further natural conditions that have impact on water quality were also considered such as Fluoride, partially due to geological settings and nature of geological structures. Except Matale, the DS divisions were scrutinized for water quality status.
2. Groundwater quantity assessment where the main activity was monitoring of ground water levels and evaluates the fluctuation due to heavy abstraction from agro wells. Matale pilot area was selected for this purpose.

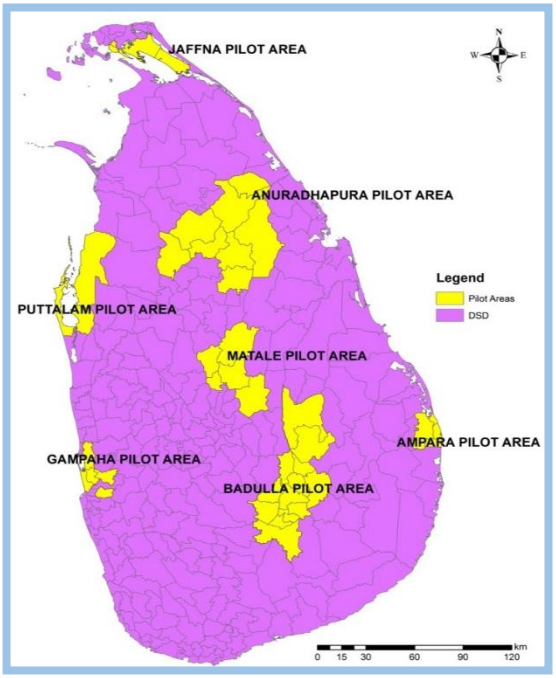


Figure 1: Identified Pilot Areas

15.3 Design of groundwater monitoring network

Groundwater assessment is the evaluation of the physical, chemical and biological status of groundwater in relation to natural conditions and human interferences (Fig.2).

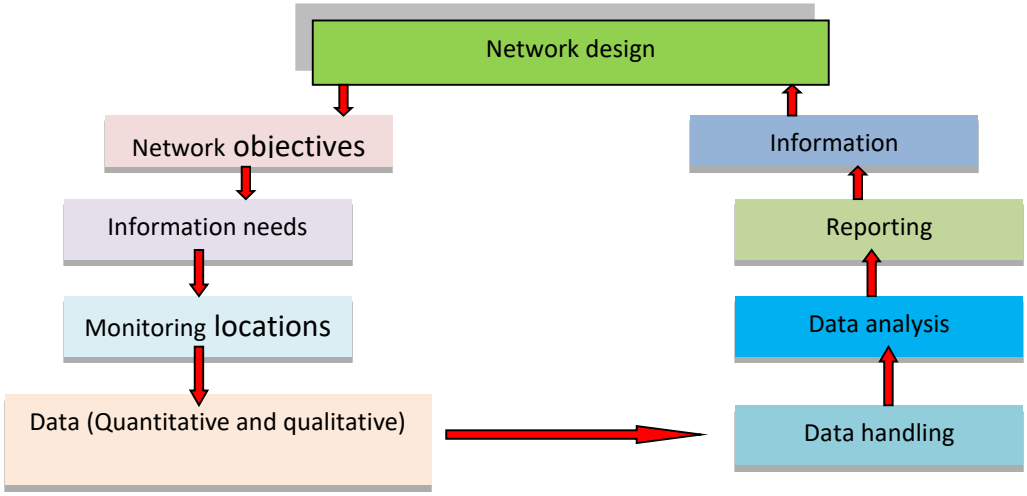
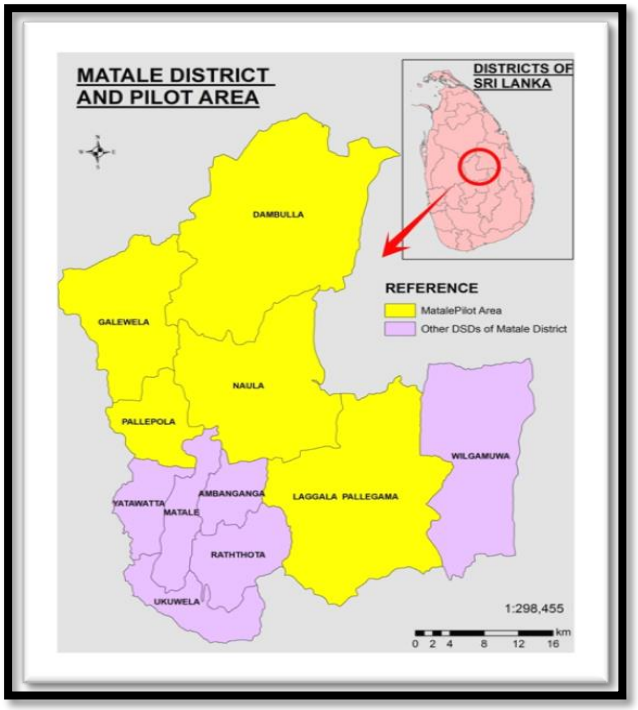


Figure 2: Logical cycle in designing monitoring network

2.1 Scale of monitoring network

The smallest unit of the study domain was considered to be the administrative boundary/or boundaries of Predeshiya Saba's. Interpretations of groundwater flow regimes and evaluation of contaminant transport were focusedon basin level.



2.2 Modular set - up of the groundwater monitoring program

Groundwater monitoring points were selected to provide different functions according to the objectives such as single function (e.g. only water levels) or multiple functions (e.g. water levels and water quality monitoring). Water level monitoring is the prime concern of the Matale area whereas the other areas were dedicated for water quality sampling and analysis but every sample event was associated with measurements of water levels (Table-2).

Table- 2 Modular set up of Groundwater monitoring network

Pilot area	Objectives of monitoring	Character being monitored	Single/ Multiple functions
Jaffna peninsula	Bacteriological and Extensive Agriculture pollution	Water quality	Single
Puttalam	Extensive Agriculture	Water quality	Single
Matale	Over extraction of water from Agro wells	Water level	Single
Anuradhapura	Kidney disease	Water quality	Single
Gampaha	Industrial pollution	Water quality	Single
Puttalam	Salinity	Water quality	Single
Ampara	Extensive Agriculture	Water quality	Single
Badulla	Overall Quality parameter assessment	Water quality	Single

2.3 Monitoring network planning -Selection of monitoring points

The criteria of final selection of monitoring points were based on the results of overall monitoring events carried out since 2010 onward and the following factors were focused in finalizing the monitoring points:

1. Variation of chemical parameters observed during the sampling events.
2. Point/s that are potentially vulnerable for future impacts such as wells located in close proximity to industrial concern, pollution point sources etc.
3. Points that have threshold values of chemical parameters with respect to permissible levels.
4. Areas with over abstraction: Vulnerability of sea water intrusion.

2.4 Criteria of interpretation of monitoring data

Though the pilot areas encompass administrative boundaries, the interpretation of data was done either at basin scale or according to the existing groundwater regimes underlain in the areas concerned.

Table-3 represents the wells selected for the monitoring network of each pilot area as of the end of December 2014. These numbers are consisted of existing wells and new wells drilled for this project as well. This figures of new well are given in Table -4.

Table-3 monitoring points selected as at the end of December 2014

Pilot area	Issues	Number of points selected
Jaffna peninsula	Bacteriological and Extensive Agriculture pollution	38
Matale	Over extraction of water from Agro wells	33
Anuradhapura	Kidney disease	38
Gampaha	Industrial pollution	38
Puttalam	Salinity and extensive agriculture	24
Ampara	Extensive Agriculture	24
Badulla	Agriculture	

Table 4- New boreholes drilled

Area	No of wells
Gampaha	12
Puttalam	5
A'pura	6
Jaffna	8
Mathale	8
Badulla	54
Ampara	7
Total	100

2.5 Awareness

Two awareness programs were conducted for each pilot area at the initial and final stages of the program with the participation of the following personnel and representative of government, and private sector, NGOs and INGOs and organization were participated;

- Divisional Secretariat
- Health Department
- NWSDB
- NGOs & INGOs
- Agriculture and Agrarian Services
- Environmental
- Education
- Pradeshiya Saba's and Provincial council's

Figure 3: The Awareness programs held at Kalpitiya DS division and Puttalam

Figure 4: The awareness programs held at A'pura Pilot area

15.3 Outcomes of monitoring activities

3.1 Issues identified

Table-5 provides information on issues and impacts identified during the process of establishing monitoring networks in the pilot areas.

Table 5 - Outcomes of the monitoring network

Pilot area	Identified issues/information	Zone (area)	Probable Reason
Gampha	NO_3 pollution	Katana, Biyagama	Poor sanitation
	Acidity of water	Katana, Biyagama, Ja-Ela, Gampaha	Industrial soil characteristics and industrial pollution
	Mn pollution	Biyagama, Ja-Ela	Industrial pollution
	High Groundwater potential zones	Katana (Ambalanmulla)	Associates with two faults zones
Ampara	NO_3 pollution	Samanthurai, Irakkamam, Addalachchena, Malwatta, Ninthauvr	Poor sanitation and excessive usage of NO_3 containing fertilizer
	Ion pollution	Central camp, Adalachchena, Malwatta, Ninthavur	Country rock weathering
	PO_4 pollution	All over the pilot area	Excessive agricultural activities
	Salinity	Chavalakkudai, Navithanveli	Sea water intrusion Geological conditions of the area.
	Mn pollution	Navithanveli, Samanthurai and Deegawapi	Usage of pesticides?
	Cd pollution	Navithanveli, Samanthurai and Deegawapi	Usage of pesticides?
A'pura	Fluoride pollution	Kebithigollawa, Kahatagasdigiliya , Padawiya, Galenbidunuwewa	Rock weathering/inherited soil properties
	Total alkalinity		High hardness
	NO_3 pollution	Scattered zones	Poor sanitation and fertilizer
Jaffna	NO_3 pollution	Kopai, Thirunaveli, Nallur, Kaithadi	Excessive use of fertilizer
	High salinity	Ariyalai	Sea water intrusion?
	Fresh groundwater zones	Iyakkathchi to Kadeikadu	Associate with isolated sand lenses
Puttalam	NO_3 pollution	Kalpitiya, Puttalam town area	Poor sanitation and excessive use of agro chemicals
	PO_4 pollution	Vanathavillu	excessive use of agro chemicals
	Salinity	Aruwakkalu	Sea water intrusion logon influence
Matale	Groundwater depletion in the Agro wells due to over abstraction.		
	High fluoride	Dewahuwa, Digampathaha	Rock weathering/ inherited soil characteristics

15.4 Pollution Mediatory program

4.1 Pollution Mitigatory plan

At each final awareness program, a follow up activity schedule was introduced which included a protection plan. (Fig 6). The committees were formed under the patronage of DS and responsibilities were entrusted to respective stakeholders.

			2014																2015	
			Jul	Au	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Ma	Jun	Jul	Au	Se	Oc	No	Dec	Jan	
Item	Activity																					
1	Awareness																					
		Institutions																				
		Public																				
		Farmer community																				
2	Formation of action committees																					
		District secretary																				
		Divisional secretaries																				
		Environmental and planning officers																				
		Grama niladari																				
		Farmer organizations																				
		Water resources Board																				
		Agriculture and agrarian																				
3	Monitoring program	WRB																				
4	Reporting and Progress	Committee																				

Figure 5: Protection plan (Groundwater Protection Plan)

4.2 Distribution of posters

Posters prepared by WRB were distributed through the District secretory to respective Divisional Secretaries to handover them to Grama Niladaries and Departmental heads to display to convey the message of the current status of groundwater in each pilot area.(Fig.7).

Figure 6: Posters distributed

Figure 7: Posters distributed

15.5. Conclusions and Recommendations

Given below are the conclusions and recommendations for each pilot area.

5.1 Matale District

This study was carried out in order to find the impact on groundwater due to high abstraction of good water from Agrowells. The rapid water level decline is observed in the pilot area due to unplanned construction of agro-wells and over abstraction of water.

Water level obtained from wells belong to private parties show irregularities such as dynamic water levels instead of static values that cannot be used in preparing piezometric contours.

Right now the government has not entrusted any authority by law to advise famers to follow scientific guidelines in the process of determining the correct physical dimension of agrowells that suit the prevailing geological, hydrogeological and geomorphological settings of the areas concerned. The function of the Agrarian Services Department is more towards the administrative oriented rather providing scientific advice.

The rapid decline of water levels recorded in certain wells in the monitoring network are primarily due to high water abstraction from agro wells and this cycle repeats every year as irrigation methods are not changed. An increase of rate of growth of construction of agrowells without any proper basic principle is a threat to the regional/local groundwater regime that should be regulated.

Criteria for approving applications for subsidies for construction of agrowells are not adequate so such applications for subsidies are to be evaluated through stakeholders like Water Resources Board, Central Environmental Authority and Divisional secretariat office before decisions are made.

High abstraction could cause quality deterioration in the long run. Results of water quality analysis noticed high nitrate concentration in some areas that is probably due to excess use of fertilizer that contains nitrate compounds.

Water level monitoring data can be taken as the key index in identifying water level decline as a management tool in regulating over abstraction and in determining whether the shallow aquifer has sufficient water to accommodate more wells.

Groundwater deficit is noticed in some parts of the project area caused due to over abstraction. Deficit/surplus is defined as the difference between the groundwater recharge in the previous year and the current year.

Recommendations

Proper technical guidelines should be made available for construction of agrowells that can be done either by Agrarian Services development or Water Resources Board. All applications for agrowells are to be forwarded to Water Resources Board for an assessment of groundwater availability in the area concerned.

A technique should be developed to optimize new agrowell systems by deciding the optimum well radii for given aquifer characteristics and well spacing, or to optimize existing agrowell systems by deciding the sustainable irrigable command areas.

5.2 Gampaha District

No significant detection of contaminants in groundwater due to industrial effluent but a few points have the possibility of increasing to higher levels. Saline water intrusion is high in the area associated with the Maoya at Kochchikade Muruthena area. It was noticed that no scientific criteria in selecting sites for dumping solid waste.

A central effluent collection mechanism should be developed to collect effluent in the industrial area. Right now the factories have to bear the responsibility of management of wastewater and there's no any centralized system to separate hazardous and nonhazardous wastes and dispose them properly.

No proper disposal of empty containers of pesticide and insecticide. It was noticed during the field visits that such used containers are dumped in water courses.

Recommendations

- Points that are vulnerable from industrial effluents should be kept under surveillance and such points should be incorporated in the monitoring network with appropriate frequency of monitoring as per the aquifer characteristics.
- Groundwater elevation maps have to be prepared indicating flow directions of groundwater that will assist in controlling and identifying the movements of contaminants in the event that effluents are contaminated.
- More 2D resistivity surveys should do along the coastal belt of the study area that deem to be vulnerable for sea water intrusion.
- Coastal sandy aquifers should be protected from over-abstraction that makes sea water to intrude towards inland. Awareness among settlers on technical aspect of the safe yield should be created.
- Proper technical evaluation should be done before dumping yards are designed. Moreover the central government intervention is vital in this regards.

5.3 Ampara District

Groundwater is polluted due to agricultural practices. The shallow aquifer is highly contaminated by PO_4, especially in alluvial deposits of Gal Oya river zone. Mn and Cd are also showing somewhat high values. The main reason for contamination is due to the over application of inorganic fertilizer and pesticide.

Recommendations

A systematic and well organized awareness programs should be conducted with the stakeholders and a mechanism has to be developed to create awareness for the grass route level and the farmer communities to minimize the impacts.

Ministry of Agriculture has to play a leading role in this process where agriculture extension officers have a great deal of responsibility to supervise the application of correct quantities of fertilizers and pesticides.

5.4 Jaffna Peninsular

- Shallow aquifer of Jaffna is under threat due to excess application of fertilizer and some areas are already contaminated with Nitrate.
- Over abstraction has caused sea water intrusion into the fresh aquifer/s and it is in the increasing trend.
- Fresh water lenses are found in some parts of the pilot area which are intact.

- Jaffna area is underlain by Miocene limestone which is highly karstic. High level of control of using excess fertilizer should be imposed to avoid the limestone from getting contaminated as the overlying sandy aquifer is highly permeable.

Recommendations

- Monitoring network established under DSWRPP should be extended to the other parts of the district.
- Water Resources Action Committee formed by the office of the District Secretary is not active to address issues related to the water sector and this should meet frequently to sort out main issues related to groundwater.
- A number of locations having good quality groundwater reserves have been identified during the study by DSWRRP project. These sources can be utilized for water supply schemes to solve the burning problem of portable water supply in Jaffna peninsula.
- In the case of Nitrate issue in Red bed areas, it is recommended to monitor the Nitrate levels on monthly basis at the selected wells.
- Control of application of excess fertilizer and pesticide are vital and procedures have to be developed.
- Sand mining affects the water table and it is observed that mining activities are being done at large scale in the Jaffna peninsula. This should be regulated through a suitable mechanism through the Water Resources Committee.

5.5 Anuradhapura District

- The High Fluoride content in ground water is one of the main issues in Anuradhapura pilot area.
- The fluoride content is highly varied with the seasonal changes as per the magnitude of recharge and also as per the duration of dry spell.
- The high fluoride distribution in groundwater has not shown any consistent pattern but it varies regionally and even locally with the varying geological conditions.
- High Total Alkalinity in ground water is also another identified issue in Anuradhapura pilot area. Following areas indicate high alkalinity in ground water , Alayapathuwa, Gambirigaswewa and parasangaswewa areas in Nuwaragampalatha central DSD, Sangilikanadarawa , Puleliya and Thammanwa areas in MedawachiyaDSD, Pihimbiya-gollawa area in Rambewa DSD, Walahawiddawewa and Habagama areas in HorowpothanaDSD, Ithalawiddawewa and Kahatagollawa area in Kebithigollawa DSD, Sivalakulama area in Galenbindunuwewa DSD and Abeypura area in Padaviya DSD.
- Total alkalinity varies regionally and locally with the seasonal changes.
- The heavy metal concentrations in shallow and deep groundwater are within the permissible levels of drinking water standards. But the occurrence of heavy metals in water bodies even in small quantities indicates the effects of over application of fertilizer in paddy and other cultivations.
- A few areas were identified in the shallow aquifer having high concentration of Nitrate and Phosphate probably due to local conditions. The selected points were added for long term monitoring network for further studies.

- The waste dumping and excavating for gravel in Quartz ridges should not be allowed and an areas must be demarcated as non-activity zone. Quartzridges are identified as good quality water bearing zones.

Recommendations

- Local variation for chemical parameters in shallow ground water is high. So water quality monitoring should be continued to find causes and address them.
- The aquifer characteristics should identify to interpret the water quality and flow patterns, so a plan should be developed to estimates characteristics for both shallow and deep aquifers that will support to developed groundwater models for all the basin in the district.
- Comprehensive hydrogeological maps should be developed.
- Maps prepared by DSWRPP indicating distribution of chemical parameters should be updated as information are coming in.
- Application of fertilizers and pesticides should be controlled in the district with the support of the respective government agencies by making the farmers aware on the effects of over application of fertilizers on health and the surrounding environment including groundwater.

5.6 Puttalam District

Hydrogeological investigations assisted by Geophysical techniques indicate that the flow regime of the Miocene limestone is complex consisting of a complex aquifer system. Therefore assessment of each aquifer is required.

Shallow aquifer of the surrounding area of Mee-oya shows high Electrical conductivity values. But in deep aquifer, there is no indication of increasing EC & Salinity. Some sampling points in the lagoonal areas as well as inland areas are shown site specific characteristics of increased EC & Salinity levels.

The phosphate contamination in deeper groundwater aquifers could also be identified towards the north of Vanathavillu (Eluwankulama, Rahalmadu & Serakkuliya) indicating more than 2mg/l.

Groundwater of the Shallow aquifer in Kalpitiya peninsular indicates high Nitrate, Total Iron together with high Electrical Conductivity values. There is a tendency to increase the salinity level.

Eththale, Alankuda, Norachchoelai, Minniya, Nirmalapura and Nawakkadu areas in the Kalpitiya DS division are mainly affected with Nitrate contamination of shallow groundwater. The Nitrate contamination pattern in groundwater of this area shows as localized pockets. However, there is a tendency of gradual increase of Nitrate contamination throughout the Kalpitiya area (NO_3 level exceeds 5mg/l in many villages of Kalpitiya area). Urban area of Puttalam is also affected with Nitrate contamination due to improper sanitation facilities.

Southern part of Kalpitiya area shows high levels of total Iron concentration in groundwater in the range of 1-10mg/L. Some locations have reached to maximum permissible levels of drinking water (10mg/L) standard. These areas are mainly associated with heavy agriculture lands. Due to high groundwater abstraction together with construction of tube wells without proper technical guidance, a rapid depletion of groundwater levels are noticed resulting an increasing trend of Iron Contamination. This is occurring mainly in Daluwa, Nawakkadu, Mampuri, Paniadiya and Norachcholai areas.

Fresh groundwater lenses with good quality water are mainly found in sand dunes. Saline water intrusion has been noticed in the Kalpitiya area resulting high EC values due to over abstraction.

The main cause for Groundwater contamination is mainly due to improper agricultural practices in highly permeable aquifer formations.

Recommendations

It is suggested to future studies, to protect shallow groundwater and to mitigate the groundwater contamination in the Kalpitiya peninsular.

- Studies should be conducted to identify the groundwater lenses in shallow sandy aquifer that varies in extent over the area. Water level elevation maps have to be prepared to identify different flow regimes that will assist in tracing these fresh water lenses.
- Demarcation of Well field protection zones will assist to protect the expansion of the radius of the contamination. Agriculture activities and sand miming should not be allowed within these zones.
- High groundwater abstraction should be controlled specially in dry periods in Kalpitiya area.
- Mining of Sand dunes should be regulated.
- Soil improvement methods should be identified to agriculture practices as retain fertilizer in upper soil layer and release to plantation gradually.
- Agriculture activities should not be spread to sand dunes which are having good quality groundwater.

5.7 Badulla district

Groundwater in the deep aquifer is affected by Fluoride, especially in Badulla and Walimada areas.
PO_4 values are close to the permissible level in the study area as a result of excessive application of fertilizers.

Based on the information collected during the study and the input from the health authorities, a remarkable number of CKD patients have been identified in these areas. A program has been initiated to extend its project activities to 4 DS divisions- Mahiyanganaya, Ridimaliyadda, Kandakatiya and Meegahakiwla- to identify relationship between groundwater chemistry and CKDu.

Recommendations

Awareness programs should be organized to create awareness among stakeholders to mitigate the impact of the over application of fertilizer in the area.

A number of CKDu patients are increasing in the areas identified during the phase-1 program so water quality assessment should be carried on long term basis.

15.6 Awareness at National Level

Three national level workshops were held on three different topics:

6.1 Workshop: “Challenges in Groundwater Management in Sri Lanka”

This workshop was held on March 2011 at the planning stage of the monitoring program to enlighten the stakeholders and the government authorities about the concept of the activities. In addition, many technical papers were also presented on the themes of Groundwater management.

Figure 8: 1st National Workshop

6.2 Workshop : "Issues and solutions: Groundwater Resources Management in SriLanka"

Figure 9: 2nd National workshop

Figure 10: 2nd workshop – Participants

This was held in July2013.

*6.3 Workshop: "Importance of Groundwater Monitoring as a Management Tool"*The purpose of the 3rd Water Resources Management Workshop under the patronage of Dam Safety and Water Resources Planning project (DSWRPP) was to mark the initiation of the expansion of existing groundwater monitoring network established by Water Resources Board in order to identify the groundwater status in 6 provinces that were deemed to be under heavy stress in both quality and quantity as a result of various anthropogenic activities. Number of professionals in the water and water related sectors participated and presented papers with somewhat a practical orientation.

Figure 11: 3rd Workshop

6.4 World Water day art competition and Awareness program

A schools awareness program was conducted for children and teachers in the Anuradhapura District on 24th March 2013 to mark the World Water Day. The objective of the program was to create awareness among school children on the current threats on freshwater resources in general and the present status of groundwater resources in Anuradhapura district in particular.

The poster competition was also held on the same day and shown great interest and participated more than 200 students for the competition. The top twenty winners were awarded with certificates and prizes.

Figure 12: Conference and Art Competition

Figure 13: World water day school program and winning posters

15.7.Capacity building-Instrumental

15.7.1 New instruments and Water Resources Management software

Different advanced field tools were made available for field activities in the groundwater assessment and also a number of software were procured for proper data management procedures. Below are the new additions to the inventory of WRB.

- ✓ Geophysical instrument unit for obtaining 2D resistivity profiles of subsurface
- ✓ Field laboratory facilities for carrying out in situ tests
- ✓ DGPS system for well point leveling
- ✓ 2D resistivity Surveys

Given below is an example showing a 2D image conducted in the Gampaha pilot area where results of water quality analysis indicated a probable seawater intrusion.

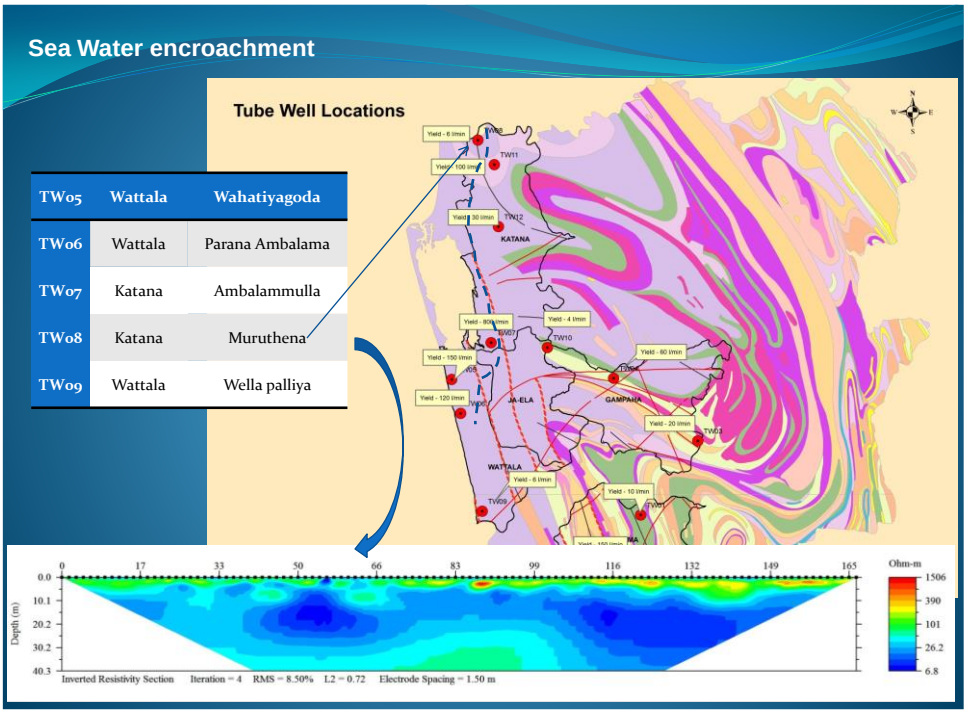


Figure 14: 2D image illustration of a profile of sea water intrusion

15.7.2 Application of DGPS: Leveling of monitoring wells in the network

Water level elevation maps are of great significant in the interpretation of groundwater flow direction and detection of solute transport in the groundwater and also that provides well elevations for groundwater modeling.

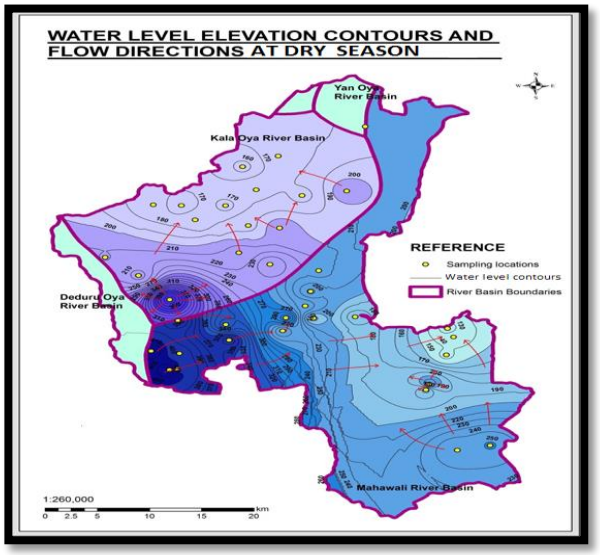


Figure 15: Groundwater elevation map

15.7.3 Mobile Laboratories

Two mobile laboratories were procured to enhance the quality of water clinics and also to provide prompt service to address urgent issues. During the Rathupaswela groundwater contamination issue, WRB immediately mobilized a mobile lab to assist water quality analysis to identify contamination.

Figure 16: Mobile laboratory

15.7.4 Data loggers

Five data loggers were procured to measure water level fluctuation due to heavy abstraction of groundwater from wells. Fig 17 & Fig18 illustrates a short training program from the supplier and the graph obtained.

Figure 17: Installation of Data Loggers

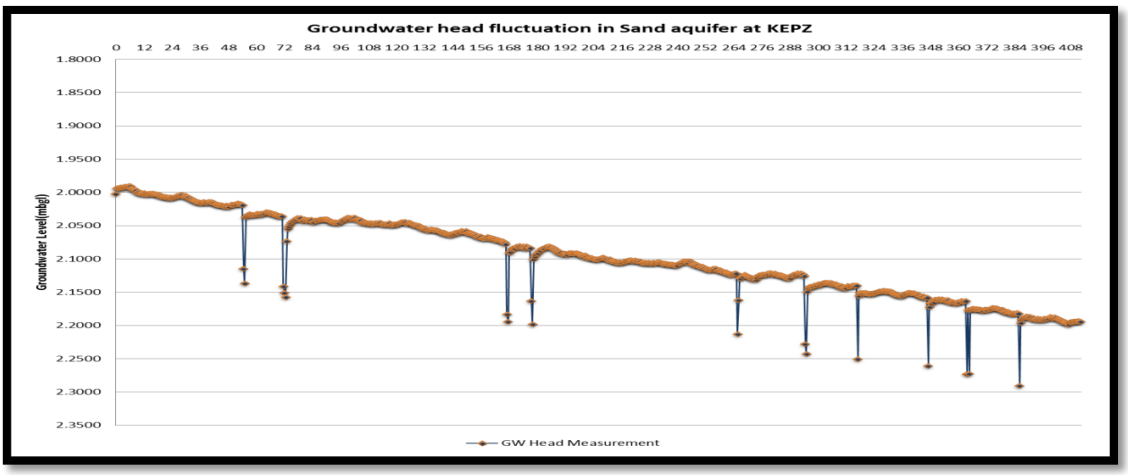


Figure 18: The hydrograph produced by the data obtained from a Data-logger.

15.8 Capacity building: Human Resources

15.8.1 *Groundwater modeling program*

Objectives

The overall objective of the groundwater modeling training program is to strengthen the capacity of hydro-geologists and other professional involved in the groundwater sector.

The 1st workshop of the training program was on theoretical aspect of developing groundwater models with a hands-on experience session to get familiarize in using software. The following were the specific objectives of the workshop as presented in the concept paper prepared and submitted to the PMU for World Bank approval:

- To develop basic knowledge of groundwater models among the groundwater professional working in the field of groundwater management.
- To prepare a core group of groundwater professionals with a knowledge in groundwater modeling.
- To provide refresher training in aquifer hydraulics and to highlight the information that is required for the understanding of hydro-geological regimes.
- To introduce a standard set of software applications required to develop groundwater models.

2nd Training Program

This program was concerned more on groundwater flow models and case studies that help participants to get aware how to develop real models according to the requirement of the problem. The following were the specific objectives of the 2nd workshop.

- To provide advanced knowledge of mathematical approach in the development of GW flow models.
- To provide an overall training of preparation of input files that require running GW software.
- To identify objective of developing a model and to determine whether the problem really requires the support of a model to solve.
- To identify constraints in developing GW models in the hard rock terrain that underlies about 95% of Sri Lanka.

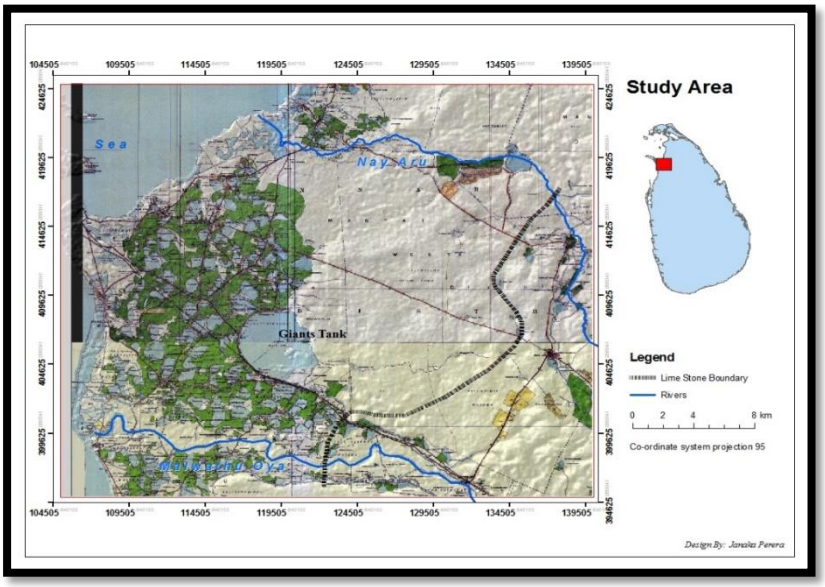


Figure 19: Model develop for Giant tank area in Mannar

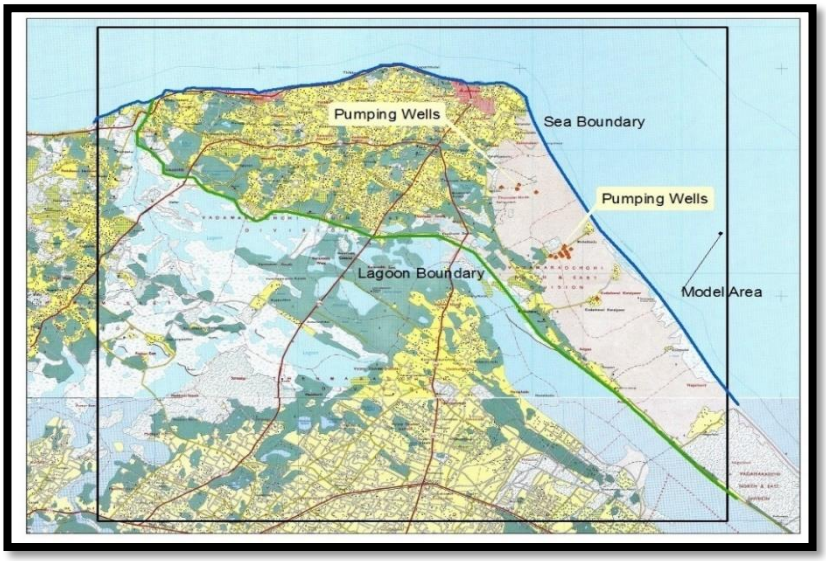


Figure 20: Model develop for Point Peduru in Jaffna Peninsular

Figure 21: Group work of 2nd training program on development of numerical models

15.8.2 *Geophysical 2D training*

Training on 2D application of resistivity techniques of geophysics were conducted by a foreign trainer (Figure22)

Figure 22: Training on 2D imaging

15.8.3 *DGPS Training*

Figure 23: DGPS training session

Two training sessions were organized to train WRB staff in handling the instrument.

15.8.4 *Restructuring of WRB database*

The WRB database was in the form of an excel sheets and was restructured by linking Spatial and non-spatial data by a user friendly interface.

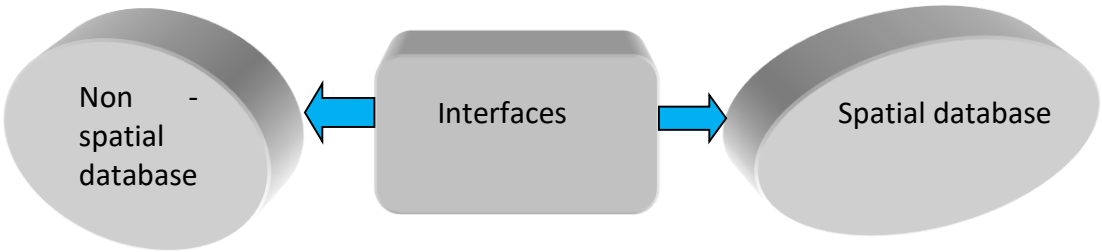


Figure 24: Main components of proposed design for restructuring project of WRB Database

Microsoft Access software was used as the engine to restructure the non - spatial data having incorporated eight categories wit 32 basic data tables.

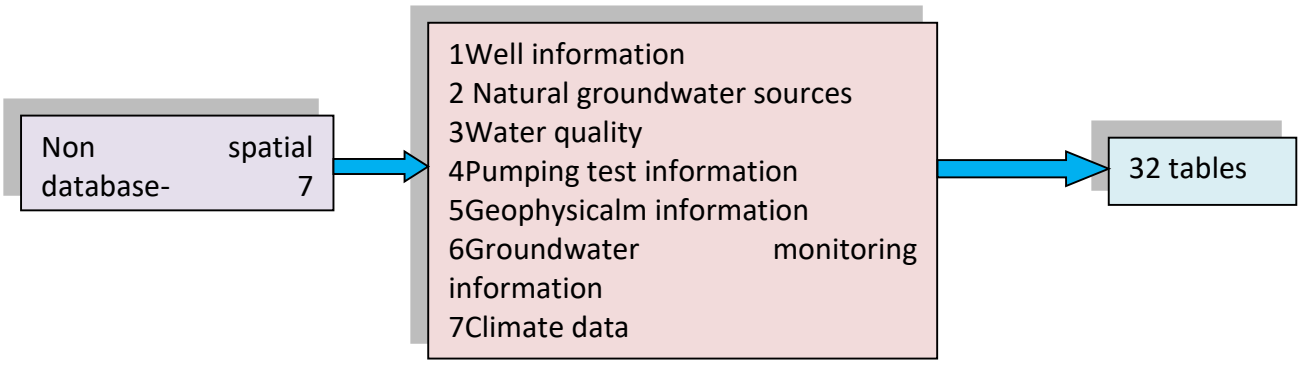


Figure 25: Categories and tables in the restructured database

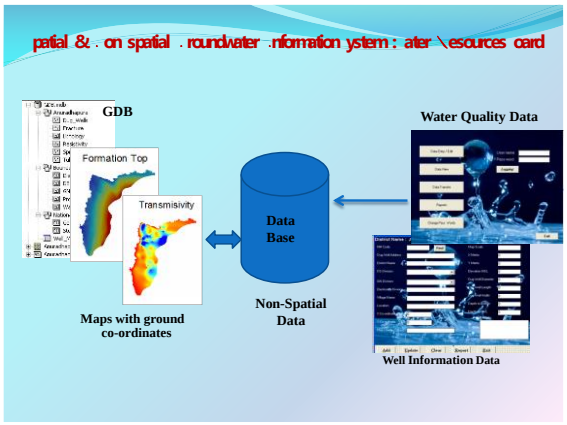


Figure 26: Spatial and Non spatial information system

Figure 27: Interface of Data view

15.8.5 *Knowledge update -India tour*

The2 week training program on ground water Management was aimed to give a holistic experience to fourteen officials from Water Resources Board, Ministry of Irrigation and water Supply and Drainage Board of Sri Lanka by providing 2 different scenarios and on site experience. The training program was designed to be conducted in both Ahmedabad and Bhopal offering different cases, complications and innovative methods that have been taken by professionals, scientists and state government authorities for effective ground water management.

Figure 28: A well fitted with data logger

Figure 29: Field and class room activities

15.9.Enhancement of Status of Laboratories of WRB

Capacities of all the laboratories of WRB were evaluated and enhanced and a new laboratory was established in the Jaffna provincial office. Further, program is underway to obtain the accreditation status to the main library of the WRB.

Provincial office	Capacity of Analysis				
	Normal cations/anions	Alkaline metals	Heavy metals	Bacteriological	Organic
Colombo	√	√	√	√	x
Puttalm	√	√	√	√	x
Anurdhapura	√	X	x	√	x
Jaffna	√	X	x	√	x

√ - Facilities available, x- Not available ***Table- 6 Status of laboratories***

15.10. Proposed extension program

15.10.1. Proposed extension work for the pilot areas

Extensions to the current pilot areas were based on the requests received during the time of conducting the phase-I. The Project Management Unit of DSWRPP was provided the additional funding to carry out the work related to the extension program. The map given below illustrates the existing and new areas under additional funding.

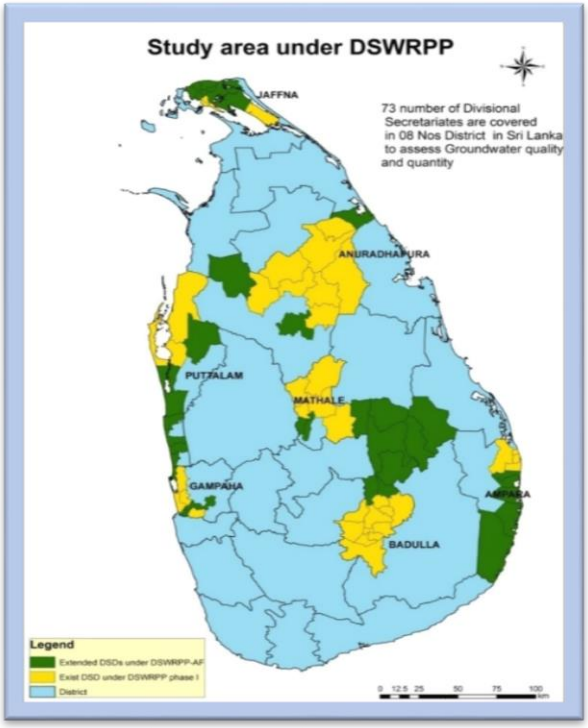


Figure 30: Areas selected for Extension program

The activities of extended DSD's of initially selected pilot areas were started in DSWRPP phase-II and the establishment of new monitoring locations on these extended areas are in operation. The selected additional DSD's are shown in below table.

Table: 7 - New areas considered for extension program

Pilot area	DS division- Ongoing activities	DS division-Extension activities
Ampara	Sammanthura,Karathivu, Adalachchena,Ninthvur,Iragama, Navithanveli	Dehiattakandiya, MahaOya, Padiyathalawa, Kalmuna, Akkarapattu, Alayadivembu, Thirukkovil, Pothuvil, Lahugala
Anuadhapura	Madawachchiya, Nuwaragampalatha(Central), Kebithigollawa, Rambawewa, Horowpathana, Kahata-gasdigiliya, Padaviya, Galenbindunuwewa	SriPura, Kebithigollawa, Elayapaththuwa
Badulla	Mahiyanganaya, Ridimaliyadda, Kandeketiya, Meegahakivula, Passara, Soranathota, Badulla, HaliEla, Ella, Bandarawela, Haputale, Haldummulla, Welimada, Uva Paranagama	Kandekatiya, Ridimaliyadda,
Gampaha	Katana, J-Ela, Gampaha, Wattala, Biyagama	Kelaniya, Mahara, Negombo
Jafna	Chavakachcheri, Jeffna, Nallur, Pachchilapallai	Sandilippan, Chankanai, Kopay, Vadamarachchi N/S, Karaveddi, Chunnakum, Chavakachcheri, Tellippalai
Matale	Dambulla, Galewela, Laggala-Pallegama, Naula, Pallepola	Wilgamuwa, Mathale, Yatawatta
Puttalam	Puttalam, Kalpiyiya, Vanathavillu	Mundala, Arachchikattuwa, Chillaw, Mahawewa, Wennappuwa

15.10.2 Activities of the extended phase-II

Given below is a brief description of the extension program.

Puttalam and Kalpitiya Pilot area

1. Carryout a number of 2D surveys in both parallel and perpendicular to the onshore (beach) to identify the extent to which the intrusion has occurred.
2. Installation of artesian wellheads for all the monitoring wellheads.
3. Installation of a one or two cluster monitoring units to identify behaviors of multi-aquifer systems.
4. Monitoring network should be strengthening by adding more points to meet the future impacts that could be anticipated due to the development of tourist industry in the Kalpitiya area.

Anuradhapura Pilot area

Addition three DS divisions that have recorded highest number of CKD patients. A survey is to be conducted to identify CKD patients with the assistance of Health Ministry.

Ampara Pilot area

1. Carryout a number of 2D surveys in both parallel and perpendicular to the onshore (beach) to identify to what extent the intrusion has been occurred.
2. As requested by the District Secretary of Ampara, three DS divisions, Dehiattthhakandiya, Padiyathalawa and Mahaoya, will be added.

Gampaha Pilot area

Cover the gap that separates the existing GW network by adding DS division/s as required. Further, more new wells have to be identified and added to the existing monitoring network. Suggested to carry out 2D resistivity profiles to identify sea water intrusion along the coastal belt.

Jaffna Pilot area

Proposed to carry out a number of 2D surveys in both parallel and perpendicular to the onshore (beach) to identify to what extent the intrusion have been occurred.

Matale Pilot area

Continuing GW level monitoring for another two years and addition of three additional DS divisions were added under the AF extension program. Plans are underway to install two data loggers in selected wells.

15.10.3 Preparation of Seawater intrusion surveillance line

Some of the pilot areas are located along the coastal belt where monitoring points were introduced to monitoring seawater intrusion. Plans are underway to incorporate the other DS divisions of the district into the extension program of which boundaries are bounded to the coastal belt.
For an example, in Ampara district three DS divisions are bounded to the coastal belt out of 4 selected for the current monitoring program. In addition to the above there are six more DS divisions in the Ampara district that might have impacts due to seawater intrusion. Therefore these six DS divisions are to be included in the extension program to establish surveillance lines.

15.11. Instruments, equipment and materials procured for WRB

The table given below shows the instruments and equipment procured through the funds provided by DSWRRP. The instruments procured are really valuable and useful in the field of Hydrogeological investigation.

No.	Category	Item procured
1	Office	Furnitures, Photocopiers, Fax Machines Desk top computers, laptops, printers, OS software
2		
3	Software	Arc GIS, Aquitest pro, Aquichem, Visual Modflow, Rockwork
4	Field Equip.	pH, EC, dip meters, field test kit chemicals, water pumps
5	Data and Maps	Geology, topographic maps, rainfall data
6	Data loggers for continuous water level measurements.	Logger and transducers
7	Navigation and Surveying Equipment	GPS, DGPS
8	Geophysical equipment	1-D, 2-D imaging systems
9	Mobile Laboratory Units	Fitted with lab equipment

10	Microbiological Lab. equipment	Oven, UV sterilizers, Incubators etc.
11	Chemical Laboratory Equipment	
12	Chemicals	
13	Drilling equipment & accessories	Hand Pumps for 50 Wells, Hammers and Bits DTH, Tricone bits, PVC ,Cement, Bentonite, Aggregates
14	Drilling Machineries	Truck Mounted Drilling Rigs

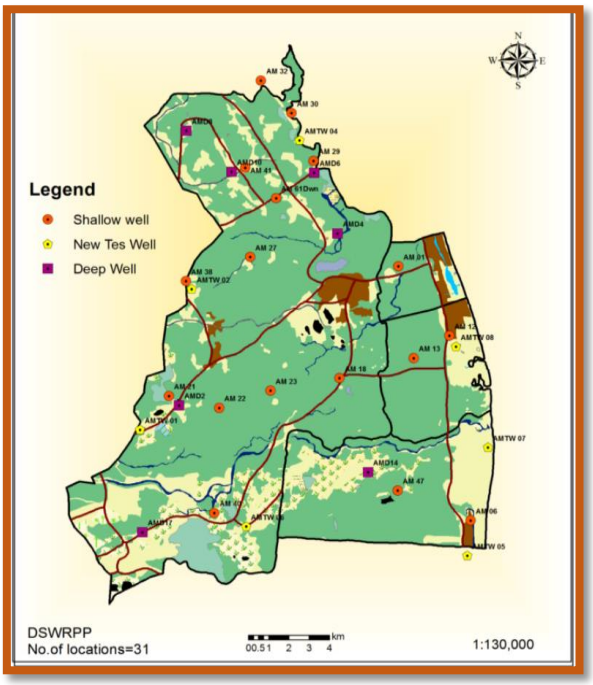
Table 08 – Equipment Procured under the Project

15.12. Final Remarks

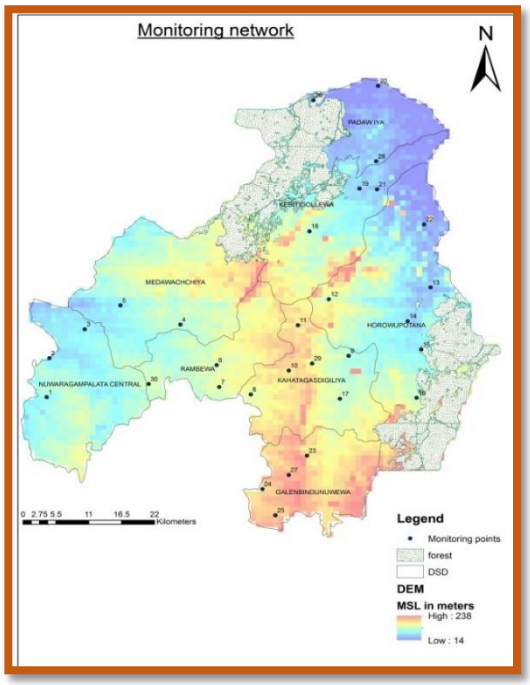
1. Monitoring should be continued for two seasons i.e. wet and dry but according to the requirements, this frequency can be changed.
2. The pilot areas should be gradually extended to the other parts of the country in order to complete a comprehensive chemical quality map.
3. Data obtained from the network should be interpreted and made available for the users.
4. All the drilling companies should be registered and be requested to provide all the information of each well they construct. Well designs should be streamlined.
5. Committees formed to mitigate groundwater issues should meet frequently and evaluate the progress of the programme that prepared under the patronage of the respective Divisional Secretary and the people must be made aware the improvements by conducting awareness programmes.

The established long-term Groundwater monitoring networks

Annexure I: Pilot area - Ampara

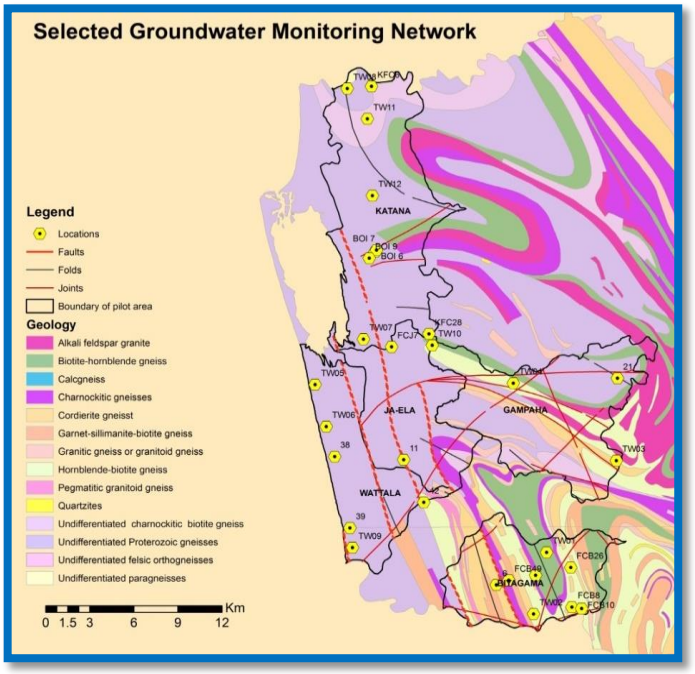


Annexure II: Pilot area - Anuradhapura

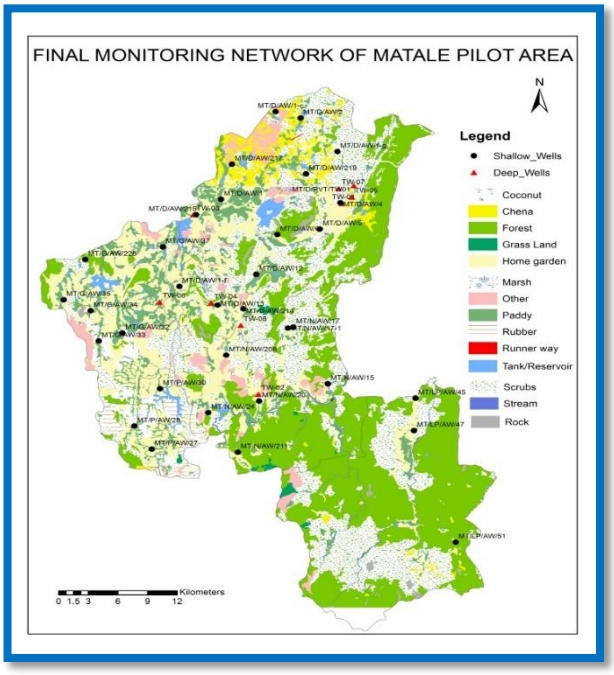


Annexure III : Pilot area - Gampaha

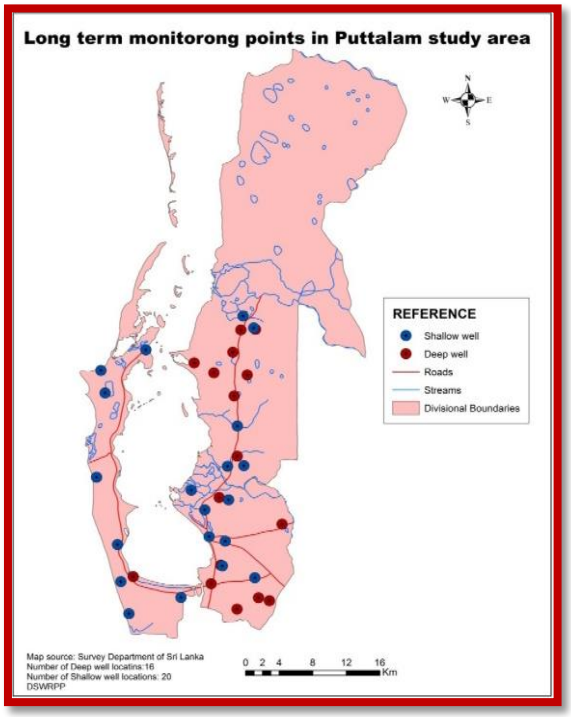
Annexure IV: Pilot area - Mathale

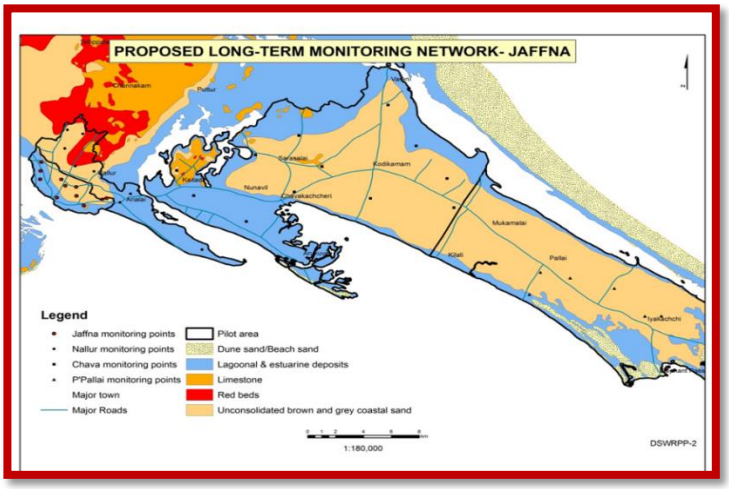


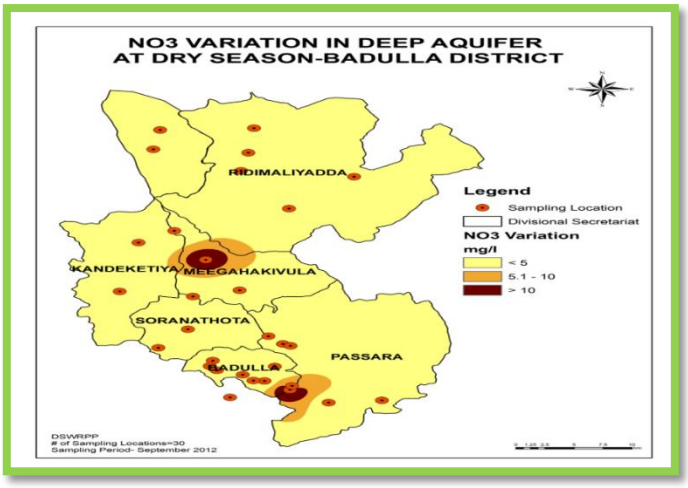
Annexure V: Pilot area - Puttalama



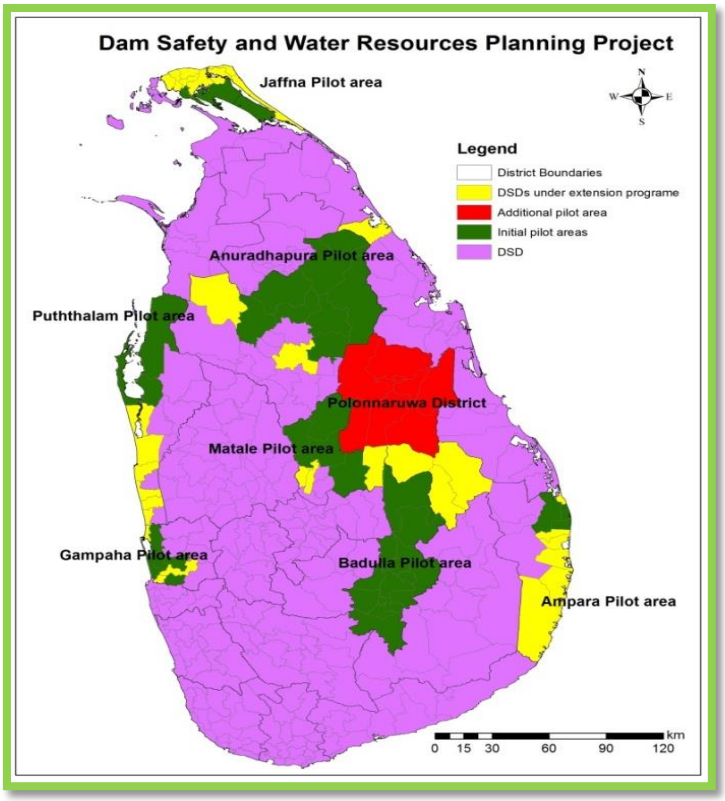
Annexure VI: Pilot area - Jaffna







Annexure VII: Pilot area - Badulla



Annexure VII: Pilot area – Polonnaruwa (red color zone of the map; study to be commenced)

14. Drilling Division

In the year reviewed, 354nos. tube wells were constructed. Further 90 nos. well cleaning were done, 94 nos. tube wells Concrete basins were constructed. 84 nos. hand pumps were rehabilitated and 104 nos. hand pumps were installed.

15. Construction Work

In the year 2015, the following construction work has been done.

- Fixed Aluminium windows to Head Office building.
- Fixed suspended Aluminium ceiling to Head Office Administration and Accounts Branch building.
- Fixed 09 Nos. Air condition Machines for Head Office.
- Renovation of wash rooms in Puttalam and Moneragala Provincial Office was completed.
- Construction of Pump House and water tank tower at Rathupasketiya, Bibila was completed.
- Rehabilitation work of Laboratory at Head Office was commenced.

16. Workshop, Ratmalana

17.1 General workshop

* Acquired 03 Nos drilling rigs, 05 Nos air compressors, 02 Nos pump units, 05 Nos Lorries & drilling equipment which donated under dam safety fund.

* Completed the fabricating works of tool boxes, passenger shades and safety guide pipes on decks for new Lorries.

* Completed fabricating of flange couplings, plugs, pipes and brackets and repaired the 02 Nos of submersible pumps.
* Completed the chassis fabricating & panting work of Rig no – 14.

* Completed the repairing of 03 Nos. – generators & fabricating of pipe assembly – 02 units for pump testing.
* Completed the tinkering works of driver's cabin of Lorry Nos. – 40/4243 & 40/1851

* Completed the procurement of vehicle hoist & accessories and construction / installing works for vehicle service unit under dam safety fund.

* Completed the procurement of lathe / milling machines & installation work in workshop under dam safety fund


* Completed the fabricating & erecting work of water tower at Bibile & fabrication of 58 Nos. name boards for tube wells for Monaragala regional office.


* Completed the fabrication of well caps for data logger installation in the tube wells constructed under C.N. project.
* Completed the fabrication work of steel cabinets for Ratmalana main stores.
* Commenced the refurbishment of workshop building – Ratmalana which awarded to S.D. & C.C. under Dam Safety fund.

- And performed the other all welding, machining, fabricating and maintenance work related to the drilling rigs, air compressors, machinery / plants etc. and also with the jobs requested from the regional offices.

17.2 Vehicle repair unit.

* Carried out 39 Nos. of major & running repairs of board vehicles.

17.3 Vehicle service unit.

* Carried out 57 Nos. of full services on board vehicles.

17.4 Heavy machinery repair unit.

Carried out major & running repairs a following heavy machinery.

* Drilling rigs – 14,15
* Air compressors - 22 & monitoring the operation performance of new drilling rigs & air compressors which donated under dam safety project.

17. Internal Audit Division

Fourteen (14) Nos. audit quarries were submitted and replied Fourteen (14) Nos. audit quarries which were submitted by the Auditor General's Department during the year 2015.

18. Finance

The total income for the year concerned was. Rs. 91 million. For the year 2015, Rs 141 million as recurrent and Rs. 27.9 million as capital was received from the treasury. The deficit reported in the year was Rs. 99.4 million.

19. Administration

The total number of staff of the Water Resources Board in the year 2015 was 290 nos. and 05nos. of which were working on contract basis. 06 nos. employees were working on casual basis. In the year concerned, 39nos. employees were recruited for permanent service. 03 nos. employees were recruited on contract basis and casual basis. In this year, 05 nos. employees were resigned and 13 employees were retired.

20. Human Resources Development

An action was taken to direct the employees to the training courses, in order to improve the productivity of the board. 16 nos. employees including executive officers were directed to short training courses and one was directed to certificate course. 06 nos. employees were directed to workshops and seminars and one was directed to a foreign workshops.

21. Welfare Facilities

In the year concerned, under the welfare and death donation scheme, donated Rs. 0.137 million to the welfare society of the Water Resources Board as to provide transport facilities in a death and also to provide welfare facilities and Rs. 0.760 million was supplied to reimburse the expenses incurred for health facilities of the employees of the Board and their family members.

22. Fleet of Transport

In the year concerned, the fleet of transport of the board was comprised with 62 nos. vehicles and out of which 59 nos. vehicles were in running condition. Those were mainly, cabs, cars, jeeps, lorries, tractors and cranes.

23. Circuit Bungalow – Anuradhapura

The purpose of maintaining the circuit bungalow was to provide accommodation for the officers of the Water Resources Board and the Ministry of Irrigation and Water Resources Management in their official tours and spending their leisure time. Addition to that, an action was taken to provide accommodation for other government officers and general public.

24. Buddhist Society

The Buddhist Society of the Water Resources Board was initiated in 05th of May 1999. In the year 2015, action was taken to decorate the office premises commemorating the Poson full moon day and Dansela and Dhamma sermon were organized for the Poson festival to commemorate the members who subjected to death after servicing in the board and presented group of employees to the Wesak Bethi Gee function at the Ministry of Irrigation & Water Resources Management

25.Acknowledgement

The board is in pleasure to thank and place on record of appreciation to the Minister of Irrigation and Water Resources Management and State Minister of the Ministry of Irrigation and Water Resources Management, Secretary, officers and staff of the same Ministry, all the officers and consultants of the other government departments, board and corporations, foreign and private institutions . The active involvement and the loyal service rendered by the employees of the Water Resources Board are highly acknowledged.

Eng. A.C.M.Zulfikar
Chairman
Water Resources Board
No. 2A, Hector Kobbekaduwa Mawatha,
Colombo 07.
20.02. 2016

WATER RESOURCES BOARD
Statement of Financial Performance

For the year ended	Note No	Actual 2015 Rs.000'	Actual 2014 Rs.000'	Budget 2015 Rs.000'
Revenue from Operating Activities	01	84,164	94,099	136,240
Treasury Grants – Recurrent		141,000	87,000	141,000
Treasury Grants – Capital (Operational)	02	27,896	26,500	34,150
Other Income	03	6,824	4,911	1,900
Total Revenue		**259,884**	**212,510**	**313,290**
Administrative Costs	4.1	(188,944)	(140,106)	(189,203)
Supplies & Requissites	4.2	(34,983)	(28,808)	(29,800)
Contractual Services & Maintenance expenses	4.3	(17,031)	(16,110)	(13,879)
Other Expenses	4.4	(1,485)	(3,342)	(1,415)
Other Project Expenses	4.5	(20,319)	(7,998)	(18,000)
Treasury Grants – Capital (Research Studies)	4.6	(27,896)	(26,500)	(34,150)
Depreciation		(68,626)	(28,709)	(26,000)
Total Expenses		**(359,284)**	**(251,573)**	**(312,447)**
Surplus / (Deficit) from Operations		**(99,400)**	**(39,063)**	**843**
Tax		(10)	(416)	-
Surplus / (Deficit) for the period		**(99,410)**	**(39,479)**	**843**

WATER RESOURCES BOARD
Statement of Financial Position

As at 31st December,	Note No.	2015 Rs.000'	2014 Rs.000'
ASSETS			
Current Assets			
Cash and cash equivalents	05	11,024	9,845
Trade and other receivables	06	16,341	22,249
Inventories	07	153,956	82,691
Prepayments	08	112	54
		181,433	**114,839**

Non - Current Assets			
Property, Plant & Equipment	09	548,867	70,113
		548,867	70,113
TOTAL ASSETS		**730,300**	**184,952**
LIABILITIES			
Current Liabilities			
Trade Creditors	10	2,283	5,155
Other Provisions & Payable	11	23,683	6,244
Deferred Income (Advances for Services)	12	11,370	18,953
		37,336	**30,352**
Non Current Liabilities			
Retirement Benefit Obligations	13	90,855	79,706
Staff Security Deposits	14	14	19
		90,869	**79,725**
TOTAL LIABILITIES		**128,205**	**110,077**
NET ASSESTS		**602,095**	**74,875**
NET ASSESTS / EQUITY			
CAPITAL & RESERVES			
Accumulated Fund	15	329,505	212,621
Other Grants	15	802,079	228,322
Accumulated Profit / (Deficit)	15	(532,052)	(368,631)
Revaluation Reserve	15	2,563	2,563
TOTAL NET ASSESTS / EQUITY		**602,095**	**74,875**

The Accounting Policies and the Notes from pages 06 to 21 form on Integral part of these financial statements.

I certify that the above Financial Statements are true and correct as per the records available .
of the Board.

A. B. M. Chandrasiri
Assistant General Manager(Finance)

The Directors are responsible for the preparation & presentation of the Financial Statements. Approved and sinned for on behalf of the Board.

Sgd. A.C.M. Zulfikar
CHAIRMAN
26th July 2016
WATER RESOURCES BOARD

Sgd. Saman P. Wickramaarachchi
WORKING DIRECTOR

Statement of Changes in Net Assets / Equity
As at 31st DECEMBER

NOTE: 15

	Accumulated Fund Rs'000	Other Grants Rs' 000	Revaluation Reserve Rs' 000	Accumulated Profit/Deficit Rs' 000	Total Rs'000
Balance as at 31st December 2013 B/F	**201,104**	**227,109**	**2,563**	**(335,774)**	**95,002**
Adjustments made for prior period events	-	-	-	6,622	6,622
Restated Balance	201,104	227,109	2,563	(329,152)	101,624
Change in Net Asset / Equity for 2013					
Surplus / (Deficit) for the period	-	-	-	(39,479)	(39,479)
Revaluation – Adjustments	225	-	-	-	225
Contributions / Additions for the Year	27	1,213	-	-	1, 240
Contributions /from Other Grants	11,265	-	-	-	11,265
Balance as 31st December 2014 C/F	**212,621**	**228,322**	**2,563**	**(368,631)**	**74,875**
Balance as 31st December 2014 B/F	**212,621**	**228,322**	**2,563**	**(368,631)**	**74,875**
Adjustments made for prior period events	-	-	-	(64,011)	(64,011)
Restated Balance	**212,621**	**228,322**	2,563	(432,642)	10,864
Change in Net Assets / Equity for 2015					
Surplus / (Deficit) for the period	-	-	-	(99,410)	(99,410)
Revaluation – Adjustment	-	-	-	-	-
Contributions / From Treasury Grants	704	-	-	-	704
Contributions / From Other Grants	116,180	573,757	-	-	689,937
Add / Valuation of Stocks	-	-	-	-	-
Balance as 31st December 2015	**329,505**	**802,079**	**2,563**	**(532,052)**	**602,095**

NOTE: - Details of other grants are as follows

OTHER GRANTS	**Balance as 31.12.2015 (Rs.000)**
JICA	11,973
ADB & NWRA	1,025
Others	24,624
Japanese 2 KR Project	81,476
Amerasian Fund	1,771
DSWRPP Fund	681,210
Total	**802,079**

CASH FLOW STATEMENT

		2015 Rs'000		2014 Rs'000
Cash flows from operating activities				
Surplus / [Deficit] for the year before Treasury Grants (Recurrent)		**(240,410)**		**(126,479)**
Add: Treasury Grants received (Recurrent)		**141,000**		**87,000**
Surplus / (Deficit) for the year		**(99,410)**		**(39,479)**
Non Cash Movements				
Depreciation	68,626		28,709	
Adjustments for Assests & Stocks	25,991		-	
Increase in Provisions to Gratuity	20,377		14,971	
Increase in payables	1,918		8,075	
Decrease in other Current Assets	(9,197)		1,137	
[Gain] / Losses on sale of Property plant & Equipments	(4,945)		(2,720)	
Increase in receivables	4,286		(1,928)	
Interest received for Gratuity Savings	(235)	106,821	-	48,244
Net Cash flows from operating activities		**7,411**		**8,765**
Cash flows from investing activities				
Proceeds from sale of Property Plant & Equipments	5,036		2,720	
Purchase of Property Plant & Equipment	(2,975)		(12,256)	
Interest income for security deposits	1		1	
Interest received for Gratuity Savings	235		-	
Payment of Security Deposit	(5)		-	
Payment of gratuity	(9,228)		(6,375)	
Net Cash flows from Investing activities		**(6,936)**		**(15,910)**
Cash flows from financing activities				
Government Grant (Capital for Property Plant & Equipment's)	704		11, 291	
Net Cash flows from financing activities		**704**		**11, 291**
Net Increase / [decrease] in cash & cash Equivalents		**1,179**		**4,146**
Cash & cash equivalents at beginning of Period		9,845		5,699
Cash & cash equivalents at end of Period		**11,024**		**9,845**

- **NOTES TO THE CASH FLOW STATEMENT**

01. Cash and cash equivalents consist of cash on hand and balances with banks. Cash and cash equivalents included in the Cash Flow Statement comprise the following statement of Financial Position amounts.

	2015 Rs' 000	2014 Rs'000
Cash on hand and balances with banks	3,047	2,157
Savings with National Saving Bank	7,977	7,688
	11,024	**9,845**

02. Cash flows from Treasury Grant (Capital) for the operational activities are included in the Cash Flows from operating activities.

WATER RESOURCES BOARD

NOTES TO THE FINANCIAL STATEMENTS & ACCOUNTING POLICIES

1. Corporate Information

General

The Water Resources Board is a statutory Board established in 1966 under the provisions of Act No. 29 of 1964.

Principal Activities and Nature of Operations

During the year, the principal activities of the Board Comprised of carryout Hydrogeological Surveys, Construction of Tube Wells, Chemical Analysis of Water Samples, preparation of Groundwater Maps etc.

Directors Responsibility Statement

The Board of Directors takes the responsibility for the preparation and presentation of these financial statements as per the provisions of Sri Lanka public sector Accounting Standards.

Address of the registered office and the Principal Place of the Activities of the Board

No. 02A, Hector Kobbekaduwa Mawatha, Colombo 07

2.1. Statement of Compliance

The financial statements of the Water Resources Board are prepared in accordance with the Sri Lanka Public Sector Accounting Standards (SLPSAS) laid down by the Public Sector Accounting Standards Committee of the Institute of Chartered Accountants of Sri Lanka (CA Sri Lanka) with the participation of the Ministry of Financial & Planning.

(Ref: Circular: PED/03/2013 dated 02.10.2013)

The Comparative figures of the previous year have been charged and presented with these Financial Statements.

At present, SLPSAS No. 01, 02 & 03 are being followed. Standard of borrowing cost is not applicable to the Board at present.

2.2. Basis of Preparation

The financial statements are prepared on the Historical Cost Basis.

2.3. Functional and Presentation Currency

These Financial Statements are presented in Sri Lankan Rupees, Which is the Boards Functional Information has been rounded to the nearest thousands unless otherwise specifically indicated.

3. Assets and Basis of their Valuation

3.1. Property, Plant & Equipments

Property Plant and Equipments are recorded at cost less accumulated depreciation. The cost of Property, Plant & Equipment is the cost of purchase / revaluation or construction together with any incidental expenses thereon.

3.2. Depreciation

No depreciation is provided in the year of purchase or revaluation and full year's depreciation is provided in the year of disposal.

NOTES TO THE FINANCIAL STATEMENTS & ACCOUNTING POLICIES

Depreciation is calculated so as to write off the Cost / Revaluation of Fixed Assets on a Straight – Line Basis over the expected useful lives of the Assets concerned. The principle annual rates used for this purpose are,

Motor Vehicles	25%
Machinery, Tools & Equipments	20%
Laboratory Equipments	20%
Scientific Equipments	20%
Geophysical Maps	20%
Computers	20%
Furniture, fitting & office Equi.	10%
Office Equipment, Computer & Laboratory Equi.Impro.	33 1/3%
Building Improvements	33 1/3%
Machinery & Vehicle Impro.	33 1/3%

3.3 Leased Assets

Payments made under operating leases are recognized in statement of Financial Performance on a Straight Line basis over the term of the lease.

3.4 Inventories

Inventories consist of vehicle spares, stores materials, machinery spares, fuel and other consumables. The cost of inventories are based on the first – in – first-out (FIFO) principle.

Inventory items identified as zero rated which was granted in previous years are measured at the net realizable value by the committee has been appointed.

Work in Progress

Work in progress balance of the 2 KR machinery, accounted as inventory stock under machinery spares from years identified as expense of maintenance of machinery due to completion of the major maintenance of machinery.

3.5 Receivables

1.1. Receivables are stated at the amounts they are estimated to realize.
1.2. Bad and Doubtful Debts.

The estimated losses to these debts are based on continuous review of all invoices and claims identified as bad and doubtful.

4.1 Accounts payables and Accrued expenses

Trade and other payables are stated at cost.

Deferred Income

Advances received for services to be rendered are shown as deferred income in the statement of Financial Position until recognize the income.

4.2 Provisions

Provisions are made for all obligations existing as at the date of statement of Financial Position.

NOTES TO THE FINANCIAL STATEMENTS & ACCOUNTING POLICIES

5. Deferred Liabilities

5.1 Retirement Gratuity

Provisions is made in the Financial Statements for retiring Gratuity, which may fall due for payment of Gratuity Act No.12 of 1983. It is provided one half of the basic salary and statutory allowances for the last month of the financial year for each year of continues service. This item is shown as Non Current Liabilities in the Statement of Financial Position.

6. Taxation

6.1 Tax Expense

Tax expense Comprises Current and any adjustment to tax payable in respect of previous years.

6.2 Value added Tax

Value added Tax is being paid on Cash Basis as the approval granted by the Commissioner of Inland Revenue.

7. Research Studies Expenses

Operational expenses which have been identified directly to Research studies under Treasury Grants capital vote have been charged to the statement of Financial Performance.

8. Cash Flow Statement

The Cash Flow statement is prepared using the indirect method as stipulated in SLPSAS 02 Cash Flow Statement.

WATER RESOURCES BOARD

NOTES TO THE FINANCIAL STATEMENT.

REVENUE FROM OPERATING ACTIVITIES	**Actual 2015**	**Actual 2014**	**Actual 2015**
NOTE NO: 01	**Rs'000**	**Rs'000**	**Rs'000**
HYDRO: INVESTIGATIONS / EXPLORATION			
Hydrogeological Survey	10,225	15,045	10,000
Tube Well Construction	35,495	46,931	55,250
Hand Pump Installation	5,156	5,785	8,640
Pumping Tests	9,175	12,058	18,000
Tube Well Cleaning	1,332	3,592	2,100
Water Sample Analysis	2,162	3,366	6,250
Installation of Iron Removable Plant	300	-	8,000
Sub Total	**63,845**	**86,777**	**108,240**

GROUNDWATER MONTORING			
Dam Safety Water Resources Planning Project	5,001	670	10,000
Subtotal	**5,001**	**670**	**10,000**
GROUNDWATER DEVELOPMENT			
Drought Relief Tube Well Rehabilitation Project	-	6,652	-
100 Days Programme	11,593	-	13,000
Gonaganara & Rathupasketiya Project	1,925	-	5,000
Chunnakam Project	1,800	-	-
Sub Total	**15,318**	**6,652**	**18,000**
Grand Total	**84,164**	**94,099**	**136,240**

NOTE NO: 02

TREASURY GRANT – CAPITAL

(RESEARCH STUDIES - OPERATIONAL)

Hydrogeological coastal study in Colombo to Negombo	230	3,125	500
Study in water quality changes in aquifer system – A'pura	280	4,735	500
Rehabilitation & Improvement Income	2,908	973	3,500
Hydrogeological Study in limestones Aquifers in Manner	4,500	3,933	3,650
Jaffna Ground water Monitoring	2,468	2,989	4,500
Hydrogeological Study in Vavunia and Kilinochchi	3,019	2,496	3,650
Study on the direct and indirect impacts of climate changes	2,254	1,178	2,600
Artificial Recharge Project (Phase I Puttlam)	2,503	1,250	2,150
Water Quality Studies in CKDU Project	4,365	5,821	4,300
Rehabilitation of H/P Tube Wells in H,tota, Badulla & Mon,gala	2,872	-	5,000
Ground Water Assessment of Kirindi Oya Basin (Phase I)	1,522	-	1,900
Ground Water Assessment of Kelani Ganga Basin (Phase I)	783	-	1,400
Staff Training	192	-	500
Grand Total	**27,896**	**26,500**	**34,150**

NOTE NO: 03

OTHER INCOME

Circuit Bungalow Reservation	191	241	250
Fines & Surcharges	51	127	100
Sundry Income	764	770	900
Dayata Kirula	-	267	-
Disposal Income	4,945	2,720	-
Interests on Loans & Bank Deposits	873	786	650
Total	**6,824**	**4,911**	**1,900**

NOTES TO THE FINANCIAL STATEMENTS CONTD.

NOTE NO: 4.1 ADMINISTRATIVE COSTS	**Actual 2015 Rs'000**	**Actual 2014 Rs'000**	**Budget 2015 Rs'000**
Salaries & Wages	138,642	101,653	140,000
over time & Holiday Pay	5,711	6,459	6,500
Employees Provident Fund -12%	14,434	8,571	14,000
Employees Trust Fund -12%	3,609	2,143	3,600
Director's Fees	705	714	500
Other Allowances	23	5	3
Gratuity	20,377	14,971	18,000
Traveling – Local	4,310	4,853	5,300
Traveling – Overseas	95	43	150
Welfare & Sports facilities	140	87	100
Medical Scheme	760	443	900
Entertainment	89	62	100
Vacation Leave Encashment	49	102	50
Total	**188,944**	**140,106**	**189,203**

NOTE NO: 4.2 SUPPLIES REQUISITES			
Fuel & Lubricants	12,940	20,648	20,000
Drilling Works Consumables	18,090	7,156	9,000
Laboratory Consumable & Others	3,640	440	400
Other Consumable	313	564	400
Total	***34*,983**	**28,808**	**29,800**

NOTE NO: 4.3 CONTRACTUAL SERVICES & MAINTENANCE EXPENSES

Postage & Telecommunication	1,188	1,088	1,200
Electricity	1,902	2,205	2,300
Rent, Rates, & Taxes	695	820	800
Cash in transit Insurance	11	11	9
Audit Fees	200	292	250
Printing & Publications	103	130	150
Workshop & Seminars	54	135	100
Water Bills	141	127	150
Consultancy Charges	67	96	70
Sundry Expenses	249	339	250
Maintenance of Motor Vehicles	3,881	3,214	3,600
Maintenance of Machinery	6,733	5,105	3,200
Maintenance of Office Equipments	1,365	1,235	1,000
Maintenance of Buildings	442	1,313	800
Total	**17,031**	**16,110**	**13,879**

NOTE NO: 4.4 OTHER OPERATING EXPENSES

Stationery & Office Requisites	381	430	300
Uniforms	116	140	100
Periodicals & Newspapers	97	77	100
Publicity	304	99	200
Bank charges	142	142	160
Medical Test Charges	-	55	25
Legal Expenses	-	18	-
Stamp Duty	6	10	10
Vehicle Service – Rathmalana	259	466	400
Hiring Charges	54	11	-
Training Centre Expenditure (A'pura)	95	118	120
Dayata Kirula Expenses	-	267	-
W.H.T Written off	-	1,462	-
Bad Debts	31	47	-
Total	**1,485**	**3,342**	**1,415**

NOTES TO THE FINANCIAL STATEMENTS CONTD.

	Actual 2015 Rs'000	Actual 2014 Rs'000	Actual 2015 Rs'000
NOTE NO: 4.5 OTER PROJECT EXPENSES			
DAM SAFETY WATER RESOURCES PLANING PROJECT			
Overtime & Holiday Pay	357	55	
Traveling	533	57	
Stationery & Office Requisites	79	1	
Fuel & Lubrications	2,034	253	
Maint. of Buildings	-	77	
Drilling Work Consumables	999	212	
Office Equipment Maint. & Repairs	458	3	
Rent. Rates & Taxes	44	7	
Entertainment	180	5	-
Other Consumables	12	-	
Salaries & Wages	43	-	
Printing & Publication	3	-	
Sundry Expenses	9	-	
Maintenance of Motor Vehicles	87	-	
Consultancy Charges	125	-	
Publicity	14	-	
Maint. of Machinery	7	-	
Maint. of Lab. Equipment's	17	-	
Sub Total	***5,001***	**670**	

DROUGHT RELIEF TUBE WELLS REHABILITATION PROJECT

Overtime & Holiday Pay	-	681	-
Traveling	-	732	-
Stationery & Office Requisites	-	2	-
Fuel & Lubrications	-	2,469	-
Drilling Work Consumables	-	3,088	-
Rent. Rates & Taxes	-	42	-
Other Consumables	-	67	-
Maintenance of Motor Vehicles	-	225	-
Maint. of Machinery	-	14	-
Sundry Expenses	-	1	-
Postage & Telecommunication	-	2	-
Labour Charge	-	4	-
Water Bills	-	1	-
Sub Total	**-**	**7,328**	**-**

100 DAYS PROJECT

Overtime & Holiday Pay	1,225	-	-
Traveling	1,106	-	-
Stationery & Office Requisites	3	-	-
Fuel & Lubrications	4,038	-	-
Maint. of Buildings	188	-	-
Drilling Work Consumables	4,500	-	-
Maintenance of Motor Vehicles	37	-	-
Maint. of Machinery	7	-	-
Sundry Expenses	18	-	-
Printing & Publication	6		
Publicity	87		
Rent. Rates & Taxes	133	-	-
Other Consumables	83		
Entertainment	162		
Sub Total	**11,593**	-	**13,000**

NOTES TO THE FINANCIAL STATEMENTS CONTD.

	Actual 2015 Rs'000	**Actual 2014 Rs'000**	**Actual 2015 Rs'000**
NOTE NO: 4.5 OTER PROJECT EXPENSES			
GONAGANARA & RATHUPASKETIYA PROJECT			
Overtime & Holiday Pay	82	-	-
Traveling	55	-	-
Other Consumables	10	-	-
Fuel & Lubrications	2	-	-
Maint. of Buildings	46	-	-
Drilling Work Consumables	1,691	-	-
Electricity	21	-	-
Hiring Charges	18	-	-
Sub Total	**1,925**	-	**5,000**

CHUNNAKAM PROJECT			
Drilling Work Consumables	1,800	-	-
Sub Total	**1,800**	**-**	**-**
GRAND TOTAL	**20,319**	**7,998**	**18,000**
HYDROGEOLOGICAL COASTAL STUDY IN COLOMBO TO NEGOMBO			
Salaries & Wages	-	90	-
Overtime & Holiday Pay	7	314	50
Traveling	15	310	50
Stationery & Office Requisites	-	2	-
Fuel & Lubrications	30	867	100
Ground Water Other	1	13	300
Drilling Work Consumables		722	-
Maintenance of Motor Vehicles		408	-
Maint. of Machinery	-	32	-
Maint. of Lab. Equipment's	177	222	-
Postage & Telecommunication		11	-
Sundry Expenditure		2	-
Rent, Rates & Taxes		132	-
Sub Total	**230**	**3,125**	**500**
STUDY IN WATER QUALITY CHANGES IN AQUIFER SYSTEM - ANURADHAPURA			
Overtime & Holiday Pay	17	312	50
Traveling	36	321	50
Fuel & Lubrications	107	1,982	200
Maint. of Lab. Equipments	120	-	-
Maintenance of Motor Vehicles	-	579	-
Drilling Work Consumables	-	961	-
Ground Water Other	-	2	200
Maint. of Machinery	-	121	-
Office Equipment Maint. & Repairs	-	59	-
Entertainment	-	127	-
Training Centre Expenditure (A'pura)	-	199	-
Salaries & Wages	-	1	-
Sundry Expenditure	-	2	-
Publicity	-	33	-
Printing & Publication	-	17	-
Maint. of Buildings	-	19	-
Sub Total	***280***	**4,735**	**500**

	Actual 2015	Actual 2014	Budget 2015
NOTE NO: 4.6 TREASURY GRANTS – CAPITAL (Research Studies)			
HYDROGEOLOGICAL STUDY IN LIMESTONES AQUIFERS IN MANNAR DISTRICT			
Salaries & Wages	-	-	50
Overtime & Holiday Pay	471	226	500
Traveling	388	261	450
Stationery & Office Requisites	3	2	30
Fuel & Lubrications	1,527	726	1,300
Drilling Work Consumables	1,323	1,955	745
Ground Water Other	38	16	50
Rent, Rates & Taxes	105	15	75
Maint. of Lab. Equipment's	120	11	-
Maintenance of Motor Vehicles	96	555	150
Maint. of Machinery	410	125	150
Maint. of Buildings	-	19	50
Postage & Telecommunication	-	-	30
Electricity	-	-	10
Postage & Telecommunication	-	-	40
Sundry Expenditure	9	2	20
Office Equipment Maint. & Repairs	9	20	-
Entertainment	1	-	-
Sub Total	**4,500**	**3,933**	**3,650**
JAFFNA GROUND WATER MONTORING			
Overtime & Holiday Pay	220	87	500
Traveling	228	109	450
Stationery & Office Requisites	2	-	30
Fuel & Lubrications	1,020	723	1500
Drilling Work Consumable	643	1,653	1280
Ground Water Other	9	-	100
Rent. Rates & Taxes	52	121	120
Salaries & Wages	-	33	50
Maint. of Motor Vehicles	56	164	150
Maint. of Machinery	9	-	150
Maint. of Buildings	-	-	50
Maint. of Lab. Equipments	224	99	-
Postage & Telecommunication	-	-	50
Electricity	-	-	50
Sundry Expenditure	5	-	20
Sub Total	**2,468**	**2,989**	**4,500**

HYDROGEOLOGICAL STUDY IN VAVUNIA & KILINOCHCHI

Salaries & Wages	14	-	50
Drilling Work Consumable	936	1,052	595
Overtime & Holiday Pay	256	120	400
Traveling	281	118	400
Fuel & Lubrications	1,225	760	1800
Ground Water Other	5	9	50
Maint. of Lab. Equipment's	109	375	-
Maintenance of Motor Vehicles	102	62	100
Rent. Rates & Taxes	78	-	50
Maint. of Machinery	8	-	120
Maint. of Buildings	-	-	25
Electricity	-	-	10
Sundry Expenditure	4	-	20
Stationery & Office Requisites	1	-	30
Sub Total	**3,019**	**2,496**	**3,650**
Staff Training	192	-	500
Rehabilitation & Improvement	2,908	973	3,500
Sub Total	**3,100**	**973**	**4,000**

THE STUDY ON THE DIRECT & INDIRECT IMPACTS OF CLIMATE CHANGES

Salaries & Wages	9	-	100
Overtime & Holiday Pay	99	32	200
Traveling	171	65	200
Fuel & Lubrications	694	608	500
Drilling Work Consumable	942	341	810
Maintenance of Motor Vehicles	12	132	150
Stationery & Office Requisites	1	-	10
Ground Water Other	109	-	350
Rent. Rates & Taxes	49	-	40
Maint. of Machinery	1	-	200
Postage & Telecommunication	-	-	10
Electricity	-	-	10
Sundry Expenditure	5	-	20
Maint. of Lab. Equipment's	158	-	-
Office Equipment Maint. & Repairs	4	-	-
Sub Total	**2,254**	**1,178**	**2,600**

ARTIFICAL RECHARGE PROJECT (PHASE 1 PUTTALAM)

Salaries & Wages	-	-	50
Overtime & Holiday Pay	79	93	200
Traveling	97	104	200
Stationery & Office Requisites	-	2	10
Fuel & Lubrications	492	355	500
Drilling Work Consumables	1,670	541	795
Ground Water Other	6	9	50
Maint. of Lab. Equipment's	120	12	-

Maint. of Machinery	20	43	100
Office Equipment Maint. & Repairs	-	14	-
Maintenance of Motor Vehicles	17	77	100
Rent. Rates & Taxes	-	-	50
Postage & Telecommunication	-	-	30
Electricity	-	-	50
Sundry Expenditure	2	-	15
Sub Total	**2,503**	**1,250**	**2,150**

WATER QUALITY STUDIES IN CKDU PROJECT

Salaries & Wages	-	22	100
Overtime & Holiday Pay	168	645	300
Maintenance of Motor Vehicles	56	118	100
Maint. Of Machinery	2	48	100
Rent, Rates & Taxes	83	126	100
Traveling	220	900	300
Stationery & Office Requisites	10	2	10
Fuel & Lubrications	995	2,514	1500
Drilling Work Consumables	2,420	1,368	760
Ground Water Other	8	28	900
Sundry Expenditure	18	6	20
Maint. of Buildings	-	41	-
Legal Expenses	-	3	-
Postage & Telecommunication	-	-	20
Electricity	-	-	20
Water Bills	-	-	20
Scholarships & Seminars	-	-	50
Printing & Publication	2	-	-
Maint. of Lab. Equipment's	81	-	-
Entertainment	251	-	-
Publicity	51	-	-
Sub Total	**4,365**	**5,821**	**4,300**

REHABILITATION OF HAND PUMP TUBE WELLS IN HAMBANTOTA & MONARAGALA

Salaries & Wages	-	-	50
Overtime & Holiday Pay	185	-	200
Maintenance of Motor Vehicles	-	-	100
Maint. of Machinery	-	-	100
Rent, Rates & Taxes	16	-	100
Traveling	151	-	200
Fuel & Lubrications	478	-	800
Drilling Work Consumables	2,024	-	350
Ground Water Other	13	-	3000
Postage & Telecommunication	-	-	10
Electricity	-	-	30
Water Bills	-	-	10
Sundry Expenditure	3	-	50
Stationery & Office Requisites	2	-	-
Sub Total	**2,872**	-	**5000**

GROUND WATER ASSESMENT OF KIRINDI OYA BASIN (PHASE – I)

Salaries & Wages	-	-	100
Overtime & Holiday Pay	107	-	200
Maintenance of Motor Vehicles	82	-	200
Maint. of Machinery	-	-	100
Rent, Rates & Taxes	7	-	50
Traveling	128	-	200
Fuel & Lubrications	740	-	400
Drilling Work Consumables	377	-	220
Ground Water Other	-	-	200
Stationery & Office Requisites	-	-	25
Maint. of Buildings	-	-	100
Postage & Telecommunication	-	-	25
Electricity	-	-	20
Sundry Expenditure	-	-	60
Maint. of Lab. Equipment's	81	-	-
Sub Total	**1,522**	**-**	**1,900**

GROUND WATER ASSESMENT OF KELANI GANGA BASIN (PHASE – I)

Salaries & Wages	-	-	100
Overtime & Holiday Pay	10	-	150
Maintenance of Motor Vehicles	21	-	50
Maint. of Machinery	-	-	100
Rent, Rates & Taxes	-	-	50
Traveling	14	-	150
Fuel & Lubrications	6	-	400
Drilling Work Consumables	651	-	100
Ground Water Other	-	-	200
Stationery & Office Requisites	-	-	25
Water Bills	-	-	25
Postage & Telecommunication	-	-	25
Sundry Expenditure	-	-	25
Maint. of Lab. Equipment's	81	-	-
Sub Total	**783**	**-**	**1,400**
GRAND TOTAL	**27,896**	**26,500**	**34,150**

NOTE NO: 5

CASH & CASH EQUIVALENTS

(1)	Bank of Ceylon York Street Branch (0002026295)	982	87
(2)	Bank of Ceylon Torrington Branch (0002322267)	1,288	586
(3)	Bank of Ceylon Torrington Branch (0002322268)	36	1,220
(4)	Bank of Ceylon Torrington Branch (0005342839)	727	250
(5)	National Savings Bank – Bammbalapitiya (100230211818)	7,977	7,688
(6)	National Savings Bank – Borella (1-0061-03-31236)	12	12
(7)	National Savings Bank – Borella (1-0061-03-31287)	2	2
	TOTAL	**11,024**	**9,845**

NOTES TO THE FINANCIAL STATEMENTS CONTD.

NOTE NO: 6	**Actual 2015**	**Actual 2014**
TRADE & OTHER RECEIVABLES	**Rs'000**	**Rs'000**
STAFF		
(1) Distress Loan	12,375	13,228
(2) Festival Advance	28	217
(3) Traveling Advance	-	13
(4) Cycle Loan	25	39
(5) Staff Debtors	247	138
Sub Total	**12,675**	**13,635**
OTHERS		
(6) Trade	3,836	9,580
(7) Deposits	56	56
(8) Advances to suppliers	163	4
Sub Total	**4,055**	**9,640**
TOTAL RECEIVABLES	**16,730**	**23,275**
(9) Less : V.A.T. Payable	(389)	(1,026)
TOTAL	**16,341**	**22,249**

NOTE NO: 7

INVENTORIES MATERIALS & SPARES

Vehicle Spares	1,149	1,036
Vehicle Spares (DSWRPP)	1,361	-
Fuel & Lubricants	923	457
Stores Materials	19,430	18,083
Building Maintenance	38	74
Stationery	318	196
Machinery Spares (with 2 KR Spares)	66,714	60,211
Machinery Spares (DSWRPP)	55,755	-
Machinery Spares (MINISTRY)	5,010	-
Laboratory Maintenance	3,258	2,634
TOTAL	**153,956**	**82,691**

NOTE NO: 8

PRE-PAYMENTS

Cash in Transits	8	8
Newspapers & Periodicals	9	14
Maintenance of Motor Vehicle	95	32
TOTAL	**112**	**54**

PROPERTY, PLANT & EQUIPMENT

NOTE NO: 09

Cost / Valuation	**Balance as at 01.01.2015 Rs'000**	**Additions for the year Rs'000**	**Disposal Adjustments Rs'000**	**Balance as at 31.12.2015 Rs'000**
Land	884	1,013	-	1,897
Motor Vehicles	75,648	61,627	(473)	136, 802
Machinery, Tools & Equipment's	234,567	464,114	-	698,681
Laboratory Equipment's	76,460	9,240	-	85,700
Furniture fittings & office Equipment's	15,569	1,588	-	17,157
Computers & Accessories	10,042	1,189	(30)	11,201
Scientific Equipment's	40,862	54,595	-	95,457
Geological Maps	2,188	86	-	2,274
Machinery & Vehicles Improvements	1,086	-	(1,086)	-
Lab Building (Work in Progress)	-	300	-	300
TOTAL	**457,306**	**593,752**	**(1,589)**	**1,049,469**

Depreciation

	Balance as at 01.01.2015 Rs'000	**Charges for the year Rs'000**	**Disposal / Adjustments Rs'000**	**Balance as at 31.12.2015 Rs'000**
Motor Vehicles	72,847	15,464	19,890	108,201
Machinery, Tools & Equipments	227,271	31,304	25,979	284,554
Laboratory Equipments	48,369	10,703	-	59,072
Furniture fittings & Office Equipments	10,104	848	-	10,952
Computers & Accessories	7,578	1,137	-	8,715
Scientific Equipment	19,775	7,646	-	27,421
Geological Maps	1,249	438	-	1,687
TOTAL	**387,193**	**67,540**	**45,869**	**500,602**
NET BOOK VALUE	**70,113**			**548,867**

Total Depreciation is made as follows	**Rs.'000**
From Accumulated Depreciation	67,540
From Improvements	1,086
	68,626

NOTES TO THE PROPERTY PLANT & EQUIPMENT

NOTE NO: 09

01. Land of Korakahawewa Training Center (Hec. 2.166) has leased agreement on paying with annual rental basis.

02. Details of the Land & Building which are utilizing of the Board without having legal ownership as at 31.12.2013 are as follows.

LAND	BUILDINGS (Appox)
Head Office	8477 Sq.ft
Work Shop at Rathmalana	32960 Sq.ft
Circuit Bungalow at Anuradhapura	3038 Sq.ft
Work site at Vauniya	1082 Sq.ft

03. Nos of Motor vehicles (Double Cabs) granted from General Treasury in year 2012 have not been valued. (Vehicle Nos. PE-0623, PE-3448, PD-5851, PD-5856)

04. 10 Nos of Motor Vehicles have not been transferred to the Board as end of the Year 2015.

NOTES TO THE FINANCIAL STATEMENTS CONTD.

	Actual 2015 Rs'000	Actual 2014 Rs'000
NOTE NO: 10		
TRADE CREDITORS		
NAME		
01. Provincial Sec. Nuwaragampalatha	422	422
02. A.M.Nijam	-	322
03. Aiken (Pvt) ltd	-	1,126
04. Augustine Motors (Pvt) Ltd	-	9
05. Ceat Kelani International Tyres (Pvt) ltd	-	48
06. Central Industries PLC	-	455
07. Dhanusha Marine Lanka (Pvt) Ltd	-	390
08. Sri Lanka State Trading Gen.Corporation Ltd	-	86
09. United Motors Lanka Plc	-	12
10. National Water Supply & Drainage Board	1,125	2,124
11. N. Technology	-	76
12. Dhanusha Marine	626	-
13. Municipal Council – Dehiwala	110	-
14. Others	-	85
TOTAL	**2,283**	**5,155**

NOTE NO: 11

OTHER PROVISIONS & PAYABLES

(1)	Staff		
	1:1 Staff Creditors	20	145
	1:2 DSWRPP Project	-	30
	SUB TOTAL (1:1 – 1:2)	**20**	**175**
(2)	Provision for Audit Fees	557	357
(3)	Retention Payable	-	45
(4)	E.P.F. 10%	(84)	(13)
(5)	Accrued Expenses	18,443	6,171
(6)	Bid Bond & Refundable Deposits	420	38
(7)	ETF Payable	5169	-
	SUB TOTAL (2 – 7)	**24,505**	**6,598**

(8) Less: V.A.T Cash	(651)	(75)
(9) Less: V.A.T Receivable	(191)	(454)
	23,683	**6,244**

NOTE NO: 12

DEFERRED INCOME

Service Advance (Pl.se Page No 25 & 26 for details)	**11,370**	**18,953**

NOTE NO: 13

RETIREMENT BENEFIT OBLIGATION

The Amounts recognized in the Statement of Financial Position are as follows

At Beginning of the year	79,706	71,141
Less:- Transfer – JV-119	-	(31)
Charge / Credit for the year	20,377	14,971
Contribution Paid	(9,228)	(6,375)
At end of the year	**90,855**	**79,706**

NOTE NO: 14

SECURITY DEPOSITS		**Deposit Rs.**		
(1) Mr. W.P.S. Gunethilake	- Cashier	**3,500**	12	12
(2) Mr. K.A. Wimal	- Store Keeper	**500**	2	2
(3) Mr. N. Wicramasinghe	- Canteen	**5,000**	-	5
	TOTAL	**9,000**	**14**	**19**

NOTE NO: 15

Please see Page No. 03 for Statement of changes in Net Assets / Equity

The Auditor General
Auditor General's Department,
No. 306/72, Polduwa Road,
Battaramulla.

විගණකාධිපති දෙපාර්තමේන්තුව
கணக்காய்வாளர் தலைமை அதிபதி திணைக்களம்
AUDITOR GENERAL'S DEPARTMENT

මගේ අංකය எனது இல. My No. IEN/A/WRB/1/16/11 මගේ අංකය உமது இல. Your No. දිනය திகதி Date 23 November 2015

CHAIRMAN
01 FEB 2017
WATER RESOURCES BOARD

The Chairman,

Water Resources Board.

Report of the Auditor General on the Financial Statements of the Water Resources Board for the year ended 31 December 2015 in terms of Section 14(2) (c) of the Finance Act, No. 38 of 1971.

The audit of financial statements of the Water Resources Board for the year ended 31 December 2015 comprising the statement of financial position as at 31 December 2015and the statement of financial performance, statement of changes in equity and cash flow statement for the year then ended and a summary of significant accounting policies and other explanatory information, was carried out under my direction in pursuance of provisions in Article 154(1) of the Constitution of the Democratic Socialist Republic of Sri Lanka read in conjunction with Section 13(1) of the Finance Act, No.38 of 1971 and Section 17(2) of the Water Resources Board Act, No.29 of 1964 as amended by Act, No 42 of 1999. My comments and observations which I consider should be published with the Annual Report of the Board in terms of Section 14(2) (c) of the Finance Act appear in this report. A detailed report in terms of Section 13 (7) (a) of the Finance Act, was issued to the Chairman of the Board on 23 August 2016.

1.2 Management's Responsibility for the Financial Statements

The management is responsible for the preparation and fair presentation of these financial statements in accordance with Sri Lanka Public Sector Accounting Standards and for such internal control as the management determines is necessary to enable the preparation of financial statements that are free from material misstatements whether due to fraud or error.

අංක 306/72, පොල්දූව පාර, බත්තරමුල්ල, ශ්‍රී ලංකාව, . - இல. 306/72, பொல்துவ வீதி, பத்தரமுல்லை, இலங்கை. - No. 306/72, Polduwa Road, Battaramulla, Sri Lanka
+94-11-2887028-34 +94-11-2887223 oaggov@sltnet.lk www.auditorgeneral.gov.lk

1.3 Auditor's Responsibility

My responsibility is to express an opinion on these financial statements based on my audit. I conducted my audit in accordance with Sri Lanka Auditing Standards consistent with International Auditing Standards of Supreme Audit Institutions (ISSAI 1000-1810). Those Standards require that I comply with ethical requirements and plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatements.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditor's judgement, including the assessment of the risks of material misstatements of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the Board's preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the Board's internal control. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of accounting estimates made by management, as well as evaluating the overall presentation of financial statements. Sub-sections (3) and (4) of Section 13 of the Finance Act, No. 38 of 1971 give discretionary powers to the Auditor General to determine the scope and extent of the audit.

I believe that the audit evidence I have obtained is sufficient and appropriate to provide a basis for my audit opinion.

1.4 Basis for Qualified Opinion

My opinion is qualified based on the matters described in paragraph 2.2 of this report.

2. Financial Statements

2.1 Qualified Opinion

In my opinion, except of the matters described in paragraph 2:2 of this report the financial statements give a true and fair view of the financial position of the Water Resources Board as at 31 December 2015 and its financial performance and cash flows for the year then ended in accordance with Sri Lanka Public Sector Accounting Standards.

2.2 Comments on Financial Statements.

2.2.1 Sri Lanka Public Sector Accounting Standards

In accordance with the Sri Lanka Public Sector Accounting Standard 07, depreciation on an asset be begins when it is available for use. However, the Board had followed the basis of not depreciating for the year in which the asset is purchased, and depreciating in the year of disposal with respect to the whole year.

2.2.2 Accounting Deficiencies

The following observations are made.

(a.) The value of 06 vehicles donated by the Treasury, and the Sri Lanka Army and the Water Resources Secretariat in the years 2012 and 2013 respectively, had not been valued and shown in the financial statements .

(b.) As the cost of living allowance had not been taken into consideration in computing the contribution to the Employee Provident Fund relating to the period 2006-2014, it had been identified in the year under review that contributions and surcharges amounting to Rs.25,268,406 and Rs.12,634,203 respectively had remained payable. However, that liability had not been brought to accounts.

2.2.3 Lack of Evidence for Audit

Confirmation of balances in respect of debtors totalling Rs.12,350,395 and service advances, had not been made available to audit.

2.3 Accounts Receivable and Payable

The following observations are made.

(a.) Of the debtor balances amounting to Rs. 3,835,577, a loan balance of Rs.212,836 had been older than 3 years as at 31 December of the year under review. However, effective action had not been taken to recover those balances.

(b.) Even though a period of more than a year had elapsed as at 31 December of the year under review since the service advances amounting to Rs. 2,707,906 had been obtained for providing services, the Board had not taken action to execute the relevant activities. Furthermore, action had not been taken to settle the advances amounting to Rs.96,432 of which the relevant activity had been completed.

2.4 Non-compliances with Laws, Rules, Regulations, and Management Decisions

The following non-compliances were observed in audit.

	Reference to Laws, Rules, and Regulations	Non-compliance
(a)	Water Recourses Board Act, No. 29 of 1964 and Sections 14 (1) and 14(3) of	Even though the Advisory Committee should advice the Board on any or all of the matters set out in the Act, the Committee of the Board had not met during the year under review. Furthermore, Eleven research studies conducted during the year

	amended Act, No 42 of 1999	under review had not been brought to the notice of the Committee for its advice. Therefore, the research expenditure of Rs.27,896,000 incurred thereon had not been approved by the Advisory Committee in terms of provisions in the Water Resource Board Act.
(b.)	Treasury Circular, No. 842, dated 19 December 1978.	Registers of Fixed Assets had not been maintained for non-current assets totalling Rs.899,569,000
(c.)	Paragraph 9.7 of the Public Enterprises Circular, No. PED/12, dated 02 June 2003.	Without obtaining the approval of the Secretary to the Treasury, 29 officers of the Board had been paid a sum of Rs.2,229,667 in the year under review, and a sum of Rs.1,716,000 had been paid to 17 officers in the preceding year as special allowances.

3. Financial Review

3.1 Financial Results

According to the financial statements presented, the operations of the Board for the year ended 31 December 2015 had resulted in a deficit of Rs.99,400,000 as compared with the corresponding deficit of Rs.39,063,000 for the preceding year, thus indicating an increase of Rs.60,337,000 in the deficit for the year under review as compared with the preceding year. The increase in the total expenditure by a sum of Rs.107,711,000, and the decrease in the income received from the operating activities by a sum of Rs.9,935,000 had mainly attributed to the increase in the deficit.

In the analysis of financial results for the year under review and the 04 preceding years, a deficit in the financial result was indicated from the year 2011 up to the year under review. Nevertheless, in considering the employee remuneration, and the depreciation on non-current assets, the contribution of the Board that amounted to Rs.97,199,000 in the year 2011, had improved continuously in a positive manner , and reached to Rs.158,170,000 in the year under review.

4. Operating Review

4.1 Performance

(a.) Accomplishment of the Objectives

The objectives of the Board set out in Section 12 of the Water Resources Board (amendment) Act, No.42 of 1999 are as follows.

(i) The control, regulation , development, and prevention of pollution including the conservation and utilization, of the water resources of the country;

(ii) The formulation of national policies relating to the control and use of the water resources of the country with the objectives of , the multi-purpose development and use of water resources, the short-term and long-term provision of water resources for domestic and industrial supplies, the control of salinity, and any other like objective.

(iii) The analysis of reports based on investigations, statistical surveys, plans and proposals relating to the ground water resources of the country made by Government institutions.

(iv) Any other suitable measures to be taken by the Government for the proper control and economic use of groundwater.

The Board had failed to take substantial measures to achieve the aforesaid objectives.

(b.) Even though it had been planned to conduct research studies in respect of 6206 units under 13 subjects through the annual estimate for the year under review, the Board had conducted only 2808 units according to the progress reports. Therefore, the plans that had not been implemented, ranged from 16-100 per cent.

(c.) Deficiencies in Implementing Research Studies

The following observations are made.

(i) Eleven research study projects had been commenced during the years from 2010 to 2015 in order to examine the quality of water and its impact on the general public at an estimated cost of Rs.410,181,400, and a sum of Rs.84,403,529 had been utilized therefrom as at 31 December 2015. Despite being scheduled to complete 09 of those research studies by 31 December 2015, the expected objectives of the projects had not been achieved as it had failed to implement the entire 09 projects as expected.

(ii) The previous research experience of the officers responsible for the research studies, and their academic and professional qualifications had not been included in the research proposal. No research study whatsoever had been supervised by a researcher skilled and experienced in the relevant area of research.

(iii) A Research Officer should have been appointed on full time basis in order to ensure successful completion of research studies. However, the Board had appointed its General Manager as the Research Officer with respect to all research studies. As he had to be involved in researches in addition to his usual duties, the research studies could not be completed within the scheduled duration.

(iv) Of the provisions allocated by the Treasury in the year under review for research studies, a sum of Rs.246,161 had been utilized on the expenses of the Board.

4.2 Management Activities

The following observations are made.

(a.) A female Geologist had proceeded abroad in the year 2005 for a scholarship under the condition of a mandatory service period of 06 years, and a surety bond of Rs.1,308,699. After the scholarship , and prior to completion of the agreed period of service, she had been released to another institute subject to a mandatory service period of 04 years under a surety bond of Rs.435,600. Despite being permanently released from the service of the Board with effect from the year 2011 whilst she had failed to act according to the 02 agreements entered into, action had not been taken even by the end of the year under review to recover the surety of Rs.1,744,299 that remained receivable by the Board in terms of the agreements.

(b.) The Divisional Secretary of Kalpitiya had paid a sum of Rs.1,751,358 to the Board in the year 2006 for the construction of a deep well under "*Karambe*" drinking water Project. Due to water of the well is being salty, the Operations Manager of the Board had agreed to deduct the sum of Rs.536,130 that had been incurred on the pump test carried out on 03 deep wells in that area, from the advance amount obtained by the Board, thereby paying back the balance amounting to Rs.1,215,228. Nevertheless, action had not been taken even up to the end of the year under review to pay back that sum to the Divisional Secretary, Kalpitiya.

4.3 Idle and Underutilized Assets

Even though it had been identified by the reports of the Boards of Survey for the years 2013, 2014, and 2015 that the final stock shown in the financial statements of the year under review included unused and non-moving stores goods valued at Rs.66,956,871, action had not been taken properly in that connection.

4.4 Personnel Administration

The following observations are made.

(a.) Even though the approved cadre had been 365 employees, it had been confirmed to audit by the letter No. ඵඅම/අව/32-2016 of the Chairman dated 19 January 2016, that the approved cadre had been 380. Hence, 15 employees had been recruited in excess of the approved cadre without approval of the Department of Management Services.

(b.) Contrary to the scheme of recruitments and promotions of the Water Resources Board, 34 employees had been recruited in the year 2015. In inspecting the personal files of those employees, there had been 06 instances in which job applications relevant to the post had not been furnished, 02 instances in which required qualifications had not been fulfilled for the posts of driver, and 06 instances where medical certificates had not been furnished, and it had not been confirmed that the educational certificates provided had been true copies.

(c.) Contrary to the scheme of recruitments, all employees of the Board had been provided with salary increments and promotions without conducting efficiency bar examinations.

4.5 Assets not Vested Properly

Action had not been taken to vest the lands and buildings where the head office of the Board, *Ratmalana* and *Vauniya* workshops, and circuit bungalow in *Anuradhapura* had been located. New buildings had been constructed, and the existing buildings on those lands had been renovated by the Board.

4.6 Resources of the Board Released to Other Government Institutions

Contrary to Section 8.3.9 of the Public Enterprises Circular, No. PED/12, dated 02, June 2003, a staff recruited to execute the functions of the Board comprising

Administration Manager (contract), Technical Officer, Laborer, Driver, and 02 Office Assistants, had been released to other Government institutions irrespective of the functions of the Water Resources Board. Salaries and allowances of Rs.816,897 paid to those employees during the year under review, had been incurred by the Board.

5. Accountability and Good Governance

5.1 Internal Audit

Even though an Internal Audit Division had been established, an adequate number of officers qualified enough to conduct audits on the functions of the Board associated with technological and engineering techniques, had not been appointed.

5.2 Budgetary Control

The following observations are made.

(a.) As variances ranging from 20 – 810 per cent were observed in respect of 176 units between the budgeted and actual income and expenditure, the budget had not been made use of as an effective instrument of management control.

(b.) The income from the *Chunnakam* Project had not been identified in preparing the budget, and an income of Rs.1,800,000 had been received therefrom in the year under review.

5.3 Tabling of Annual Reports

The annual reports should have been tabled in Parliament within 150 days of closure of the accounting year in terms of Section 6.5.3 of the Public Enterprises Circular No. PED/12 dated 02 June 2003. However, the annual reports for the years 2012 and 2013 had not been tabled in Parliament even by 31 July 2016.

6. Systems and Controls

Deficiencies in systems and controls observed during the course of audit were brought to the notice of the Chairman of the Board from time to time and special attention is needed in respect of the following areas of control.

Areas of Systems and Controls	Observations
(a.) Accounting	Failure to follow the Public Sector Accounting Standards, and take over the assets.
(b) Control of Operations	Failure to take actions in order to achieve the financial and physical performance as expected, and conclude the research studies as scheduled.
(c) Control of Creditors and Debtors	Failure to take actions effectively for the settlement.
(d) Assets Control	Failure to record the non-current assets.

H.M. Gamini Wijesinghe.
Auditor General

The Auditor General's Report made under Section 14 (2) (c) of the Financial Act No. 38 of 1971 on the Financial Statement of the Water Resources Board for the year ended on 31st December 2015

1. As per investigations on the above report the comments of the Water Resources Board on it are as follows.

2.2 Comments on the Financial Statement

2.2.1 **Sri Lanka Public Sector Accounting Standards**

Actions are being taken to revalue the property, plant and equipment's and in future steps will be taken to change the policy of depreciation.

2.2.2 **Accounting Deficiencies**

(a) Steps are being taken for the accounting and revaluing of the value of vehicles received from the treasury.

(b) According to the calculation of the contributions by taking into consideration the cost of living, by further confirming relevant calculation of the Employees' Provident Fund is being carried on and so far it has not been confirmed the liabilities on the Employees' Provident Fund. If a surcharge is being levied, the Board is expecting to withdraw that as well.

2.2.3 **Lack of evidence for audit**

Action had been taken to send letters to confirm indebted and balance due to the relevant transacting institutions.

2.3 Accounts Receivables and payable

(a) Further attention is paid to recover these moneys.

(b) Until the relevant work is performed and invoiced on the advance obtained for services, it is recorded as the income derived earlier and among them are certain balance dues are delayed due to problems of the transacting parties. However, attention is being paid to settle the overdue balances soon.

2.4 Non – Compliance with Laws Rules and Regulations.

(a)	Water Resources Boar Act No 29 of 1964.	As per the Water Resources Board Act, to amend the Advisory Committee and to amend the Act, it has been sent to the Ministry of Irrigation.
(b)	The treasury circular No.842 Dated 19th December 1978	Actions are being taken to computerize and update other immovable assets.
(c)	Government's Financial Circular No. 12 dated 02nd June 2003.	Forwarded for the advice of the National Employees' Salaries Cadre Commission by the Management Service Department. (Letter No. DMS/1713/VII dated 18.07.2016)

4. Operating Review

4.1. Performance

(a) In respect of the matters mentioned under (i), (ii), (iii) and (iv), in order to preserve the water resources in the country, regulations having been prepared, sent for the approval of the Attorney General's Department.

(b) Under the provision of the treasury, 11 scientific surveys were been planned and put into operation in various parts of the country.

For these projects, there are variations between the estimated value and the real value due to the following reasons.

In carrying out the activities of several projects, the progress of the physical target was higher than the allocated fund.

Along the coastal areas extending from Colombo to Negombo primary studies of the water in areas of underground sand and aquifers were completed at the end of 2014 and collection of water samples in relation to the testing pump well constructed in 2015, conducting of chemical testing and recording of the measurement of the water level only was timely carried out. Although the estimate for chemical testing was Rs. 350,000/=, (Due to the use of chemical water testing equipments received by the Board under the dam protection project, expending of expected chemicals did not occur) when collecting samples of water in parallel with other commercial activities, the collection of water samples took place, and hence the estimated money for it could be saved.

In the ground water study activities in the Anuradhapura District, collection of water sample equal to this and chemical analysis were carried out in achieving the relevant progress, the estimated amount of money could be minimized. Further, in conducting chemical analysis, as planned at the beginning of the year, instead of the complete chemical analysis of the water sample, according to the results received by the middle of the year as it was decided that would be suffice to conduct only the essential chemical parameters for this study, the expenditure made on chemical items were minimized. However, I would like to inform that action will be taken to give advice to the relevant officers to plan future projects taking into consideration the variation between physical and financial progress.

Under the development of supervision of the ground water in the Jaffna peninsula, inspecting the pumps and here, out of the expected physical progress about 43% was achieved and in all the constructed testing wells, the testing of pumps cannot be carried out. As the pump testing equipment owned by the Board had to be deployed in commercial and areas where there were disasters, to provide water, the testing pumps were carried out by using instruments. Due to this situation, there was a decrease in progress. Therefore, there was a balance in the money estimated for the testing. Due to this situation there was a decrease in progress.

(C) General shortcoming in the implementation of research study

(i) Taking into consideration the rapid variation qualitatively and quantitatively of the ground water resources in the island, studies were planned and commenced in the year 2010 by the Water Resources Board.

Here by giving priority to areas where there are more sensitive water sources exist and in order to determine the quantitative and qualitative degree of the ground water in those areas the necessary construction of experimental tube wells, analysis of samples of water, timely surveying of water levels and preparing scientific maps and produce results and accordingly generating data with a view to managing the ground water.

Thirteen (13) similar experimental projects were started and they consisted of mainly two phases. Firstly, during the primary project within the period of surveying the ground water scientifically and constructing tube wells, experimenting water pumps were carried out in places where it was considered necessary. According to this from the year 2010, the construction of experimental tube wells were completed to a greater extent covering the more sensitive areas in the island and by the analysis of the water samples preparation of timely maps about the quality of the ground water.

However, by timely reporting the variations of the ground water according to the prevailing weather conditions as it was essential to collect data for the management of ground water as per the outcome of the primary surveys, as the second phase of the relevant study, the surveying of the timely water level and after conducting chemical analysis on the change of quality and collecting data thereof and forwarding them to the main data centre of the Board must be done annually and on long term basis.

Therefore, in respect of each area, although the relevant planned geological survey and the construction of tube wells were completed and experimental projects were concluded, arrangements are made to carry on with only the long term ground water monitoring continuously.

(ii) All the officers appointed for these projects are specialists in the field ground water.

(iii) The responsibility of installing this research work is entrusted to the General Manager and to implement each project by appointing an officer in charge of the project and carrying on with it will be entrusted to him/her. Due to the resigning of the officers in charge of the projects very often, it has become necessary to appoint other officers to the relevant projects.

(iv) When implementing every project, project offices should be maintained. Likewise vehicles, boring machines and officers connected with them must be employed At least minimum facilities must be made available to the field officers. Therefore, action is being taken to cover the insurance expenses, repairing expenses of the vehicles used in implementing the projects, expenses for the lodging, the expenses relating to buying equipments for the relevant projects, electricity charges and the telephone charges through the respective projects.

4.2 Management Activities

(a) As per the instruction of the Secretary to the Ministry of Irrigation, it has been arranged to release permanently. For the period of compulsory service, Miss. A.A.A. K. K. Seneviratne has entered into a bond and the value of which is Rs. 1,308,684/=. After setting off the sum for the period she served, the balance due is Rs. 181,763/=. It was informed on the 28th of June 2011 to pay that sum.

(b) The failure of the tube well constructed under the well water project was due to the complex geological situation existed there and the inconvenience faced in digging deep wells. Accordingly, in order to get the necessary water for the project opportunities were made available by making use of the tube wells found in the area and carrying out testing of pumps. It was discussed to give the balance money out of advance Rs. 1,215,225/= provided for the project to the Divisional Secretary of Kalpitiya and as per the request of the Divisional Secretary Kalpitiya, to make use of that money for another ground water development project, the payment of this advance money has been withheld.

4.3 Idle and underutilized assets

Under these items of stock spare parts and accessories for the vehicles are in sufficient quantities and as those machineries are very old, taking into account also of the non availability in the market and the slow moving items are in a state that they cannot set off. However, the work on removing of the unnecessary stocks were carried out in 2015 and arrangements are being made to remove in the year 2016 the things identified through further surveying of stocks.

4.4 Personnel Administration of the working staff

(a) According to the budget proposal of 2015 in relation to the circular number 25/2014 issued in respect of offering permanent appointment to those employees who have been recruited on temporary, casual (daily paid) substitute or on contract basis, as per the instruction therein to make permanent the employees who had completed 180 days of satisfactory service, fifteen (15) persons were made permanent for the post of labourers with effect from 24.10.2014. By that time as all the vacancies in the approved cadre for the labourers had been filled, there were no vacancies in the labourer post. After making permanent those casual substitute employees to update the number of employees as per the circular particulars have been sent to the Management Services Department.

(b) In keeping with the service necessities, on the approval of the Management Services Department, with the participation of the Water Resources Management Ministry, recruitment of employees has been done.

(c) Attention is drawn to take action in future in this regard.

4.4 Assets which were not acquired through proper means

In order get the necessary approval to acquire these lands, the Secretary to the Ministry of Lands has been informed by the Secretary to the Irrigation and Water Resources Ministry.

4.5 The resources of the Board which were given to the other Institutions.

At the request of the Hon. Minister of Water Resources Management for essential duties, they are attached to the staff of the Minister. In order to reimburse the relevant salaries and allowances, necessary action is being taken.

5. Accountability and good governance

5.1 Internal Audit

For the internal auditing unit of the presently approved staff, there has been no separate staff approved and for that purpose, in future steps will be taken to amend the workforce. Further, by taking into consideration facilities existing in the institution and the number of the workforce, steps will be taken to attach officers with high technological and engineering skills to the internal auditing unit.

5.2 Budgetary Control

(a) It appears that these variations have occurred mostly due to the contradictions that exist in the approved budget and the basic activities of the action plan. Steps will be taken to prepare future budgets taking into considerations the variations occurring in getting provisions allocated from the budget.

The relevant officers were given instructions to plan projects minimizing these contradictions pointed out by the auditing as far as possible.

(b) This project had to be identified after the preparation of the budget.

5.3 Annual Report

Has been forwarded to the Cabinet for approval.

6. Systems and Control

Further attentions have been paid to take action in future in the fields indicated.

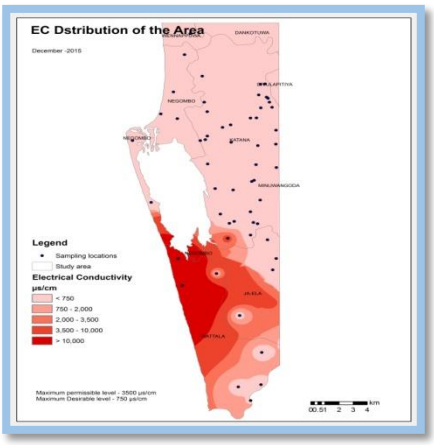
A.C.M. Zulficar
Chairman
Water Resources Board.

Copy to: The Secretary, The Ministry of Irrigation and Water Resources Management.

A Summary of the Performance of the Institution during the Relevant Period
Physical Progress of Project Conducted by Water Resources Board for Year 2015

A) Projects under Treasury Funds

EC distribution of the area



(i) Longterm ground water monitoring of the coastal sandy extending from Colombo to Negambo (CN Project)

All the activities specified under the methodology of the Project were completed by the end of the year 2014. Based on the previous year works, a long term groundwater monitoring programme was started from the year 2014 for collecting temporal data on groundwater quality and quantity. This has conducted quarterly basis and completed 393 water sampling, chemical analysis and measurements of water level fluctuation.

(ii) Water quality changes in aquifer systems and identification of zones with hazardous minerals containing in water in Anuradhapura District .

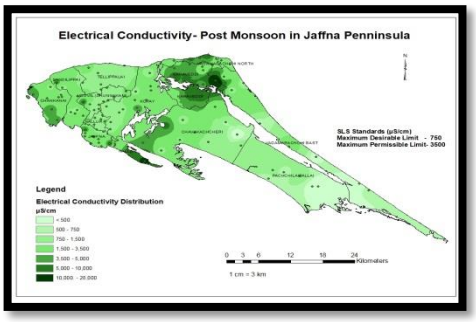
With the idea of controlling Chronic Kidney Dist (CKDU) and other water born dieses that are wider spread in Anuradhapura district, water clinics and awareness programmes were carried out during the 2015. The activities carried out under the project are

(1) Groundwater monitoring, water sampling and chemical analysis - 200 Nos.

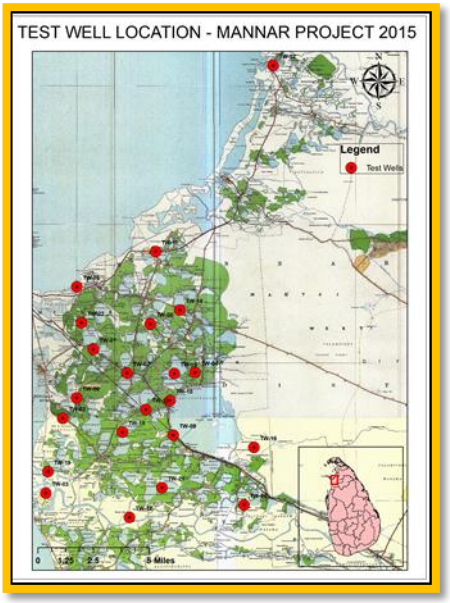
(2) Conducting water clinics and awareness programmes - 7 Nos.

(iii) Development of Ground Water Monitoring Network for Jaffna Penninsula (Jaffna Project)

Under this project, collecting water sample and analyzing chemical parameters of water, conducting hydrogeological and geophysical investigations and drilling shallow tube wells were carried. In 2015, 30 Nos. detailed groundwater surveys, test well drilling were completed. Also samples from these tube wells were collected and analysed. 30 locations of monitoring wells were leveled.



(iv) Hydrogeological Study in Limestone Aquifers in Mannar District (Mannar Project)



Mannar groundwater study is aimed to identify high potential groundwater terrains in limestone terrains which were capable to provide groundwater for agricultural and domestic use. The activities completed under the project were as follows:

(1)	Hydrogeological investigations	-	40 Nos.
(2)	Test well drilling	-	23 Nos.
(3)	Pumping tests	-	02 Nos.
(4)	Water sample analysis (Full)	-	60 Nos.
(5)	Water Sample analysis (Partial)	-	50 Nos.
(6)	Water Sample collection	-	200 Nos.

Well monitoring programmes were carried out in five times throughout the year in existing shallow groundwater network.

(v) Hydrogeological Study in Vauniya and Killinochchi District (Vavuniya Kilinochchi Project)

The objective of the project was to identify the aquifer parameters, its extension and finally the identification and demarcation of different ground water zones. For the year 2015 the activities scheduled were completed as follows.

(1)	Carry out Hydrogeological survey	-	20 Nos.
(2)	Construction of test bore holes	-	20 Nos.
(3)	Conducting pumping test	-	10 Nos.
(4)	Levelling of monitoring well points	-	16 Nos.
(5)	Water Sampling and well monitoring	-	122 Nos.
(6)	Chemical analysis of water samples	-	122 Nos.

(vi) The study on the direct and indirect impacts of the climate changes on the coastal aquifer system of Sri Lanka

Under this project details of water projects and other water exctracting systems of selected river basins and district were collected. In this regards Thrincomalee, Puttalum, Mannar, Hambantota, Matara, Ampara, Jaffna, Colombo and Gampaha DS devisions were selected.

For the year 2015 following activities were done.

(1)	Hydrogeological surveys	-	15 Nos.
(2)	Construction of test bore holes	-	15 Nos.
(3)	Conducting of pumping test	-	08 Nos.
(4)	Levelling of monitoring well points	-	15 Nos.
(5)	Water sampling and well monitoring	-	288 Nos.
(6)	Chemical analysis of water samples	-	288 Nos.

(vii) Water quality study in Chronic Kidney Disease (CKD) prevailing areas of Ampara, Kurunegala, Thrincomalee, Hambantota, Polonnaruwa, Badulla and Monaragala

Ground water resources at areas where people infected by CKD such as Ampara, Kurunegala, Thrincomalee, Hambantota, Polonnaruwa, Badulla and Monaragala were selected to analyse the water quality parameters.
The activities completed are as follows.

(1) Sociological Survey - 191 Nos.
(2) Groundwater monitoring & water sampling- 191 Nos.
(3) Chemical analysis of water samples - 191 Nos.

(viii) Identification of suitable area for ground water recharge in Sri Lanka (Phase I- Puttalum District

The main objective of the project is to identify aquifer parameters and its extention and from that developing a method for artificial recharge in Puttalum area.For the year 2015, the following activities were done under this project.

(1) Hydrogeological investigations - 15 Nos.
(2) Test well drilling - 07 Nos.
(3) Pumping test - 06 Nos.
(4) Water sample collection - 196 Nos.
(5) Water sample analysis - 26 Nos.

(ix) On the request of government bodies and private sector clients following investigations were done amounting to total cost of 84.92 million rupees.

Hydrogeological Investigations	-	200
Construction of tube wells	-	114
Pump tests	-	72
Cleaning of tube wells	-	20
Hand Pump installation	-	48
Installation of Iron removal plant	-	15
Chemical analysis of water sample	-	952
Bacteriological analysis of water sample	-	175

The measures adopted to rectify the accounting and management deficiencies pointed out in the audit Queries and audit reports of the Auditor General;

01. Cost amount has been assessed for the vehicles which could not fix the proper value.
02. The necessary steps have been taken to pay the contribution & the E.P.F on the cost of living and the surcharge from 2006 to 2014.
03. The steps have been taken to revaluation the fixed assets and to depreciate them.
04. Steps have been taken to appoint the representatives for the Advisory Committee from the relevant institutes
05. Appointing the stock verification committee, actions have been taken to identify the goods and after that actions have been taken to disposal and sale.
06. Steps have been taken rectify the accounts as shown the audit queries. by journal enters.

ACTION TAKEN TO UPGRADE THE ACTIVITIES OF WATER RESOURCES BOARD

Water Resources Board is engaged with Water Resources Studies in Sri Lanka. 11 Nos. of Studies according to the Action Plan, 2015. To upgrade the efficiency of the activities of the Board, the following activities were taken.

1. Action was taken to recruit the technical staff. (specially Hydrogeologists, Chemists and Technical Officers)
2. Training of the staff to upgrade their management and technical knowledge.
3. Procurement of the goods and equipment required for the activities of the Board.
4. Evaluate the weekly progress of all the Divisions of the Board.
5. Action will be taken to manage and control the fixed assets using the software.
6. Introduction of regulations to manage groundwater of the country and develop the mechanism to implement the related activities in the ground.
7. Follow up of all the activities carried out by the Board.

WATER RESOURCES BOARD

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இல.2ஏ, ஹெக்டர் கொப்பேகடுவ மாவத்தை கொழும்பு – 07.

2A, Hector Kobbakaduwa Avenue, Colombo 07.