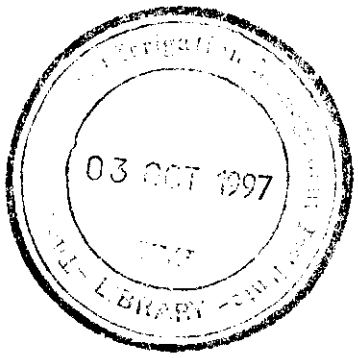
Identification of Hydrologically Endowed Small Tanks for Rehabilitation and Agrowell Development Potential in the Cascades of Anuradhapura District, North Central Province, Sri Lanka



GROUND WATER STUDY OF 50 CASCADES

Volume III

April 1997

International Irrigation Management Institute
Sri Lanka National Program
127 Sunil Mawatha
Pelawatte, Battaramulla

FINAL REPORT

USE OF GROUND-WATER TO ALLEVIATE WATER DEFICIT DURING DRY SEASON (YALA) IN THE NORTH CENTRAL PROVINCE OF SRI LANKA.

A REPORT SUBMITTED TO THE SRI LANKA NATIONAL PROGRAM OFFICE OF THE INTERNATIONAL IRRIGATION MANAGEMENT INSTITUTE, BATTARAMULLA, SRI LANKA.

BY

DR.ATULA SENARATNE

DEPARTMENT OF GEOLOGY,

UNIVERSITY OF PERADENIYA, SRI LANKA.

AUGUST, 1996

Table of Contents

List of figures

List of Tables

Acronyms and Abbreviations

A	Area
ADA	Agricultural development authority
Avg.	Average
Cu.m.	Cubic meters
Cu.m./day	Cubic meters per day
Cu.m./ha.day	Cubic meters per hectare day
D.S.	Divisional Secretariat
ET^0	Evapotranspiration
G.L.	Ground level
ha.	Hectare
ha.m.	Hectare meters
ha.m./year	Hectare meters per year
IFAD	International fund for agricultural development
IIMI	International irrigation management Institute
IOH	Institute of Hydrogeology
LD	Light drilling
mm.	Millimeter
mm./year	Millimeters per year
NCP	North central Province
Nos.	Numbers
No.	Number
N-S	North - South directional
P	Paddy Locations on map
PRA	Participatory Rural Appraisal
R	Locations of Resistivity surveyed points on map
RT	Resistivity Survey
RECOM.	Recommended
SL	Sri Lanka
SW	South west
VES	Vertical electrical sounding

Team Composition

Name	Qualifications	Position
1. Dr. Senaratne, A.	BSc, MSc, Ph.D.	Team Leader / Consultant Hydrogeologist
2. Amaranayake, M.B.	BSc.	Hydrogeologist
3. Dhammika, R.M.A.	BSc.	Hydrogeologist
4. Kalupahana, S.S.	BSc.	Hydrogeologist / Computer Analyst
5. Peduruarachchi, S.	BSc.	Field gp. leader / Hydrogeologist
6. Amunugama, S.M.B.	Diploma	Draughtsman
7. Jayaratne, T.M.	Diploma	Field Assistant

USE OF GROUND-WATER TO ALLEVIATE WATER DEFICIT DURING DRY SEASON IN THE NORTH CENTRAL PROVINCE OF SRI LANKA

1. INTRODUCTION

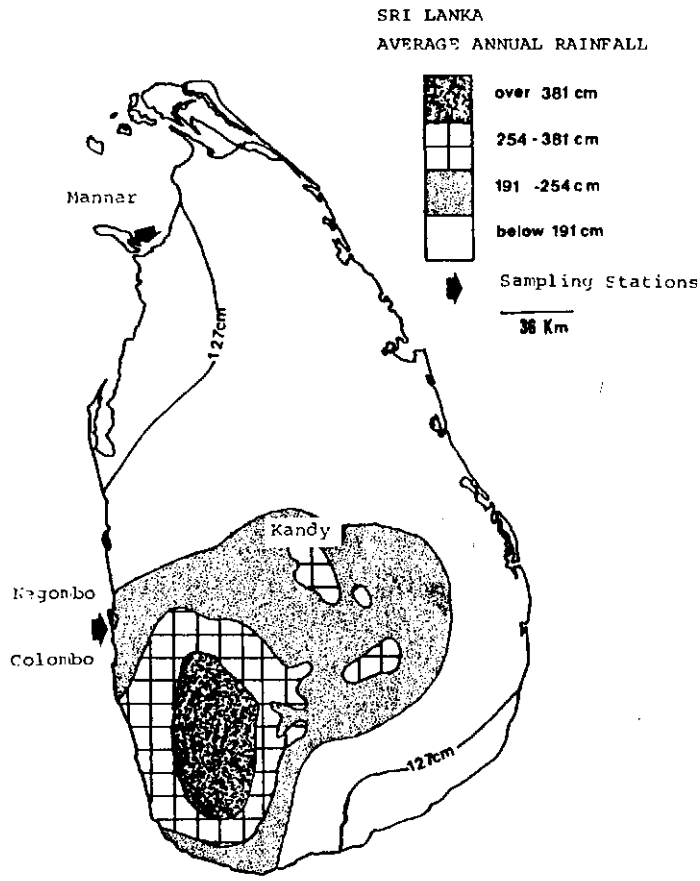
For thousands of years, ground water from shallow dug wells has been the primary source of drinking water for a vast majority of Sri Lankans. The rivers, streams and lakes meanwhile, have been in use for irrigation. Wells dug in the home garden have been used for drinking and cooking including washing, bathing and for livestock care. In general, the situation as regards drinking water adequacy was satisfactory except in some parts of the dry zone specially during the dry season.

Sri Lanka receives about 12 million ha. m. of water annually *(Dissanayake, 1992)* from rainfall, of which more than 50% is lost through evapotranspiration. Another 20% seeps down to replenish ground water while only 30% or about 3.5 million ha.m. is available for irrigation through streams, rivers and lakes. With the average annual rainfall varying from 1000 mm to over 5000 mm, there are considerable rainfall variations in time and space that affect Sri Lanka's surface water balance *(Natural Resources of SL, 1991)*. As illustrated in the Figure 1.1, some districts in the wet zone record over 2.4 m of water depth while in much of the dry zone it records below 0.3 m. This shallow water levels can be attributed to artificial recharge of ground water resources, through constant infiltration, from tanks through-out the year.

Farmers particularly in the dry zone of Sri Lanka essentially depend on seasonal rainfall and thousands of man made tanks of varying dimensions to sustain their traditional chena and irrigated paddy cultivation. However, in view of rapidly depleting surface sources, the attention has been diverted to harness the shallow ground water to supplement dry season crops.

The purpose of this study is to evaluate the potential of shallow aquifers that are constantly replenished by artificially raising water table in and around tanks to alleviate water deficit during dry season.

Figure 1.1. Climatic map of Sri Lanka



1.1. Ground water occurrences in general:

Ground water occurrence in the study area can be divided into three main categories.

1. Ground water in the soil overburden
2. Ground water in the weathered rock
3. Ground water in deep fractures.

The shallow wells in the NCP are fed by the water migrating through the soil cover(1). Most of the farmers are not bothered to go beyond the soil into the more yielding fractured weathered rock(2). Only at few places the investigators have come across deep wells(3) where water flowing in the fracture zones have been tapped. **At some places, the saprock has been found to be clogged by calcareous precipitation which has a bearing on the transmisivity of the aquifer.** This is also evident in the chemical data published in the pioneering work by *Panabokke (1959)*.

1.2. Ground water recharge and balance:

The best known component contributing to water balance is precipitation. The average rainfall over the entire area is about 2100mm and every 4th year it would be 60% of this amount. Due to lack of proper instrumentation in this area, only approximate values can be given for other vital meteorological parameters.

Actual evapotranspiration would be less than the potential values that are calculated by the IOH. for the eastern part of the province in 1978. The equation used by IOH;

$$Rainfall = Evapotranspiration + Run\text{-}off$$

does not account for infiltration of water, ground water extraction and import of water from other areas through irrigation canals. Actual evapotranspiration can vary even with the type of vegetation cover, which is higher in forested areas, tanks and inundated paddy fields and marsh lands. The infiltration of rain water contributes to the ground water regime in addition to recharge through infiltration from stagnant water bodies such as lakes, flowing rivers and irrigation canals etc. In the NCP area ground-water potential is appreciable as irrigation canals and tanks are scattered throughout the area. Therefore the present investigation was designed to cover both shallow and deep ground water occurrences.

1.3. Geology:

Undifferentiated meta-sediments, mostly dominated by Charnockitic Gneiss, Garnetiferrous Biotite Gneiss and intermingling Quartzite bands were found to be the main rock types within the NCP (Figure 1.2). The high siliceous (quartzitic) nature of the soils of elevated areas can be attributed to the weathered gneiss which is rich in quartz and feldspar. Similarly the presence of clayey sediments in marshy areas and paddy fields is a result of feldspar weathering. Exploitation weathering is common in rock outcrops resulting in the accumulation of thin colluvial scree while elsewhere in-situ chemical weathering is dominant. The regional strike of rocks in the study area is approximately N-S (Figure 1.3).

2. METHODOLOGY

Figure 2.1 exemplifies the water table in a surrounding of a typical lake in the dry-zone during wet and dry seasons. During the wet season stream water and also ground water flow in to the lake. During the dry season, lake water slowly begins to flow outward feeding the regional water table creating a *"hanging water table"*. This hanging water table will continue to feed wells and springs (if any) through out the dry season.

This study has been conducted in two phases, namely;

Phase I - 1. Plotting available data on 1:50,000 *"Cascade Maps"*
2. Demarcating potential areas for shallow ground water extraction in each cascade on the basis of geomorphological characteristics.

Phase II - 1. Field checking of well data plotted on 1:50,000 topographic maps.
2. Field checking of potential areas identified during the Phase I by visiting the area with the PRA Team. During these meetings the hydrogeologists were able to collect first hand information on existing agro-wells and their performance.
3. Confirmation of ground water potential in predicted areas (where dug wells are not available) by means of Electrical Resistivity and Light Drilling surveys.

Figure 1.2. Geological Map of NCP of Sri Lanka

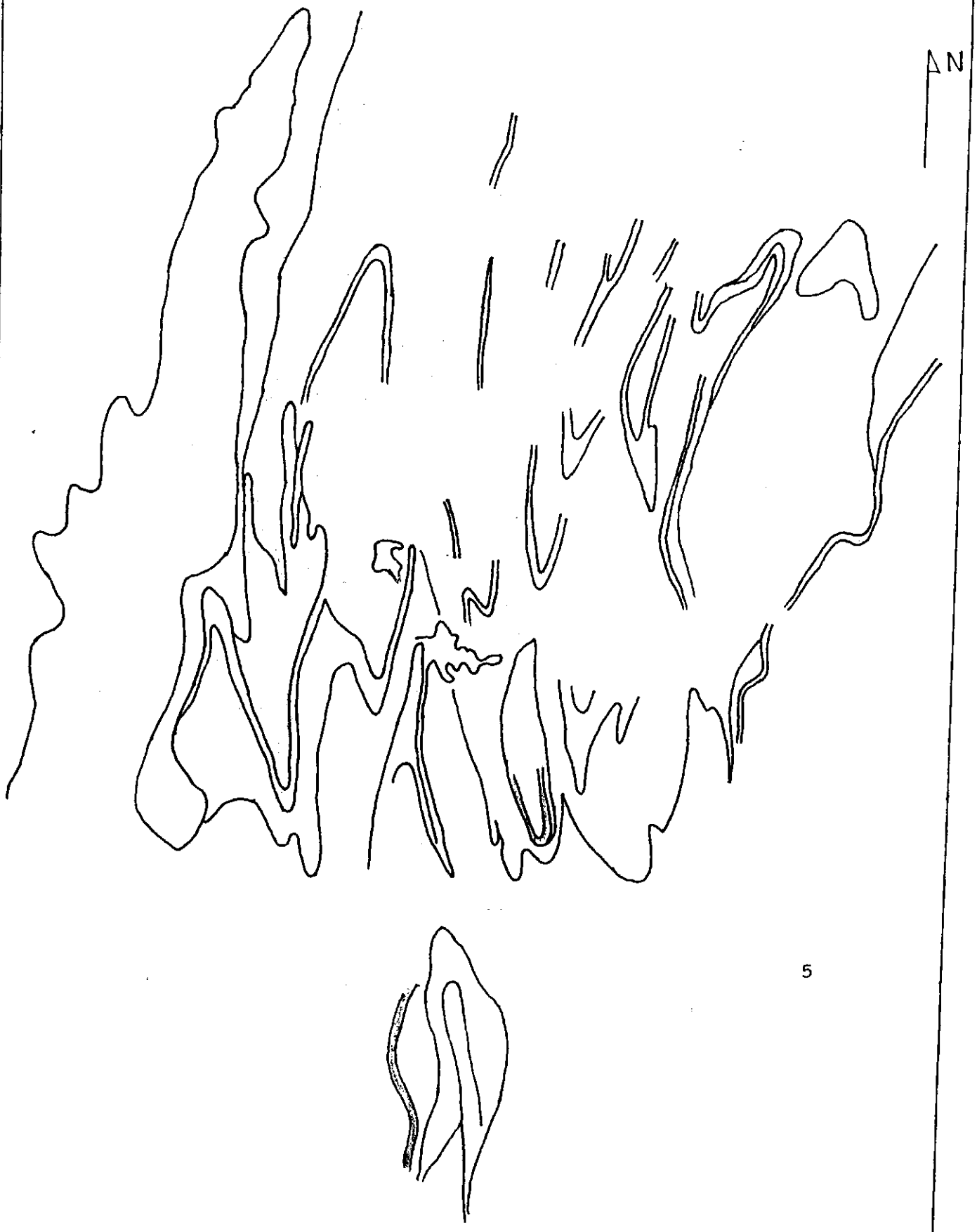
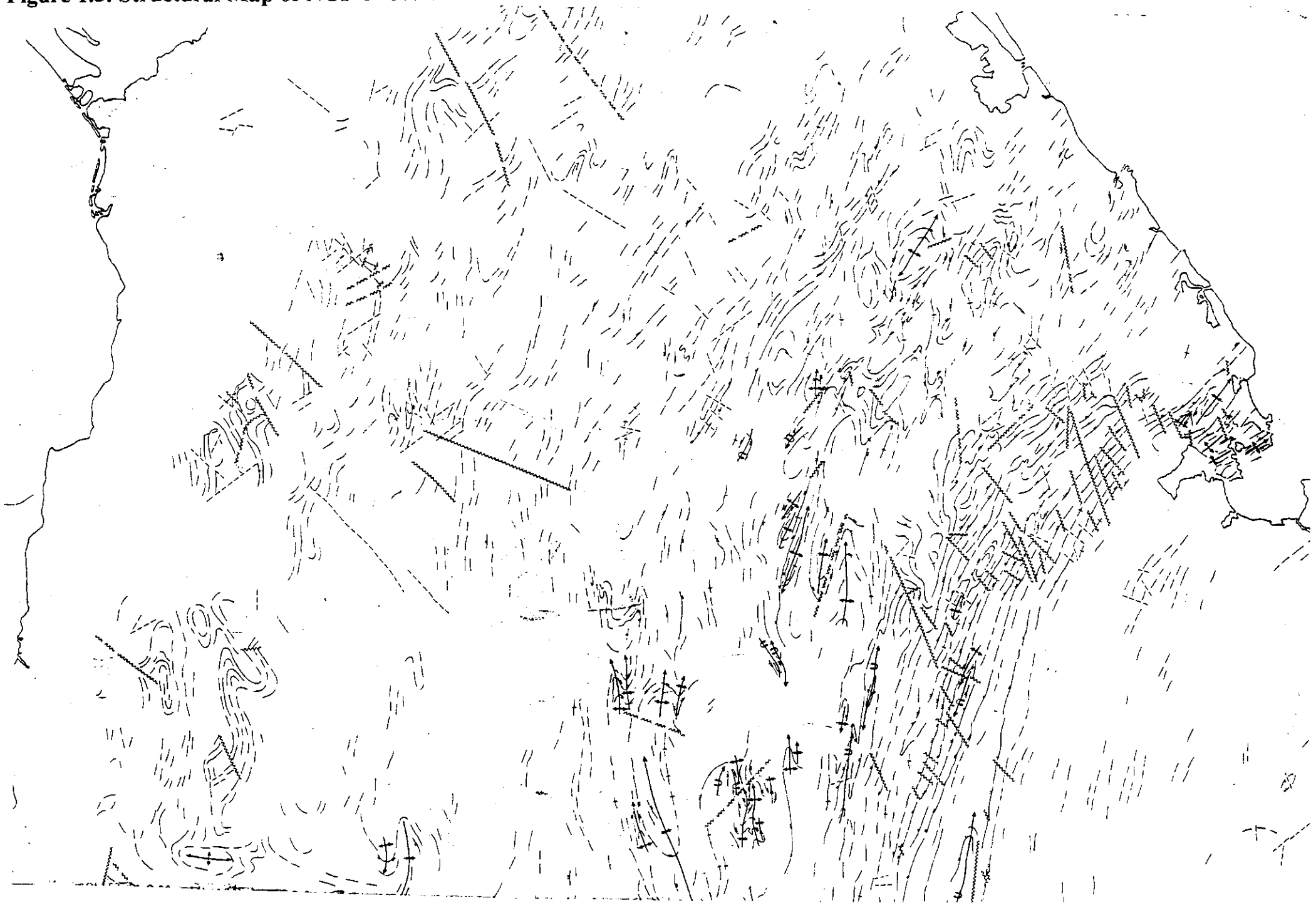


Figure 1.3. Structural Map of NCP of Sri Lanka



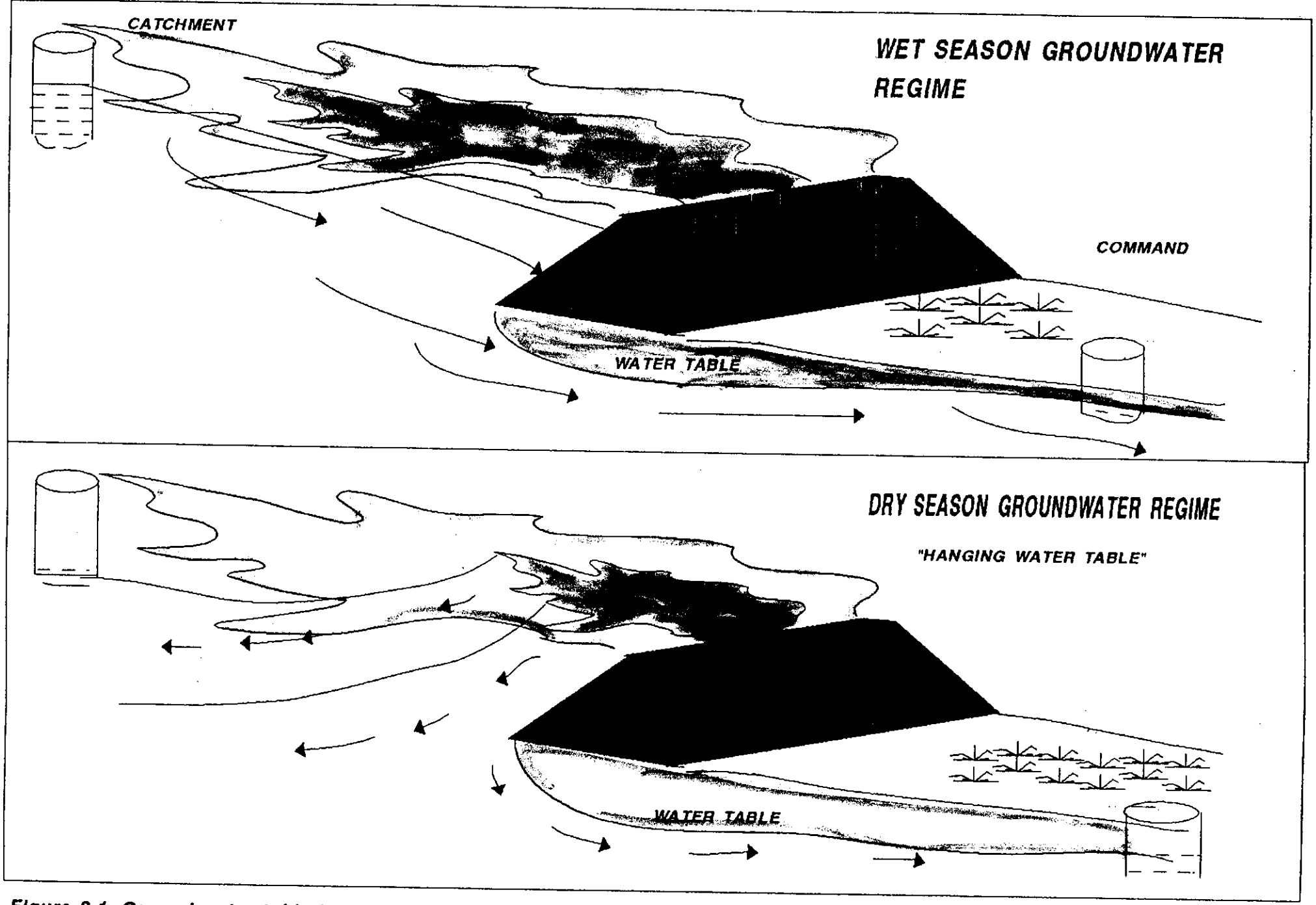


Figure 3.1. Ground water table in a tank environment in dry and wet seasons

Figure 2.2 and the Annexes 2.1 through 2.15 show predicted hydrogeological characteristics (mainly fracture zones and strike valleys-Phase I) . These areas have been extended (Figure 2.3 and Annexes 2.16 to 2.30) after considering other lithological characteristics to show potential areas for digging agro-wells. These areas were visited by the team of hydrogeologists (Phase II) to check the applicability of the technique and found very successful agro-wells (marked on annexes 2.16-2.30) within the predicted zones to their surprise. Annexes 2.16 through 2.30 further show areas confirmed by Resistitivity Surveys and Light Drilling. These maps also indicate areas rejected after field visits and in some instances after Resistivity surveys.

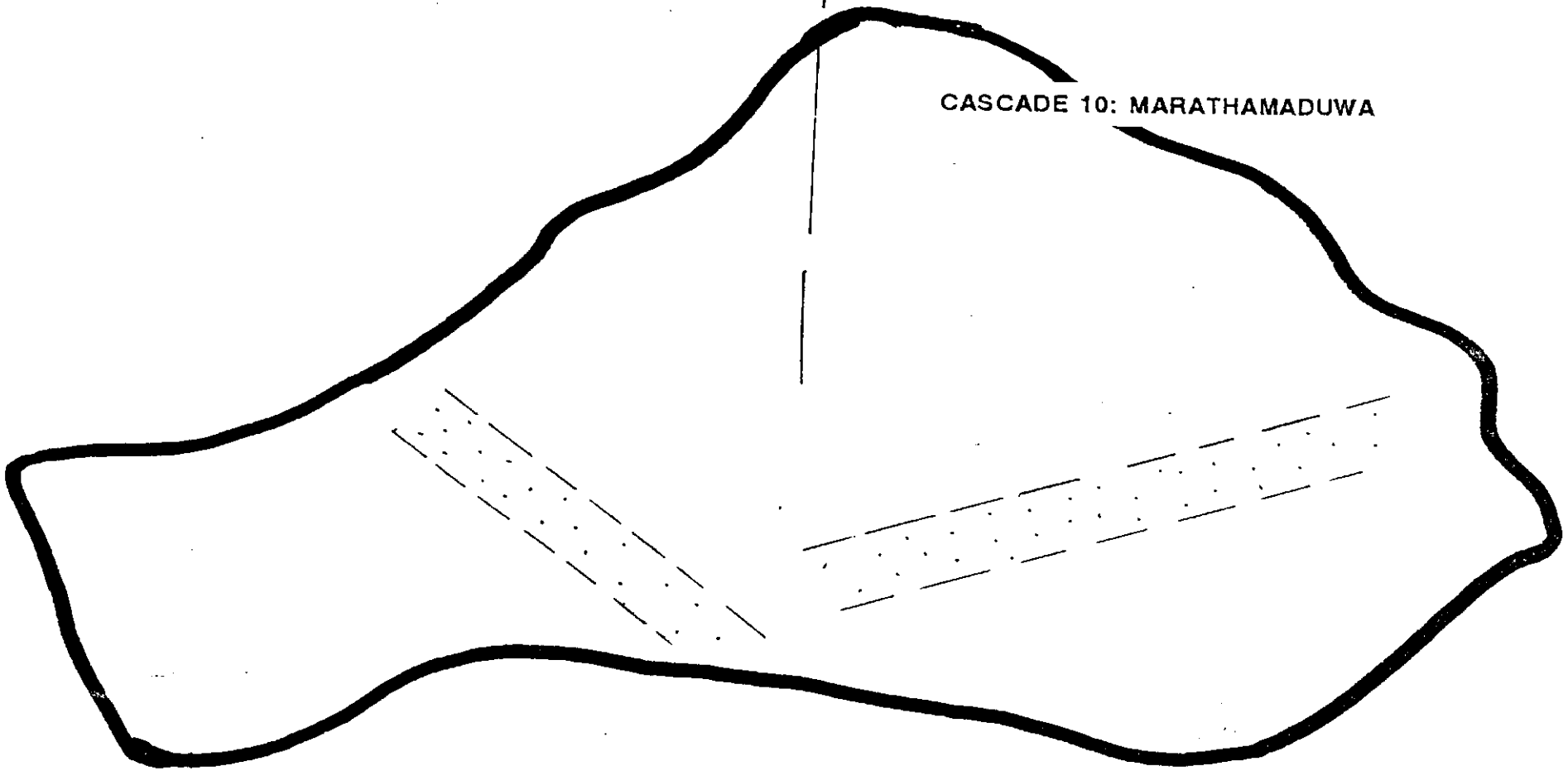
2.1. Interpretation of Topographical Maps:

Tanks and irrigated areas or, in other words the "Command" areas are always found in strings which are correctly called "*Cascades*". In most of the NCP areas contours are very widely spaced and very difficult to identify the morphological variations on the map. However the tanks and irrigated areas should always be in low lying areas than surrounding areas. The shallowness reflects differential erosion where weaker zones are more eroded than stronger areas. The weakness may be of the rock type or the geological structure (Figure 2.4).

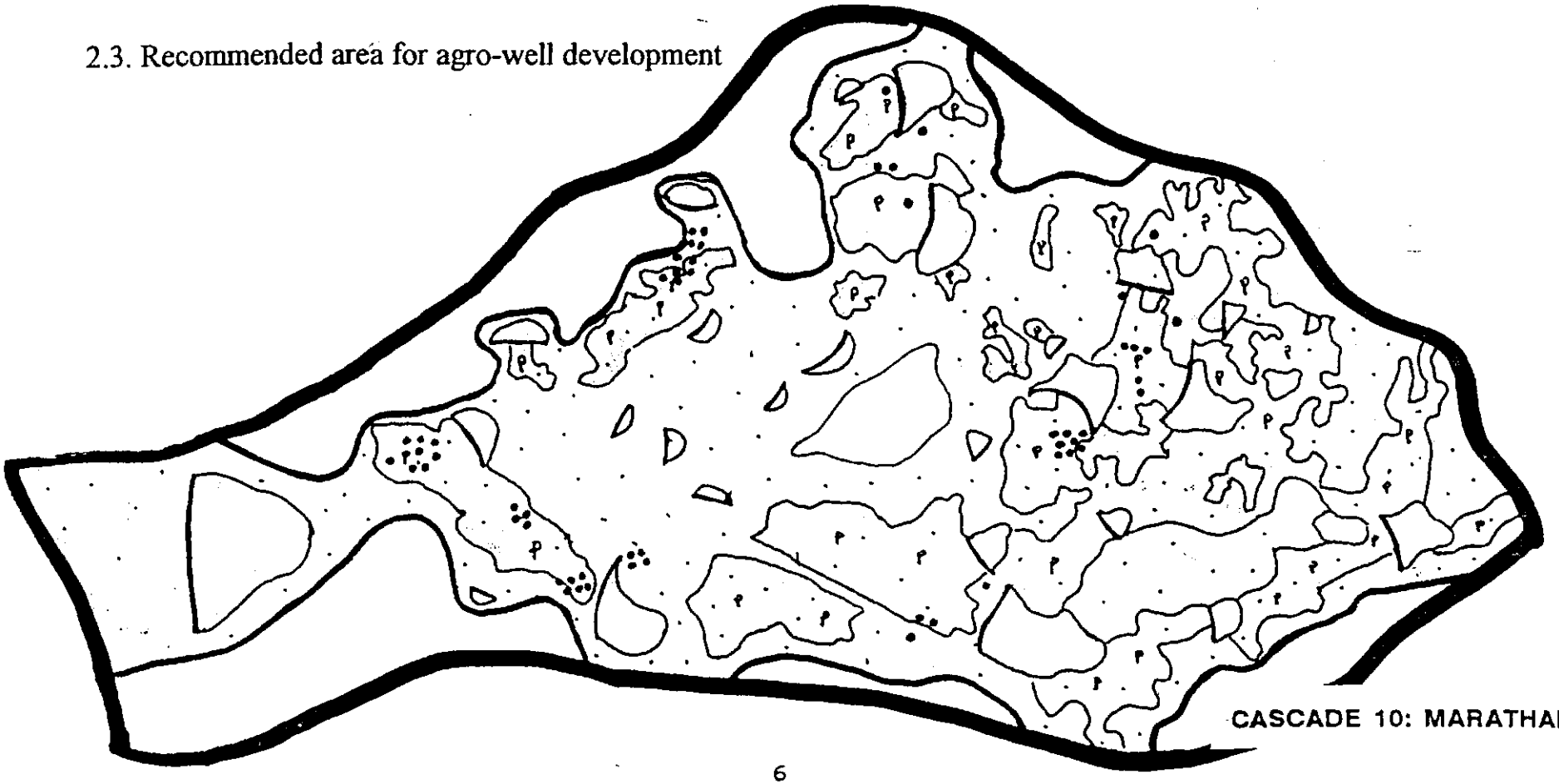
The fracture zones and the lithological strike lines were first drawn in cascade maps in order to demarcate potential areas for agricultural wells. The alluvium deposited in marginal areas of the tanks can also be considered as potential zones though the transmisivity in such sediments is not considered significant. **However, in the process of identifying potential areas for agro-wells, fracture zones, strike valleys and alluvium filled areas have been seriously considered.**

In the NCP cascades it was noted that the rock at the soil-rock interface is very highly weathered and also at the lower level of this weathered zone is highly fractured. The transmisivity in the fractured (weathered) rock is very high and makes pathway for the ground water flow through the cascades (Figure 2.4). In almost all the cascades visited, the predictions were found to be very accurate. In only few instances, farmer selected locations were not recommended as the on-site light drilling could not prove presence of water.

2.2. Hydrogeological map of a sample cascade



2.3. Recommended area for agro-well development



CASCADE 10: MARATHAMADUWA

2.2. Resistivity Survey:

Since 1978, deep well drilling for rural water supplies has expanded to an unprecedented level, drilling more than 3000 wells in many parts of the island. Currently the success rate in tapping deep fracture zones with flowing water is about 95%. This rate was achieved by employing geophysical techniques in addition to conventional geological and structural interpretation of topographical maps and aerial photographs, in ground water exploration.

In the present study geophysical surveys have been employed to verify the results of geomorphological and topographical interpretations, specially when the presence of water is not indicated on the ground or in domestic wells and when the farmers insist on the availability of water.

Geophysical surveys have been conducted during visits at locations where the farmers have requested for new agro-wells and when there are no previously constructed dug-wells around. Two teams of Hydrogeologists were employed and the Vertical Electrical Soundings (VES) were conducted at selected locations (Annexes 2.16 through 2.30) with two site specific arrays (Table 2.2). The Resistivity data obtained from the soundings were analyzed using RESIXS, a special software developed by the ITC of Netherlands for similar ground water studies.

3. HYDROGEOLOGY OF A TANK ENVIRONMENT

Based on the agro-well position, in relation to the tank, the agro-wells can be classified in to four types (Figure 3.1).

1. Wells located in the upper part of the catchment.
2. Wells located in the middle part of the catchment.
3. Wells located in the lower part of the catchment.
4. Wells located below the tank bund or in the command area.

The performance of agro-wells in above four categories was also seem to vary within a category due to variations in the rock type.

GEOPHYSICAL RESISTIVITY DATA ANALYSIS SHEET

Cascade	Kudakalaththewa
Location	Kudakalaththewa village - R1
Date	
Time	

RHO = R x CONST.

Schlumberger array			Resistivity data			Resistivity Calculations		
AB/2	MN/2	CONST	R1	R2	R3	RHO1	[illegible]	[illegible]
1.0	0.50	2.36						
2.0	0.50	11.78	0.85			9.95		
3.0	0.50	27.48	0.30			8.25		
4.0	0.50	49.46	0.16			7.92		
5.0	0.50	77.72	0.13			10.11		
6.0	0.50	112.26	0.10			11.23		
7.0	0.50	153.08	0.05			7.63		
8.0	0.50	200.18	0.05			10.01		
9.0	0.50	253.56	0.05			12.69		
10.0	0.50	313.22	0.05			15.67		
11.0	0.50	379.16						
12.5	0.50	489.84						

Direction			
Data read by	S.S.K.		
Data Entry by	S.P.		

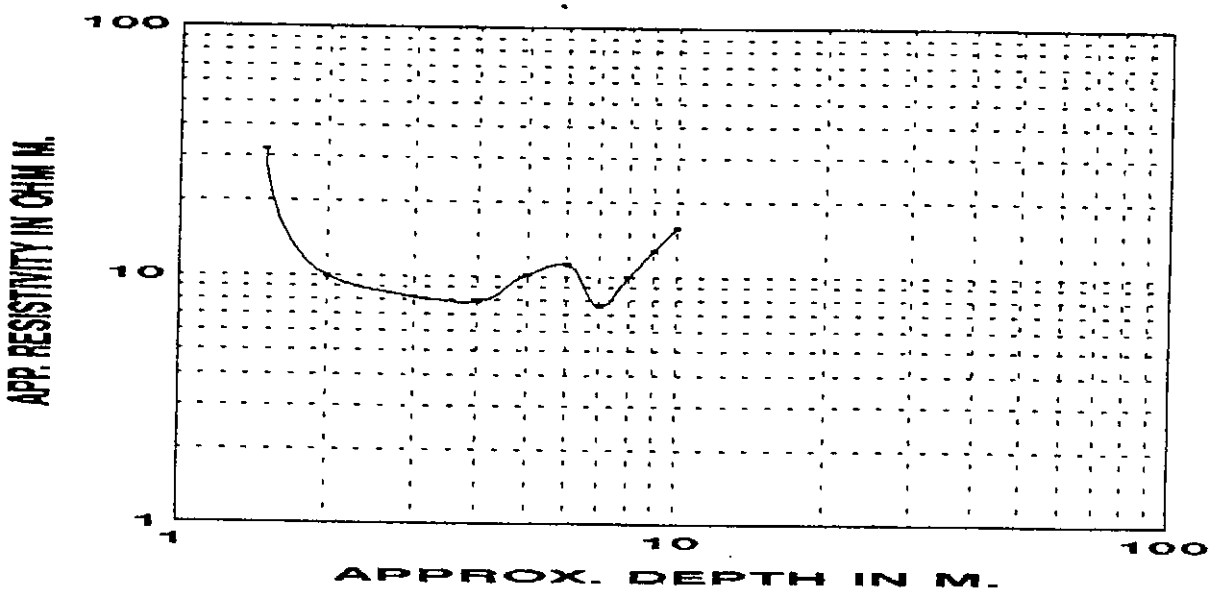


Table 2.2 A sample resistivity data analysis sheet

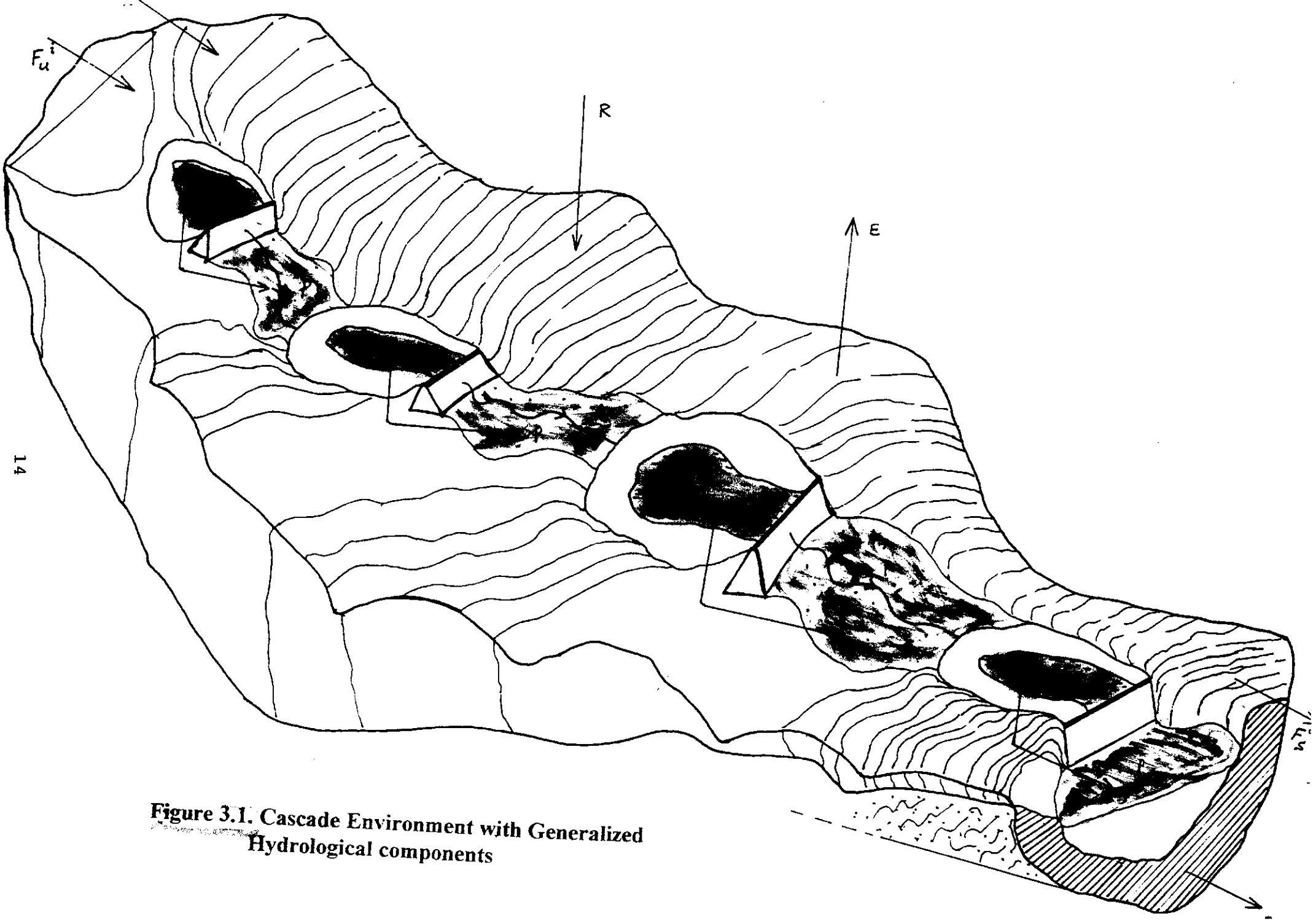


Figure 3.1. Cascade Environment with Generalized Hydrological components

3.1. Occurrence and Distribution of Ground water within a Cascade in NCP:

The main water bearing formations in the area are the weathered overburden and the crystalline bed rock. The alluvial deposits along streams and few springs present in SW part of the area also play a vital role in water supply. The thickness of the overburden ranges from 0 to 20m with an average thickness of about 12m (Figure 3.2). The depth to the ground water table varies between 1-10m with an average seasonal fluctuation of 4m.

In the study area most of the agro-wells are distributed around tanks. The number of agro-wells dug in the upper catchment area is much less than that in the middle and lower catchment areas. Most of these agro-wells have not been sited using scientific means of ground water exploration. However some areas have been already identified as ground water potential areas by indigenous knowledge of villagers. The number of agro-wells is daily increasing in such areas.

3.2. Design of Agro-wells in NCP:

The most of the agro-wells dug in the visited cascades have a common design recommended by the ADA. In general they have 6-m depth and 5-7 m diameter. Most of the agro-wells are lined with brick or rock material. Some agro-wells have a parapet wall. The height of parapet wall varies from 0.2 to 1.2 m. Most of the agro-wells are dug in the overburden and only a few wells penetrate in to fractured hard rock.

4. PERFORMANCE OF AGRO-WELLS IN CASCADES UNDER INVESTIGATION

After thorough analysis of information gathered during field visits, it was found that performance of all the agro-wells in a given cascade is not uniform. Some wells provide a good amount of water with a rapid recovery. Some do not perform well due to poor recovery rate. Large diameter of all these wells however facilitate a good storage.

The agro-wells observed under the second phase of The IFAD project were categorized in to four groups as indicated above, based on their geographical location in each catchment.

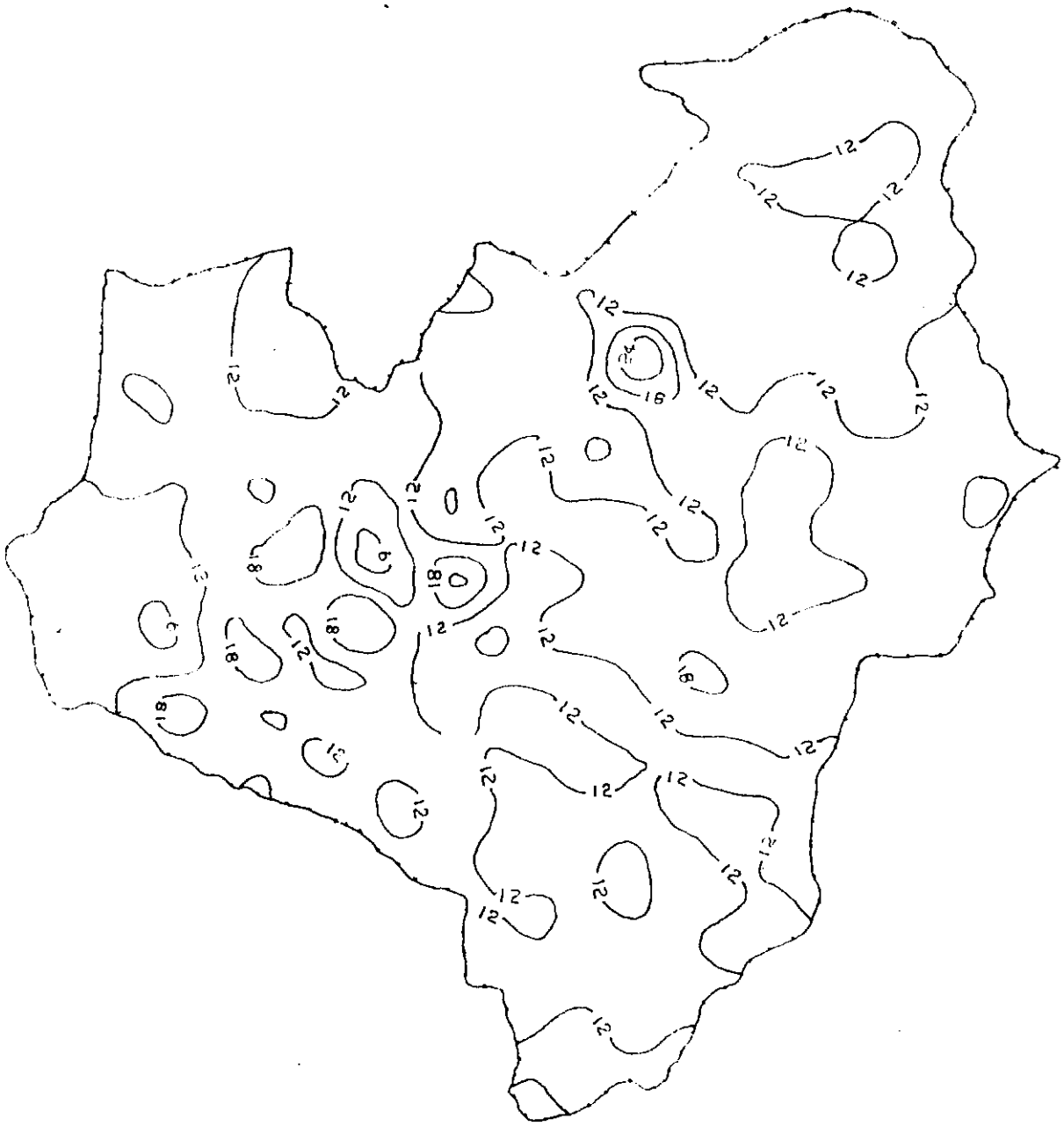


Figure 3.2. Soil thickness map of NCP of Sri Lanka

4.1. Wells in upper catchment area:

About 20% of the agro-wells are located in the upper catchment area. Most of these wells have penetrated through the soil overburden and gone in to the fractured (partially weathered) rock (Table 4.1.).

During pumping, agro-wells show varied draw down and recovery rates owing to their varying overburden conditions. Except in agro-wells on biotite gneiss, the other agro-wells have shown a decrease in recovery rate since their construction. During pumping of the agro-wells, water levels in nearby wells (to a lake) also drops at varying degrees depending on the geological structure which governs the flow of ground water.

4.2. Wells In the Middle (intermediate reaches of the) Catchment Area:

About 37% of the agro-wells studied under the present study are located in the middle part of catchment. the middle catchment area. They can be again grouped according to rock type on which they are located. There are nineteen agro-wells located on charnockite and seventeen on biotite gneiss. (Table 4.2.)

In the middle catchment area, water level of all the agro-wells come up to ground level during rainy season and go 4m below ground during dry season. During pumping the agro-wells on charnockite rocks have shown high draw down (1.2m/h) and wells on biotite gneiss rocks have shown low draw downs (0.8m/h). However the farmers say 100% recovery in wells on biotite gneiss takes about two days (one day in wells on charnockite rock). The above two statements are however contradictory to each other where the recovery in biotite gneiss hosted wells should be faster than that on charnockite rock. Agro-wells that are very close to tanks or irrigation channels have very fast recovery rates and low draw down.

Most of the agro-wells have shown decrease in recovery rates and discharge since their construction. The agro-wells very close to tanks or irrigation channels however have not shown such decrease.

The lowering of recovery can be attributed to clogging in the aquifer surrounding the well, where the clay and other colloidal substances in suspension can slowly build-up at points of extraction (i.e. agro- wells).

Rock type	No. of wells*	Average depth m.	Water level m.		Draw down m.	Recovery time days**
			Rainy	Dry		
Cramockite	6	8.0	G.L.	3.0	0.7	1
Biotite	6	7.0	G.L.	5.0	0.5	1
Granulite	8	7.5	G.L.	6.5	1.0	2
Quartzite	3	7.0	G.L.	7.0	1.0	2

* No. of wells - No. of wells selected for rock type/ recovery analysis

** Recovery time - 100% recovery time

G.L. - Ground level

Table 4.1. Performance of agro-wells in the upper part of the catchment.

Rock type	No. of wells*	Average depth m.	Water level m.		Draw down m.	Recovery time days**
			Rainy	Dry		
Biotite - Gneiss	19	8.0	G.L.	4.0	0.8	2
Charnockite	17	7.5	G.L.	4.0	1.2	1

* No. of wells - No. of wells selected for rock type/ recovery analysis

** Recovery time - 100% recovery time

G.L. - Ground level

Table 4.2. Performance of agro-wells in the middle part of the catchment.

4.3. Wells in the Lower (lower reaches of the) Catchment:

About 20% of the agro-wells visited by the team to evaluate their performance, were situated in the lower reaches of the catchment area, eight on biotite gneiss and 12 on charnockite rock. (Table 4.3.)

In the lower catchment area water level of all agro-wells come up to ground level during rainy season. During dry season it lowers down to about 3m (average) below ground level. In wells on biotite gneiss 3m and 4m on charnockite rocks .Water level of agro-wells close to tanks or irrigation channels go 1.53 m below the surface during dry season. Overburden characteristics however do not vary from charnockite hosted soil profiles to biotite gneiss hosted soil profiles. All agro-wells on biotite gneiss and six on charnockite have gone to hard rock. When the wells of same depth, and diameter are compared for their recovery, the wells penetrating thicker overburden have shown better discharges than the wells with shallow overburden (*Wickramaratne, 1996*).

However these wells have shown high draw down and slow recovery during dry season. Some wells close to irrigation channels recover within 6 hours. In this part of any catchment (lower reaches) lining depth of the well effect the draw down and recovery.

4.4. Wells located below the Tanks:

About 27% of the visited wells are located below the tanks. The farmers however use both rain water and tank water during the rainy season. When the tank distribute water for cultivation, agro-wells are least utilized in the command areas. During *"Yala"* season when supplementary irrigation is required the farmers utilize agro-wells to alleviate the water deficit for the crops. The wells dug below the tank bund have shown stabilized water table or a water table with small fluctuations (0.5-1.2m). The water level of the wells close to a tanks is controlled by the water level of the tank or by the "hanging water table" (*Senaratne 1996*) .

Rock type	No. of wells*	Average depth m.	Water level m.		Draw down m.	Recovery time days**
			Rainy	Dry		
Biotite - Gneiss		8.5	G.L.	3.0	0.7	1
Charnockite	12	7.5	G.L.	4.0	0.7	1

Table 4.3. Performance of agro-wells in the lower part of the catchment.

* No. of wells - No. of wells selected for rock type/ recovery analysis
** Recovery time - 100% recovery time

5. ALLOCATION OF AGRO-WELLS TO EACH CASCADE AREA

To make use of the ground water flowing underground in each cascade, large diameter wells can be constructed at appropriate places. For that one should know the volume of water available for extraction and suitable locations. In previous chapters the locations or the areas suitable for agro-wells in each cascade have been discussed. However the number of wells could be constructed within a cascade have not been discussed in any previous discussions / papers.

In the current study an attempt has been made to evaluate the volume of ground water flow in each cascade. In this exercise a set of assumptions have been employed and are given below.

1. A cascade is a closed system.
2. Incoming ground and surface water to a cascade from adjacent one is zero.
3. Water is contributed to a cascade only through rainfall.
4. Water loss from a cascade occur only through evapotranspiration, soil saturation, surface and underground out-flow from a cascade.

Using the above assumptions an equation has been constructed to calculate the ground water availability in a given cascade.

$$Effective\ Rainfall = Rainfall - Evapotranspiration_{total}$$

$$Effective\ Rainfall = Tank\ Retention + Ground\ water\ flow + Surface\ water\ flow + Soil\ saturation$$

$$Evapotranspiration_{total} = ET^{0} \times (A_{forest} + A_{chena} + A_{homegarden})$$

The data for the above formula have been collected from the IIMI data base for 50 cascades and the respective ground water flow is calculated accordingly. In allocation of wells for each tank environment from the total number allocated for a cascade, tank area has been considered vital. For this purpose, to identify the decisive factors which govern the volume of ground water available for extraction, regression analysis has been done and not a single parameter found responsible to contribute alone for the ground water flow. However as traditionally the size of the tank in the vicinity is considered as a main factor which should govern the ground water seepage in the dry zone, the well allocation was based on the same

The table 5.1 compiles the vital data for the cascade evaluation. Table 5.2. contains Hydrological data of cascades and table 5.3 house the interpretation of these data (calculated results). Table 5.4 shows how the number of wells allocated for each cascade is distributed among the different tank environments.

5.1. Well allocation procedure:

A certain no. of wells have been allocated to each cascade based on different cascade environments as mentioned above. This procedure is based on several assumpsions.

Assumptions :

1. The under-ground flow is always towards the lowest area in the cascade (i.e. recommended area).

2. The recharge in the cachment area is restricted by rainfall amount, while the recharge in tank waterspread and the low-lying paddy area is restricted by under-ground weathered formation.

3. The recharge per average agro-well is estimated based on the following;
   * depth to water table is approx. 12 ft.
   * diameter of an agro-well is approx. 20 ft.
   * max. depth of an agro-well is approx. 20 ft.
   * volume of water in an agro-well during dry season is πr^2.

4. A 50% of water volume (of underground flow) is extractable keeping the environmental impacts to the minimum.

The agro-well recommendations were further distributed among tank environments based on the size of each tank in the cascade. (20% of agro-wells to the Cathment and 80% to command area of tank)

5.2. A numerical example for computing Number of wells per cascade / tank:

D.S. Division - 02. Kebithigollewa
Cascade - 08. Kunchuttuwa

Tabulated / averaged data common for all cascades :-

1. Soil saturation index = 0.052m
2. Evaporation factor = 0.504
3. Vol. of water extractable per day (Avg. in NCP) = 56 Cu.m.

Collected data in cascade :-

1. Cascade Area = 1,671.00 ha.
2. Estimated tank capacity = 100.77 ha.
3. Annual avg. Rainfall = 1,587.00 mm/year
4. Vol. of water escaping cascade = 108.70 ha.m./year
5. Total no. of existing wells = 15 Nos.

Calculations :-

1. Soil Saturation = Cascade area x Soil saturation index
   = 1,671.00 ha. x 0.052m
   = 86.89 ha.m.

2. Effective rainfall = Annual avg. rainfall x Evaporation factor
   = 1,587.00 mm/year x 0.504
   = 799.85 mm/year

3. Under-ground flow= Effective rainfall - Vol. of water escapinng cascade - Soil Saturation
   - Estimated tank capacity
   = 799.85 - 108.70 - 86.89 - 100.77
   = 503.49 ha.m./year
   = 13,794.14 Cu.m./day

Possible no. of agro-wells = Under-ground flow / Vol. water extractable per day
= (13,794.14 Cu.m./day) / 56
= 246 Nos.

Recommended agro-wells = (Possible no. of wells - Existing no. of wells) x 50%

= (246 - 15)*50/100

= **116 Nos. (Per cascade)**

This **116 Agro-wells** are then distributed among tanks on the basis of their percentage area. Then the wells are allocated to the catchment and command area of tank in the ratio of 20% : 80% , respectively.

eg:- Total tank area in cascade = 105.11 ha.

Tank area of Medawewa = 7.28 ha.

Percentage area of Medawewa = (7.28 / 105.11) x 100 %

= 6.93%

Well allocation for Medawewa = Percentage area x No. of wells per cascade

= (6.93 / 100) x 116

= 8 Nos.

Catchment 20% = 8 x (20 / 100)

= 2 Nos.

Command 80% = 8 x (80 / 100)

= 6 Nos.

The same calculation is repeated to all tanks.

Conclusion :-

D.S. Division - 02. Kebithigollewa

Cascade - 08. Kunchuttuwa

No. of Agro-wells recomended = 116 Nos.

Wells are distributed among 16 tanks.

Well allocation for

eg:-

1. Medawewa 8 Nos.

In catchment area 2 Nos.

In command area 6 Nos.

HYDROGEOLOGICAL CHARACTERISTICS OF CASCADES
IN NORTH CENTRAL PROVINCE OF SRI LANKA

DIVISIONAL SECRETARIAT	NAME OF CASCADE	NAME OF VILLAGE	AGRO WELL POTENTIAL	NO OF EXISTING AGRO WELLS	PROPOSED AGRO WELLS	MEANS OF IDENTIFICATION	DEPTH TO WATER LEVEL	ARABLE PADDY	ARABLE HIGH LEV
01. PADAWTYA	02. NAWAGASWEWA	NAWAGASWEWA	SUCCESS	5	5	MAP/FIELD/RT	15'	1.5	
02. KEBITHIGOLLEWA	08. KUNCHCHUTTUWA	KUNCHUTTUWA	SUCCESS			MAP/FIELD/LD	20'	3	
		DAMBAGAHAYAYA	SUCCESS			MAP/FIELD/LD	11'	3	
				15					
	10. KOLIBENDEWA	RELAPANAWA	SUCCESS			MAP/FIELD/LD	15'	5	
		KOLIBENDEWA	POOR			MAP/FIELD/LD	14'	1.5	
		IKKIRIGOLLEWA	POOR			MAP/FIELD/LD	7'	0.25	
				30					
	12. TAMMANNEWA	NIKAWEWA	SUCCESS	1	2	MAP/FIELD	22'		
		WATTEWEWA	SUCCESS	2	4	MAP/FIELD	20'		
		TAMMANNEWA	SUCCESS	1	2	MAP/FIELD	22'		
		APPUWEWA	SUCCESS	2	1	MAP/FIELD	23'		
		TIKIRIHENDEWA	SUCCESS		1	MAP/FIELD			
	14. USGOLLEWA	PAHALAUSGOLLEWA	SUCCESS			MAP/FIELD/LD	12'		
		IHALAUSGOLLEWA	SUCCESS			MAP/FIELD/LD	17'		
				5					
03. MEDAWACHCHIYA	01. MEKICHCHAWA	PUHUDIWULA	SUCCESS	5	2	MAP/FIELD	15'		
		ETAMBAGASKADA	SUCCESS	5	4	MAP/FIELD/RT	15'		
		AMBULPITIYAYA	SUCCESS	2	10	MAP/FIELD	15'-16'		
	10. MURUTHAMADUI	PALUGASWEWA	SUCCESS	5	6	MAP/FIELD			
		YAKAWEWA	SUCCESS	10	5	MAP/FIELD			4
		KUDA KONGASKADA	SUCCESS	8	4	MAP/FIELD			
		MAHASILAMBALAGASKADA	SUCCESS	12		MAP/FIELD	18'-19'		
		PERIYAKULAMA	SUCCESS	10	3	MAP/FIELD	17'	2.5	2-3
		KATUKELIYAWA	SUCCESS	6	4	MAP/FIELD			2.5
		IRRAMBAKKUALAMA	SUCCESS	6	4	MAP/FIELD	17'	2.5	
		KUDA KUMBUKGOLLEWA	SUCCESS	2	6	MAP/FIELD	17'	1.5	
		WEDITHIBBAGALA	SUCCESS		8	MAP/FIELD			
	23. PARANAHALMILLEWA	TAMMENNEWA	SUCCESS		5	MAP/FIELD	20'		
		KADAWATHRAMBEWA	SUCCESS	3	4	MAP/FIELD	11'		1
		PURANAWELA	SUCCESS		4	MAP/FIELD	15'		
		PARANAHALMILLEWA	SUCCESS		7	MAP/FIELD	12'		
		TARANAWEWA -	SUCCESS		2	MAP/FIELD/RT	18'		
		PADIGGAMA	SUCCESS 57%	7	5	MAP/FIELD	20'		2
		ETAKADA	SUCCESS 66%	15	15	MAP/FIELD	24'		
		PEDDEGAMA	SUCCESS 25%	4	3	MAP/FIELD	16'		0.75
		ETAWEERAGOLLEWA	SUCCESS	1	5	MAP/FIELD	24'		0.5
	24. KONGOLLEWA	GALEGAMA	SUCCESS	7	5	MAP/FIELD	17-18'	1.5	
		KONGOLLEWA	SUCCESS 16%	18	8	MAP/FIELD/RT	16'		2.5
		LOLUGASWEWA	SUCCESS	4	7	MAP/FIELD/RT	15-17'	2	1.5
		ALUTHHALMILLEWA		10	3	MAP/FIELD	15		

* MAP : Topographic sheet study, FIELD : Actual field visits, RT : Resistivity survey, LD : Light drilling

HYDROGEOLOGICAL CHARACTERISTICS OF CASCADES

IN NORTH CENTRAL PROVINCE OF SRI LANKA

DIVISIONAL SECRETARIAT	NAME OF CASCADE	NAME OF VILLAGE	AGRO WELL POTENTIAL	NO. OF EXISTING AGRO WELLS	PROPOSED AGRO WELLS	MEAN OF IDENTIFICATION	DEPTH TO WATER LEVEL	ARABLE PADDY	ARABLE HIGH ELEV.
04. NUWARAGAMPALATHA CENTRAL	06. TAMMANNEWA	DIGANEGAMA		0	5	MAP/FIELD/RT	20		
		MADURUPITIGAMA		0	6	MAP/FIELD			
		PAHALAMADURUPITIGAMA		0	0	MAP/FIELD	22'		
		IHALAMADURUPITIGAMA		0	3	MAP/FIELD			
		BALAYAPATTUWAWEWA		0	10	MAP/FIELD			
		TAMMANKULAMA	SUCCESS	1	1	MAP/FIELD	10'		
	07. GALPOTTEGAMA	PALAPANAWA	SUCCESS	8	10	MAP/FIELD/RT	22'		4
		KATUKELIYAWA		0	0	MAP/FIELD			
		KARUKKAMKULAMA	SUCCESS	1	10	MAP/FIELD	19'		0.5
		HINGURUWEWA		0	0	MAP/FIELD			
		GALPOTHTHEGAMA		0	20	MAP/FIELD			
	18. GALKADAWALA	IHALATHALAKOLAWEWA	SUCCESS	1	1	MAP/FIELD	15'	1	
		THALAKOLAWEWA	SUCCESS	1	2	MAP/FIELD	15'	1	
		WANEWEWAA			1	MAP/FIELD			
		MAHAWATTEWEWAA			1	MAP/FIELD			
		GALKADAWALA			2	MAP/FIELD			
		IHALADEMATAWEWA			1	MAP/FIELD			
		LOLUGASWEWA			1	MAP/FIELD			
		IHALAMIDDEYAGAMA			1	MAP/FIELD			
	22. BELLANKADAWALA	GAMBIRIGASWEWA	SUCCESS	15	10	MAP/FIELD/RT	22'		5-6
		BELLANKADAWALA	SUCCESS	4	2	MAP/FIELD	22'	1	1
05. MAHAWILACHCHIYA	03. SIVALAPITIYA	SIVALAPITIYA	SUCCESS			MAP/FIELD	10'	1	
		KADURUPITIYA	SUCCESS			MAP/FIELD	5'	1.5	
				2					
	12. SANDAMALELIYA	VIHARAGAMA	SUCCESS			MAP/FIELD	8'	0.5	
		DLUPPOTHANA	SUCCESS			MAP/FIELD	7'		
				24					
07. RAJANGANA	01. IHALA TAMMANNEWA	IHALA TAMMANNEWA	SUCCESS	0	0	MAP/FIELD	3'-4'		
		PUHUDIVULWEWA	SUCCESS	0	1	MAP/FIELD			
		DIWVULWEWA	SUCCESS	0	1	MAP/FIELD			
10. NUWARAGAMPALATHA EAST	05. KUDA KALETHTHEWA	HALMILLEWA	SUCCESS	4	0	MAP/FIELD	18'	2	
		PALUGASWEWA	SUCCESS	25	0	MAP/FIELD	14'-15'	3	17
		KUDA SATTAMBIKULAMA	SUCCESS	8	3	MAP/FIELD	15'-16'		5
		MAHA SATTAMBIKULAMA	SUCCESS	10	0	MAP/FIELD/RT	13'	0.5	4
		NELUNKANNIYA	SUCCESS	8	0	MAP/FIELD	15'		5-6
		KALETTEWA	SUCCESS	10	8	MAP/FIELD	13'-16'		6-7
		TARIYANKULAMA	SUCCESS	1	10	MAP/FIELD/RT	15'		0.5-1
11. MIHINTALE	01. RAMBEWA	PUDUKKULAMA			5	MAP/FIELD	24'		
		SANGILIKULAMA	SUCCESS	1	3	MAP/FIELD	17'	0.5	
		UKKULANKULAMA	SUCCESS	3	5	MAP/FIELD	17'	0.5	

* MAP : Topographic sheet study, FIELD : Actual field visits, RT : Resistivity survey, LD : Light drilling

Table 5.1. Hydrogeological characteristics of cascades

HYDROGEOLOGICAL CHARACTERISTICS OF CASCADES

IN NORTH CENTRAL PROVINCE OF SRI LANKA

DIVISIONAL SECRETARIAT	NAME OF CASCADE	NAME OF VILLAGE	AGRO WELL POTENTIAL	NO. OF EXISTING AGRO WELLS	PROPOSED AGRO WELLS	MEAN OF IDENTIFICATION	DEPTH TO WATER LEVEL	ARABLE PADDY	ARABLE HIGH ELEV.
11. MIHINTALE ..contd.	08. MARADANKALLA	KARADIKKULAMA	SUCCESS 80%	5	1	MAP/FIELD	13'	1	
		PUNCHIKULAMA	SUCCESS	2	1	MAP/FIELD	11'	1	0.5
		GALKULAMA	SUCCESS	0	1	MAP/FIELD			
		MARADANKALLA	SUCCESS	4	2	MAP/FIELD	25'		
		KUDAKIRINDIGAMA	SUCCESS	3	0				
	10. KATUPOTA	KATUKELIYAWA	SUCCESS	4	0	MAP/FIELD	3'	2	
		WELLAMORANA	SUCCESS 50%	4	4	MAP/FIELD	13'	1.5	
		KARADIKKULAMA	UNSUCCESS	4	0	MAP/FIELD	13'	2	
		ALAPPANKULAMA	SUCCESS	1	0	MAP/FIELD/RT	12'	0.5	
		KATUPOTA	SUCCESS	0	5	MAP/FIELD			
	11. MANKULAMA	KANAPATHWALAGAMA	SUCCESS	5	0	MAP/FIELD	10'-12'	2.5	
		PAHALAWEWA	SUCCESS	3	3	MAP/FIELD	15'		
		MADIRIPPUWA	SUCCESS	1	3	MAP/FIELD	10'		
		NOCHCHIYAKULAM	SUCCESS	9	0	MAP/FIELD	18'		
		KUDA WEWA	SUCCESS	0	2	MAP/FIELD	10'-12'		
	12. MAHARAMBEWA	KATUKETTYAWA	SUCCESS	1	5	MAP/FIELD	12'		2
		THALA HINGURUWEWA	SUCCESS	1	6	MAP/FIELD	15'	2	
		MAHARAMBEWA	SUCCESS	0	5	MAP/FIELD	15'-20'		
		KATTAMBUWEWA GAMA	SUCCESS	0	5	MAP/FIELD	12'		
		TIRIPPANE	SUCCESS	1	8	MAP/FIELD	10		1
		KIRIMETTYAWA	SUCCESS	0	3	MAP/FIELD			
12. RAMBEWA	11. PIHIMBIYAGOLLEWA	TORANAGOLLEWA	SUCCESS	12	1	MAP/FIELD	12'-15'	8	
		ILUGGASWEWA	SUCCESS	4	2	MAP/FIELD	18'	2	
		WEWALKETIYA	SUCCESS	2	1	MAP/FIELD	12'-15'	0.5	
		BLAHONDAWEWA	SUCCESS	4	1	MAP/FIELD	18'	0.5	
		ANDARAYAGOLLA	SUCCESS	1	1	MAP/FIELD	18'	0.5	
		URAPINOOWEWA	SUCCESS	2	2	MAP/FIELD	15	1	
12. RAMBEWA	04. KEDEWA	KEDEWA	SUCCESS	3	6	MAP/FIELD	25'		
		EHETUWAGAMA	SUCCESS	1	3	MAP/FIELD/RT	25'		
13. KAHATAGASDIGILIYA	04. HALMILLEWA	GALKANDEWWEWA	SUCCESS			MAP/FIELD	6'	2.5	
		AMBAGAHAWEWA	SUCCESS			MAP/FIELD	12'		
		HALMILLEWA	SUCCESS			MAP/FIELD	10'		
		HETTIYAWA	SUCCESS			MAP/FIELD	7'		
		WELIWEWA	SUCCESS			MAP/FIELD	8'	3	
		PAHALAKANAHINDAGAMA	SUCCESS			MAP/FIELD	8'	1	
				25					
	06. RANPATHWILA	KIRIBBEWA	SUCCESS			MAP/FIELD	8'		
		KAHATAGASDIGILIYA	SUCCESS			MAP/FIELD	8'	1	
		KUDAMESSEWA	SUCCESS			MAP/FIELD	8'	1	
		BEHETHKEWA	SUCCESS			MAP/FIELD/LD	3'		
		MORAGAHAWALA	POOR			MAP/FIELD	10'		
		RANPATHWILA	SUCCESS			MAP/FIELD	10'		
				13					

* MAP : Topographic sheet study, FIELD : Actual field visits, RT : Resistivity survey, LD : Light drilling

Table 5.1. Hydrogeological characteristics of cascades

HYDROGEOLOGICAL CHARACTERISTICS OF CASCADES

IN NORTH CENTRAL PROVINCE OF SRI LANKA

DIVISIONAL SECRETARIAT	NAME OF CASCADE	NAME OF VILLAGE	AGRO WELL POTENTIAL	NO. OF EXISTING AGRO WELLS	PROPOSED AGRO WELLS	MEAN OF IDENTIFICATION	DEPTH TO WATER LEVEL	ARABLE PADDY	ARABLE HIGH ELEV.
13. KAHATAGASDIGILIYA ..contd.	10. GANGUREWA	NIKATUWAWEWA	SUCCESS			MAP/FIELD	10'	12	
		KONWEWA	SUCCESS			MAP/FIELD	8'	2	
		GANGUREWA	SUCCESS			MAP/FIELD	8'	3	
		GALENBINDAWEWA	SUCCESS			MAP/FIELD	8'	2	
		PALUWEWA	SUCCESS			MAP/FIELD	8'	3	
		RATMALE	POOR			MAP/FIELD	8'	2	
		ULPATHAWEWA	SUCCESS			MAP/FIELD	8'	3	
		ELAPATAGAMA	SUCCESS			MAP/FIELD	8'	2	
				17					
	11. MAHAKIRIMETTYAWA	NIKAWEWA	SUCCESS			MAP/FIELD	12'	4	
		MULKIRIYAWA	SUCCESS			MAP/FIELD	12'	1	
		MAHAWILAGOLLEWA	SUCCESS			MAP/FIELD	12'	2	
		KUDAGAHATOTTAMA	SUCCESS			MAP/FIELD	12'	5	
				32					
	16. PANDARELLEWA	PANWILAWEWA	SUCCESS			MAP/FIELD	12'	1	
		IHALAGAMA	POOR			MAP/FIELD	12'	5	
		PANDITHAYAGAMA	SUCCESS			MAP/FIELD	12'	3	
		ETHAWETUNUWEWA	SUCCESS			MAP/FIELD	12'	4	
		DIYAMYLAGASWEWA	SUCCESS			MAP/FIELD	13'	5	
		THALKOLAWEWA	SUCCESS			MAP/FIELD	12'	1	
	18. NELUGOLLEKADA	KANDAGASWEWA	SUCCESS			MAP/FIELD	12'	4	
		KUMBUKGOLLEWA	SUCCESS			MAP/FIELD	13'	2	
		DEKATIPOTHANA	SUCCESS			MAP/FIELD	13'	4	
		WAHAGAPUWEWA	SUCCESS			MAP/FIELD	12'	2.5	
14. HOROWPATHANA	19. DEMATAWEWA	DEMATAWEWA	SUCCESS	9	10	MAP/FIELD	14'-15'		10
	21. DIYATHITHAYAWEWA	DIYATHITHAYAWEWA	SUCCESS	10	10	MAP/FIELD/RT	15'		1.5
		WELAHIDEWA	SUCCESS		10	MAP/FIELD			
	14. PULIYANKADAWALA	PULIYANKADAWALA	SUCCESS	10	5	MAP/FIELD	12'	2	0.5
		KANHINDAGAMA	SUCCESS	3	3	MAP/FIELD	19'	5	
		MEEHONDAWEWA	SUCCESS	10	10	MAP/FIELD	10'-15'	3	
		OLUWEWA	SUCCESS	2		MAP/FIELD	10'-13'		
	03. DUTUWEWA	DUTUWEWA	SUCCESS	4		MAP/FIELD	12'-18'	2	
		DIKWEWA	SUCCESS	1	20	MAP/FIELD	10'-15'		
		PALUGASWEWA	SUCCESS	1	15	MAP/FIELD/RT	16'	1	
		ETAMBAGASWEWA	SUCCESS	7	10	MAP/FIELD	10'-12'	0.5	
15. GALENBINDUNUWEWA	05. HIMBUTUGOLLEWA	SIYAMBALAWA	SUCCESS			MAP/FIELD	14'	3	
		ELAPATHTHEWEWA	SUCCESS			MAP/FIELD	15'	2	
		MAHAHIMBUTUWEWA	SUCCESS			MAP/FIELD	16'	2	
		MYLAGASWEWA	SUCCESS			MAP/FIELD	15'	7	
		THARUNAGOLLEWA	SUCCESS			MAP/FIELD	14'	8	
		DAMBAGAHAWEWA	SUCCESS			MAP/FIELD	15'	0.5	
		AMBAGAHAWEWA	SUCCESS			MAP/FIELD	16'	2	
		USGOLLEWA	SUCCESS			MAP/FIELD	14'	3	
				124					

* MAP : Topographic sheet study, FIELD : Actual field visits, RT : Resistivity survey, LD : Light drilling

Table 5.1. Hydrogeological characteristics of cascades

HYDROGEOLOGICAL CHARACTERISTICS OF CASCADES

IN NORTH CENTRAL PROVINCE OF SRI LANKA

DIVISIONAL SECRETARIAT	NAME OF CASCADE	NAME OF VILLAGE	AGRO WELL POTENTIAL	NO. OF EXISTING AGRO WELLS	PROPOSED AGRO WELLS	MEAN OF IDENTIFICATION	DEPTH TO WATER LEVEL	ARABLE PADDY	ARABLE HIGH FILEY
15. GALENBINDUNUWEWA ..contd.	10. SIVALAKULAMA	SIVALAKULAMA	SUCCESS			MAP/FIELD	14'	20	
		KONGASWEWA	SUCCESS			MAP/FIELD	16'	5	
		WEMBUWEWA	SUCCESS			MAP/FIELD	18'	1	
		MURIYAKADAWALA	SUCCESS			MAP/FIELD	18'	1	
		THALAKUNCHIKULAMA	POOR			MAP/FIELD			
		THALAALIYAWETUNUWEWA	SUCCESS			MAP/FIELD	11'	2	
		PAHALAALIYAWETUNUWEWA	SUCCESS			MAP/FIELD	15'	1	
		PALUGOLLEWA	POOR			MAP/FIELD			
				62					
	11. KARUWALAGASWEWA	KARUWALAGASWEWA	SUCCESS			MAP/FIELD	20'	1.5	
		THALAGALKULAMA	SUCCESS			MAP/FIELD	15'	4	
		PAHALAKARUWALAGASWEWA	SUCCESS			MAP/FIELD	14'	2	
		THALAKARUWALAGASWEWA	SUCCESS			MAP/FIELD	15'	4	
				21					
	13. TAMMENNEWA	UDIYANKULAMA	SUCCESS	2	8	MAP/FIELD	10'	2	
		MANDIYAKKULAMA	SUCCESS	1	5	MAP/FIELD	10'	1	
		PULIYANKULAMA	SUCCESS	2		MAP/FIELD/RT	10'	2	
	17. DIVULWEWA	KARAWAKKULAMA	SUCCESS			MAP/FIELD	16'	10	
		GARDIYAULPATHA	SUCCESS			MAP/FIELD	18'	3	
		THALATAMMANNEWA	SUCCESS			MAP/FIELD	12'	3	
		KUMBUKWEWA	SUCCESS			MAP/FIELD	12'	0.5	
		DOMBAULPATHA	SUCCESS			MAP/FIELD	12'	3	
		PANSALWEWA	SUCCESS			MAP/FIELD	14'	2	
		NELUMWEWA	SUCCESS			MAP/FIELD	14'	1	
		SAMGIWEWA	SUCCESS			MAP/FIELD	13'	2	
				23					
16. TIRAPPANE	04. MAHAKANAMULLA	ARMANE	SUCCESS	1	4	MAP/FIELD	18'		
		SIWALAGALA	SUCCESS	5		MAP/FIELD	8'-10'	5	
		WALANGAMBAHAWA	SUCCESS	12	4	MAP/FIELD	15'	18	
		THORAPITIYWA	SUCCESS	23		MAP/FIELD	13'	36	
		PAHALA AMANKATTAMBU	SUCCESS	5		MAP/FIELD	13'	5	
		MAWATHAWEWA	SUCCESS	5	3	MAP/FIELD	17'	3	
		PENDIKULAMA	SUCCESS	37		MAP/FIELD	16'	70	
		MAHAKANAMULLA	SUCCESS	6	3	MAP/FIELD	16'	4	
		KUDAKANAMULLA	SUCCESS	18	10	MAP/FIELD	15'	25	
		ETAWEERAWEWA	SUCCESS	8		MAP/FIELD	16'	8	
		SEMBUKULAMA	SUCCESS	16	10	MAP/FIELD	8'	18	
		KUNCHIKULAMA	SUCCESS	3	4	MAP/FIELD	10'	2	
		KUDAGAMA	SUCCESS	5	3	MAP/FIELD	12'	3.5	
		DEMATAGAMA	SUCCESS	2	5	MAP/FIELD	10'	1.5	
		TAMMANNAGALA	SUCCESS	4	3	MAP/FIELD	12'	4.25	

* MAP : Topographic sheet study, FIELD : Actual field visits, RT : Resistivity survey, LD : Light drilling

Table 5.1. Hydrogeological characteristics of cascades

HYDROGEOLOGICAL CHARACTERISTICS OF CASCADES

IN NORTH CENTRAL PROVINCE OF SRI LANKA

DIVISIONAL SECRETARIAT	NAME OF CASCADE	NAME OF VILLAGE	AGRO WELL POTENTIAL	NO. OF EXISTING AGRO WELLS	PROPOSED AGRO WELLS	MEAN OF IDENTIFICATION	DEPTH TO WATER LEVEL	ARABLE PADDY	ARABLE HIGH ELEV.
16. TIRAPPANE ..contd.	06. ULAGALLA	THITHAYAGAMA	SUCCESS	12	8	MAP/FIELD	23'-25'		
		KUNUMULLEGAMA	SUCCESS	8	2	MAP/FIELD	15'		
		WAGAYAKULAMA	SUCCESS	2	1	MAP/FIELD	15'-18'		
		MANAKKULAMA	SUCCESS	4		MAP/FIELD	18'		
		KRAMBAYAGAMA	SUCCESS	6		MAP/FIELD	20'		
		PUDUKKULAMA	SUCCESS 50%	6		MAP/FIELD	20'		
		PERIYAKULAMA	SUCCESS 12.5%	8		MAP/FIELD	20'		
		ULANKULAMA			2	MAP/FIELD	20'		
		PAHALAPULIYANKULAMA	SUCCESS	6		MAP/FIELD	15'-18'		
		PANSALWEWA			1	MAP/FIELD			
		HAPIDIYAGAMA	SUCCESS	2	2	MAP/FIELD	15'		
		SETTIKULAMA	SUCCESS		2	MAP/FIELD			
	08. PAHALAAMBATALE	PAHALAAMBATALE	SUCCESS	4	8	MAP/FIELD			
		PANDITHA RAMBEWA	SUCCESS	3	5	MAP/FIELD		1.5	
		ALAGOLLEWA	SUCCESS	4	6	MAP/FIELD		2	
	16. WANNAKKULAMA		SUCCESS			MAP/FIELD			
17. PALUGASWEWA	01. MAHADIVULWEWA	MAHADIVULWEWA	SUCCESS	3	15	MAP/FIELD/RT	15'		1.5
		KONGWEWA	SUCCESS	0	4	MAP/FIELD	8'-10'		
	08. PALUGASWEWA	HORIWILA	SUCCESS	3	5	MAP/FIELD/RT	15'	2	
		NIKATUGAMA	SUCCESS	0	1	MAP/FIELD	10'		
	10. WERAGALA	WERAGALA	SUCCESS	15		MAP/FIELD			
21. PALAGALA	02. HALMILLEWA	IHALABAMUNUGAMA	SUCCESS			MAP/FIELD	12'	3	
		PAHALABAMUNUGAMA	SUCCESS			MAP/FIELD	12'	4	
		KARAWILAGALA	SUCCESS			MAP/FIELD	12'	1	
		HALMILLEWA	SUCCESS			MAP/FIELD	13'	2	
	03. MEEGASWEWA	MANAKETIYA	SUCCESS			MAP/FIELD	14'	1	
		UPULWEHERA	SUCCESS			MAP/FIELD	14'	7	
		PARAWAHAGAHA	SUCCESS			MAP/FIELD	12'	3	
		SADARAGAMA	SUCCESS			MAP/FIELD	12'	3	
		MANERUWA	SUCCESS			MAP/FIELD	14'	2	
		AMBAGASWEWA	SUCCESS			MAP/FIELD	14'	10	
		WAMBATUWAGAMA	SUCCESS			MAP/FIELD	13'	2	
				49					

* MAP : Topographic sheet study, FIELD : Actual field visits, RT : Resistivity survey, LD : Light drilling

Table 5.1. Hydrogeological characteristics of cascades

[redacted] CASCADES
IN THE NORTH CENTRAL PROVINCE OF SRI LANKA

D.S. DIVISION	CASCADE NAME	CASCADE AREA ha. (A)	ESTIMATED TANK CAPACITY ha. (B)	ANNUAL AVERAGE RAINFALL mm/year (C)	CASCADE WATER ESCAPE ha.m./year (D)	TOTAL IRRIGATION RELEASE ha.m. (X)	ESTIMATED CASSCADE LOSSES ha.m./year (Y)
01. PADAWIYA	1 NAWAGASWEWA	299.5	556.43	1519	52.8	317.96	417.2
02. KEBITHIGOLLEWA	8 KUNCHUTTUWA	1671	100.77	1587	108.7	191.97	135.89
	10 KOLIBENDAWEWA	2565	171.1	1587	168.7	317.79	290.49
	12 THAMMANNEWA	1451	89.72	1587	51.78		
	14 USGOLLEWA	701	77.19	1587		85.23	87.35
03. MEDAWACHCHIYA	1 MAKICHCHAWA	2816.2	149.98	1587.1	363	209.29	426.65
	10 MURUTHAMADU	4226.7	299.36	1587	295.04	439.53	815.57
	23 PARANAHALMILLEWA	3750	338.36	1587.1	322.54	374.98	800.35
	24 KONGOLLEWA	1643.5	133.28	1587.1	63.22	216.9	340.66
04. NUWARAGAMPALATHA CENTRAL	6 TAMMANNEWA	1835	146.31	1351	67.8	193.51	227.26
	7 GALPOTTEGAMA	1778	106.7	1351	31.7	211.75	170.27
	18 GALKADAWALA	1044.2	95.42	1351.3	27.36	216.2	166.06
	22 BELLANKADAWALA	1451.4	134.22	1351	27.36	199.19	194.36
05. MAHAWILACHCHIYA	3 DUNUMADALAWA	782	53.28	1176	52.9	70.31	41.91
	12 SANDAMAELIYA	1938	108.46	1176	365	169.94	223.92
07. RAJANGANA	1 IHALA THAMMENNAWA	299.5	56.2	1054	20.2	128.34	169.12
10. NUWARAGAMPALATHA EAST	5 KUDAKALETHTHEWA	1308	14.38	1351	134	9.49	52.66
11. MIHINTALE	1 UKKULANKULAMA	2020	64.54	1176		125.06	93.55
	8 MAHAKIRINDEGAMA	1483	112.58	1369	101.67	195	237.27
	10 KATUPOTHA	1064	19.45	1606	33.6	49.83	46.68
	11 MANKULAM	1225.8	89.54	1176.7	116.14	143.35	142.03
	12 MAHA RAMBAWA	749.8	136.84	1369	38.2	216.34	212.71
12. RAMBEWA	10 KAPIRIGAMA	2321.8	221.59	1587	40.4	320.87	441.58
	11 PIHIMBIYAGOLLEWA	3425	466.77	1329	153	494.1	813.4
	14 KENDAWA	1204	111.48	1329	63.6	156.86	331.44
13. KAHATAGASDIGILIYA	4 HAMMILLEWA	2869	452.13	1437		393.44	380.99
	6 RANPATHWILA	3137	856.13	1437	251	555.51	1742.13
	10 GANGUREWA	3141	554.31	1437	255	325.69	715.67
	11 MAHAKIRIMETIYAWA	2393	146.41	1437	232.4	354.59	270.63
	16 PANDARELLEWA	2654	244.28	1437	102.3	414.86	428.56
	18 NELLUGOLLEKADA	2762	232.97	1437	53.2	351.42	394.11
14. HOROWPATHANA	3 DUTUWEWA	2328.74	109.9	1606.8	74.99	190.43	505.18
	14 PULIYANKADAWALA	2430.7	137.71	1606	205.2	293.02	617.7
	19 DEMATAWEWA	2678	125.8	1606.8	370.9	77.47	320.31
	21 DIYATITITHTHA WEWA	3241.96	181.12	1606.8	66.7	203.72	163.46
15. GALENBINDUNUWEWA	4 CHCHANKULAMA	1022	98.79	1606	63	157.1	12.54
	5 HIMBUTUGOLLEWA	2421	401.18	1606	24.9	378.56	636.79
	10 SIVALAKULAMA	2204	312.14	1606	12.3	274.58	300.5
	11 KARUWALAGASWEWA	545.7	36.08	1458	9.2	31.06	60.32
	13 TAMMANNEWA	135.6	76.7	1350	69.65	77.74	126.8
	17 DIWULWEWA	2375	247.29	1458	44	200.22	502.57
16. THIRAPPANE	4 MAHAKANAMULLA	4494	181.2	1369	3.26	519.14	454.07
	6 ULAGALLA	4918.61	356.68	1369	309.94	513.93	624.48
	8 PAHALA AMABATALE WEWA	1601.6	61.14	1369	128.8	192.99	184.57
	16 WANNAKKULAMA	998.38	176.07	1369	0.66	114.25	105.71
17. PALUGASWEWA	1 MAHADIWULWEWA	2054	132.79	1350	139.4	140.41	270.06
	8 PALUGASWEWA	1860	116.69	1350		135.26	303.13
	10 WERAGALA	898.8	58.05	1350	85.7	103.31	132.6
21. PALAGALA	2 HAMMILLEWA	933	55.57	1373	124.4	121.8	120.2
	3 MEEGASWEWA	4421	185.16	1374	353.45	467.26	234.77

[redacted]

[redacted]A OF CASCADES
IN THE NORTH CENTRAL PROVINCE OR SRI LANKA

D.S. DIVISION		CASCADE NAME	CALCULATED RESULTS					INFERENCES			
			SOIL SATURATION (A)x 0.05 (E)	EFFECTIVE RAINFALL (C)x 0.50 (F)	UNDERGROUND FLOW ha.m./year (F)-(D)-(E)-(B) (G)	UNDERGROUND FLOW Cu.m./day (G)/365x10000 (H)	UNDERGROUND FLOW Cu.m./ha day (H)/(A) (I)	POSSIBLE TOTAL WELLS (H)/56 (J)	NO OF EXIST WELLS (K)	NO OF BALANCE WELLS (J)-(K) (L)	RECOM NO OF WELLS (L)/2 (M)
01. PADAWIYA	1	NAWAGASWEWA	15.57	765.58	140.77	3856.77	12.88	69	5	64	32
02. KEBITHIGOLLEWA	8	KUNCHUTTUWA	86.89	799.85	503.49	13794.14	8.26	246	15	231	116
	10	KOLIBENDAWEWA	133.38	799.85	326.67	8949.61	3.49	160	30	130	65
	12	THAMMANNEWA	75.45	799.85	582.9	15969.8	11.01	285	6	279	140
	14	USGOLLEWA	36.45	799.85	686.21	18800.16	26.82	336	5	331	165
03. MEDAWACHCHIYA	1	MAKICHCHAWA	146.44	799.9	140.48	3848.66	1.37	69	30	39	19
	10	MURUTHAMADU	219.79	799.85	(14.34)	(392.89)	(0.09)		59		
	23	PARANAHAMMILEWA	195	799.9	(56.00)	(1534.29)	(0.41)		12		
	24	KONGOLLEWA	85.46	799.9	517.94	14190.04	8.63	253	19	234	117
04. NUWARAGAMPALATHA CENTRAL	6	TAMMANNEWA	95.42	680.9	371.37	10174.63	5.54	182	2	180	90
	7	GALPOTTEGAMA	92.46	680.9	450.05	12330.08	6.93	220	9	211	106
	18	GALKADAWALA	54.3	681.06	503.97	13807.47	13.22	247	2	245	122
	22	BELLANKADAWALA	75.47	680.9	443.85	12160.31	8.38	217	19	198	99
05. MAHAWILACHCHIYA	3	DUNUMADALAWA	40.66	592.7	445.86	12215.34	15.62	218	2	216	108
	12	SANDAMAL ELIYA	100.78	592.7	18.47	505.97	0.26	9	24		
07. RAJANGANA	1	IHALA THAMMENNAWA	15.57	531.22	439.24	12034.03	40.18	215		215	107
10. NUWARAGAMPALATHA EAST	5	KUDAKALETHTHEWA	68.02	680.9	464.51	12726.25	9.73	227	64	163	82
11. MIHINTALE	1	UKKULANKULAMA	105.04	592.7	423.12	11592.44	5.74	207	4	203	102
	8	MAHAKIRINDEGAMA	77.12	689.98	398.61	10920.82	7.36	195	14	181	91
	10	KATUPOTHA	55.33	809.42	701.05	19206.74	18.05	343	12	331	165
	11	MANKULAMA	63.74	593.06	323.64	8866.72	7.23	158	18	140	70
	12	MAHA RAMBAWA	38.99	689.98	475.95	13039.63	17.39	233	3	230	115
12. RAMBEWA	10	KAPIRIGEAMA	120.73	799.85	417.12	11428.01	4.92	204		204	102
	11	PIHIMBIYAGOLLEWA	178.1	669.82	(128.05)	(3508.33)	(1.02)		25		
	14	KENDAWA	62.61	669.82	432.13	11839.12	9.83	211	4	207	104
13. KAHATAGASDIGILIYA	4	HAMMILLEWA	149.19	724.25	122.93	3367.95	1.17	60	25	35	18
	6	RANPATHWILA	163.12	724.25	(546.01)	(14959.07)	(4.77)		13		
	10	GANGUREWA	163.33	724.25	(248.39)	(6805.32)	(2.17)		17		
	11	MAHAKIRIMETIYAWA	124.44	724.25	221	6054.85	2.53	108	30	78	39
	16	PANDARELLEWA	138.01	724.25	239.66	6566.03	2.47	117	42	75	38
	18	NELLUGOLLEKADA	143.62	724.25	294.45	8067.23	2.92	144		144	72
14. HOROWPATHANA	3	DUTUWEWA	121.09	809.83	503.84	13803.95	5.93	246	13	233	117
	14	PULIYANKADAWALA	126.4	809.42	340.12	9318.24	3.83	166	25	141	71
	19	DEMATAWEWA	139.26	809.83	173.87	4763.59	1.78	85	9	76	38
	21	DIYATHITHA WEWA	168.58	809.83	393.43	10778.77	3.32	192	10	182	91
15. GALENBINDUNUWEWA	4	CHCHANKULAMA	53.14	809.42	594.49	16287.4	15.94	291		291	145
	5	HIMBUTUGOLLEWA	125.89	809.42	257.45	7053.48	2.91	126	124	2	1
	10	SIVALAKULAMA	114.61	809.42	370.38	10147.29	4.6	181	62	119	60
	11	KARUWALAGASWEWA	28.38	734.83	661.18	18114.4	33.19	323	21	302	151
	13	TAMMANNEWA	7.05	660.4	527	14438.32	106.48	258	5	253	126
	17	DIWULWEWA	123.5	734.83	320.04	8768.27	3.69	157	23	134	67
16. THIRAPPANE	4	MAHAKANAMULLA	233.69	689.98	271.83	7447.34	1.66	133	150		
	6	ULAGALLA	255.77	689.98	(232.42)	(6367.55)	(1.29)		54		
	8	PAHALA AMBATHALE WEWA	83.26	689.98	416.75	11417.88	7.13	204	11	193	96
	16	WANNAKKULAMA	51.92	689.98	461.33	12639.18	12.66	226		226	113
17. PALUGASWEWA	1	MAHADIWULWEWA	106.81	660.4	301.4	8257.59	4.02	147	3	144	72
	8	PALUGASWEWA	96.72	660.4	466.99	12794.25	6.88	228	3	225	113
	10	WERAGALA	46.74	660.4	489.91	13422.25	14.93	240	15	225	112
21. PALAGALA	2	HALMILLEWA	48.52	691.99	463.51	12698.79	13.61	227	8	219	109
	3	MEEGASWEWA	229.89	692.5	(76.00)	(2082.25)	(0.47)		49		
								8365	1095	7531	3766

[redacted]

[redacted]

NORTH CENTRAL PROVINCE OF SRI LANKA

D.S. DIVISION	CASCADES				NAME OF TANK	TANK AREA ha.	WELL RECOMENDATIONS		
	NAME	RECOM. WELLS	POSSIBLE WELLS 50%				TANK	Catchment 20%	Command 80%
01. PADAWIYA	01. NAWAGASWEWA	64	32	1	Ihala Nawagaswewa	12.50	13	3	10
				2	Mahasenpura	4.00	4	1	3
				3	Pahala Nawagaswewa	14.20	15	3	12
						30.70	32	7	25
02. KABITHIGOLLEWA	08. KUNCHUTTUWA	231	116	1	Meda wewa	7.28	8	2	6
				2	Kuda wewa	3.24	4	1	3
				3	Pincha wewa	3.24	4	1	3
				4	Kudagama	2.02	2	0	2
				5	Kolibendewa	10.12	11	2	9
				6	Minipitiya	1.21	1	0	1
				7	Galapita	2.43	3	1	2
				8	Kunchuttuwa	39.54	43	9	34
				9	Nikatuwa	1.62	2	0	2
				10	Viharagama	4.86	5	1	4
				11	Viharahalmillewa	13.76	15	3	12
				12	Dambulu wewa	2.02	2	0	2
				13	Kudahalmillawetiya	3.24	4	1	3
				14	Maha Halmille Wetiya	3.24	4	1	3
				15	Kudakadigalla	4.05	5	1	4
				16	Mahakadigalla	3.24	4	1	3
						105.11	117	24	93
	10. KOLIBENDAWEWA	130	65	1	Ralapanawa	15.38	6	1	5
				2	Damunugollewa	4.86	2	0	2
				3	Kirimetiyawa	18.62	7	1	6
				4	Kuda Udangewa wewa	1.62	1	0	1
				5	Udangawa wewa	10.52	4	1	3
				6	Kolibendewa	28.33	11	2	9
				7	Kohombagas wewa	7.69	3	1	2
				8	Tikiri Siyambalawa	5.67	2	0	2
				9	Lolugas wewa	11.33	4	1	3
				10	Timbiri wewa	12.95	5	1	4
				11	Hendagama	48.56	19	4	15
						165.53	64	12	52
	12. THAMMANNEWA	140	70	1	Meegahawewa	2.60	2	0	2
				2	Appuwewa	8.10	5	1	4
				3	Kuda Appuwewa	1.80	1	0	1
				4	Tikiri Hendewa	8.90	6	1	5
				5	Tikiri Hendewa Kuda	3.60	2	0	2
				6	Makanduragolle		0	0	0
				7	Nike wewa	7.90	5	1	4
				8	Kuda Nike wewa	4.00	3	1	2
				9	Watte wewa	30.40	20	4	16
				10	Kuda Watte wewa	23.90	16	3	13
				11	Ihala Thammannewa	4.90	3	1	2
				12	Pahala Thammenewa	9.70	6	1	5
						105.80	69	13	56
	14. USGOLLEWA	331	166	1	Siyambala wewa	6.88	20	4	16
				2	Ihala usgollewa	7.69	23	5	18
				3	Pahalausgollewa	25.89	76	15	61
				4	Pankotuwa	3.24	10	2	8
				5	Veheragala	1.62	5	1	4
				6	Palupuliyankulama	11.33	33	7	26
						56.65	167	34	133
03. MEDAWACHCHIYA	01. MAKICHCHAWA	39	20	1	Timbiriwewa	8.50	1	0	1
				2	Dutuwewa	11.30	1	0	1
				3	Etambagaswewa	37.60	3	1	2
				4	Mahameegaskaada	8.10	1	0	1
				5	Kudmeegaskada	6.50	1	0	1
				6	Mahadivulgaskada	22.70	2	0	2
				7	Kudadivulgaskada	1.80	0	0	0
				8	Palugollewa	2.40	0	0	0
				9	Puhuduwula	15.80	1	0	1
				10	Makichchawa	43.30	4	1	3
				11	Nugawewa	1.80	0	0	0
				12	Wedikkarayagewewa	2.00	0	0	0
				13	Kadawatha	3.40	0	0	0
				14	Kongollewa kudawewa	2.80	0	0	0
				15	Rathmalwetiya	2.40	0	0	0
				16	Aluth halmillewa	55.00	5	1	4
						225.40	19	3	16

[redacted]

DETAILED WELL RECOMMENDATION

NORTH CENTRAL PROVINCE OF SRI LANKA

D.S. DIVISION	CASCADES NAME	RECOM. WELLS	POSSIBLE WELLS 50%		NAME OF TANK	TANK AREA ha.	WELL RECOMENDATIONS TANK	Catchment 20%	Command 80%
03. MEDAWACHCHIYA	10. MARUTHAMADU	NOT RECOMMENDED FOR MORE WELLS							
Contd.,	23. PARANAHALMILLEWA	NOT RECOMMENDED FOR MORE WELLS							
	24. KONGOLLEWA	234	117	1	Malwila	1.00	1	0	1
				2	Diwulwewa	2.80	2	0	2
				3	Galegama	23.90	20	4	16
				4	Panwewa	1.40	1	0	1
				5	Kongollewa	23.10	20	4	16
				6	Lolugaskada	16.60	14	3	11
				7	Kongollewa kudawewa	2.80	2	0	2
				8	Rathmalwetiya	2.60	2	0	2
				9	Aluthhalmillewa	53.80	46	9	37
				10	Kuda Indigollewa	1.40	1	0	1
				11	Indigollewa	8.10	7	1	6
						137.50	**116**	**21**	**95**
04. NUWARAGAMPALATHA CENTRAL	06. TAMMANNEWA	180	90	1	Ihala Diganagama	17.80	11	2	9
				2	Pahala Diganagama	22.70	13	3	10
				3	Ihala Madurupitiya	16.20	10	2	8
				4	Madurupitiya	8.90	5	1	4
				5	Elayapattuwa	62.70	37	7	30
				6	Wetiwewa	2.60	2	0	2
				7	Midellawewa	3.40	2	0	2
				8	Ihala Tammanna Kulama	3.20	2	0	2
				9	Tammanne Kulama	5.70	3	1	2
				10	Pahala wewa	5.30	3	1	2
				11	Kudamenikkadullewewa	4.50	3	1	2
						153.00	**91**	**18**	**73**
	07. GALPOTTEGAMA	211	106	1	Ralapanawa	6.90	6	1	5
				2	Katukeliyawa	8.10	7	1	6
				3	Kurrukkankulama	23.10	20	4	16
				4	Ihala Palugaswewa	7.70	7	1	6
				5	Pahala Palugaswewa	7.10	6	1	5
				6	Hinguraggama	10.10	9	2	7
				7	Rambawela Amuna	1.80	2	0	2
				8	Gale wewa	2.60	2	0	2
				9	Walaththewa	4.70	4	1	3
				10	Galpoththegama	42.10	37	7	30
				11	Gurudiyawewa	5.30	5	1	4
						119.50	**105**	**19**	**86**
	18. GALKADAWALA	245	123	1	Ihala Halmillewa	2.00	2	0	2
				2	Pahala Halmillewa	4.50	4	1	3
				3	Kerambage	13.80	12	2	10
				4	Ihala kuda wewa	3.20	3	1	2
				5	Pahala Kuda wewa	1.60	1	0	1
				6	Paresangale wewa	8.90	8	2	6
				7	Meda wewa	5.70	5	1	4
				8	Ihal Indukketiyawa	4.50	4	1	3
				9	Galkadawala	76.10	66	13	53
				10	Panekkewa	1.40	1	0	1
				11	Kadugama	0.80	1	0	1
				12	Ihala Halmille Kulama	1.00	1	0	1
				13	Nindagama	1.80	2	0	2
				14	Pahala Halmillewa	3.60	3	1	2
				15	Wane wewa	2.40	2	0	2
				16	Ihala Demata wewa	0.90	1	0	1
				17	Pahala Demata wewa	1.20	1	0	1
				18	Ihala Thalakola wewa	1.00	1	0	1
				19	Thalakola wewa	4.00	4	1	3
				20	Ihala Lolugas wewa	0.80	1	0	1
				21	Lolugas wewa	2.00	2	0	2
				22	Heenuk wewa	0.80	1	0	1
						142.00	**126**	**23**	**103**

Table 6.4 Recommended well distribution among different tank environments

DETAILED WELL RECOMMENDATION

NORTH CENTRAL PROVINCE OF SRI LANKA

D.S. DIVISION	CASCADES NAME	RECOM. WELLS	POSSIBLE WELLS 50%		NAME OF TANK	TANK AREA ha.	WELL RECOMENDATIONS TANK	Catchment 20%	Command 80%
04. NUWARAGAMPALATHA CENTRAL Contd.,	22. BELLANKADAWALA	199	100	1	Ihalakudawewa	9.88	3	1	2
				2	Kudagama	11.12	3	1	2
				3	Tammannewa	36.06	9	2	7
				4	Galkulama	9.88	3	1	2
				5	Gambirigswewa	93.86	24	5	19
				6	Bandiyawewa	5.93	2	0	2
				7	Kudagambirigaswewa	7.90	2	0	2
				8	Kudabellankadawala	9.88	3	1	2
				9	Bellankadawala	89.91	23	5	18
				10	Siyambalawa	27.91	7	1	6
				11	Kuda Tammannewa	16.06	4	1	3
				12	Kadahathgama	21.96	6	1	5
				13	Diwulwewa	51.87	13	3	10
						392.24	**102**	**22**	**80**
05. MAHA WILACHCHIYA	03. DUNUMADALEWA	216	108	1	Siwalapitiya	39.66	50	10	40
				2	Palugama	6.48	8	2	6
				3	Ihalawewa	7.28	9	2	7
				4	Kadurupitiya	31.97	40	8	32
						85.39	**107**	**22**	**85**
	12. SANDAMAL ELIYA	NOT RECOMMENDED FOR MORE WELLS							
07. RAJANGANA	01 IHALA THAMMENNAWA	215	108	1	Viharagodellewewa	7.30	34	7	27
				2	Puhudiwulwewa	5.30	25	5	20
				3	IhalaTammannewa	10.50	49	10	39
						23.10	**108**	**22**	**86**
10. NUWARAGAMPALATHA EAST	05. KUDAKALATHTHEWA	163	82	1	Kudasattambikulama	2.20	3	1	2
				2	Sattambikulama	2.00	3	1	2
				3	Teriyankulama	16.20	21	4	17
				4	Palugaswewa	4.00	5	1	4
				5	Nelunkanniya	20.20	26	5	21
				6	Halmillewa	2.20	3	1	2
				7	Kudakalaththewa	16.20	21	4	17
						63.00	**82**	**17**	**65**
11. MIHINTALE	01 UKKULANKULAMA	203	102	1	Pudukkulama	10.10	15	3	12
				2	Konwewa	6.50	10	2	8
				3	Tammannewa	3.60	6	1	5
				4	Ukkulankulama	21.40	33	7	26
				5	Siyambalawewa	2.00	3	1	2
				6	Kudagamawewa	2.80	4	1	3
				7	Sangilikulama	20.20	31	6	25
						66.60	**102**	**21**	**81**
	08. MAHAKIRINDEGAMA	181	91	1	Wellamorana	13.00	9	2	7
				2	Ethapitiyawa	4.90	3	1	2
				3	Katukeliyawa	17.80	12	2	10
				4	Kudakirindegama	10.50	7	1	6
				5	Elappankulama	8.90	6	1	5
				6	Siyambalagaswewa	6.10	4	1	3
				7	Katupotha	39.10	26	5	21
				8	Humbasbendawewa	7.30	5	1	4
				9	Mahakirindegama	30.80	20	4	16
						138.40	**92**	**18**	**74**
	10. KATUPOTHA	331	166	1	Ihala Kidapolagama	4.50	6	1	5
				2	Pahala Kidapolagama	6.90	10	2	8
				3	Galatabendawewa	2.60	4	1	3
				4	Muqappalliya	5.30	8	2	6
				5	Ginigalwewa	2.60	4	1	3
				6	Maradankalla	31.60	45	9	36
				7	Elapathwewa	2.60	4	1	3
				8	Mannakkulama	11.30	16	3	13
				9	Kadirikkulama	42.10	60	12	48
				10	Gal Kulama	2.60	4	1	3
				11	Punchi Kulama	3.60	5	1	4
						116.10	**166**	**34**	**132**

Table 5.4. Recommended well distribution among different tank environments

DETAILED WELL RECOMMENDATION

NORTH CENTRAL PROVINCE OF SRI LANKA

D.S. DIVISION	CASCADES NAME	RECOM. WELLS	POSSIBLE WELLS 50%	NAME OF TANK	TANK AREA ha.	WELL RECOMENDATIONS TANK	Catchment 20%	Command 80%
11. MIHINTALE Contd.,	11. MANKULAMA	140	70	1 Kahapathwilagama	14.60	9	2	7
				2 Kahapathwila pahala	5.30	3	1	2
				3 Kudanochchikulama	6.50	4	1	3
				4 Mankulama	15.80	10	2	8
				5 Kapapuwewa	14.60	9	2	7
				6 Pallankulama	8.90	5	1	4
				7 Mudirippuwewa	16.20	10	2	8
				8 Mahanochchikulama	26.30	16	3	13
				9 Sooppugala	6.50	4	1	3
					114.70	**70**	**15**	**65**
	12. MAHARAMBEWA	230	115	1 Wewahenawewa	1.42	1	0	1
				2 Elapathwewa	1.32	1	0	1
				3 Dematawewa	13.35	11	2	9
				4 Katukeliyawa	14.54	12	2	10
				5 Karuwalagaswewa	2.43	2	0	2
				6 Ihalahinguruwewa	12.55	11	2	9
				7 Kirimetiyawa	2.43	2	0	2
				8 Maharambewa	16.99	14	3	11
				9 Nikawewa	4.45	4	1	3
				10 Kittambugama	21.85	18	4	14
				11 Bogahawewa	2.02	2	0	2
				12 Kaletirappane	42.89	36	7	29
					136.24	**114**	**21**	**93**
12. RAMBEWA	10. KAPIRIKGAMA	204	102	1 Mailagammana wewa	7.30	3	1	2
				2 Palugonamariawa	6.50	3	1	2
				3 Kona Kumbuk wewa	19.40	8	2	6
				4 Puliyankulama	2.40	1	0	1
				5 Maha Kadiyawa	4.90	2	0	2
				6 Kuda Kadiyawa	2.40	1	0	1
				7 Peenagama	21.90	9	2	7
				8 Kuda Peenagama	4.90	2	0	2
				9 Aluketiwala	10.50	4	1	3
				10 Aluth wewa	19.40	8	2	6
				11 Kohombagaswewa	6.50	3	1	2
				12 Galkadawala	24.30	9	2	7
				13 Karuwalagas wewa	3.20	1	0	1
				14 Messalewa	21.00	8	2	6
				15 Kapiriggama	92.30	36	7	29
				16 Penikewewa	12.90	5	1	4
				17 Andarawewa	4.00	2	0	0
					263.80	**105**	**22**	**81**
	11. PIHIMBIYAGOLLEWA	NOT RECOMMENDED FOR MORE WELLS						
	14. KENDAWA	207	104	1 Weddewawewa	5.67	5	1	4
				2 Kendewa	31.56	29	6	23
				3 Kendewa kudawewa	6.07	6	1	5
				4 Diwulgahawewa	2.43	2	0	2
				5 Poradutugama	4.05	4	1	3
				6 Kudawewa	2.43	2	0	2
				7 Ehetuwegama	8.90	8	2	6
				8 Siyambalagaswewa	48.56	45	9	36
				9 Aluthwewa	3.04	3	1	2
					112.71	104	21	83

Table 5.4 Recommended well distribution among different tank environments

DETAILED WELL RECOMMENDATION

NORTH CENTRAL PROVINCE OF SRI LANKA

D.S. DIVISION	CASCADES NAME	RECOM. WELLS	POSSIBLE WELLS 50%		NAME OF TANK	TANK AREA ha.	WELL RECOMENDATIONS TANK	Catchment 20%	Command 80%
13. KAHATAGASDIGILIYA	04. HAMILLEWA	35	18	1	Mahakulumwakkada	16.99	1	0	1
				2	Ihalakanhindigama	8.70	1	0	1
				3	Pahalakanhindigama	12.55	1	0	1
				4	Konwewa	1.42	0	0	0
				5	Panbattiya	5.87	0	0	0
				6	Ambagahawewa	7.69	0	0	0
				7	Nikawewa	4.45	0	0	0
				8	Kaluwaragaswewa	1.42	0	0	0
				9	Madayakade	2.23	0	0	0
				10	Amunuwettiya	9.51	1	0	1
				11	Rambewewa	3.64	0	0	0
				12	Thalgahapothana	23.27	1	0	1
				13	Ulpathwewa	3.03	0	0	0
				14	Kuda Gaikandegama	7.65	0	0	0
				15	Gaikandegama	4.05	0	0	0
				16	Ihalahalmillewa	13.35	1	0	1
				17	Weliwewa	5.06	0	0	0
				18	Aluthwewa	3.84	0	0	0
				19	Dachchihalmillewa	27.11	2	0	2
				20	Pahalawewa	3.04	0	0	0
				21	Mahahamillewa	67.58	4	1	3
				22	Kudahettiwewa	5.67	0	0	0
				23	Hettiyawa	8.49	1	0	1
				24	Kirihapuwewa	2.43	0	0	0
				25	Wirangollewa	10.52	1	0	1
				26	Weliwewa	2.43	0	0	0
				27	Diyamillagaswewa	38.44	2	0	2
				28	Welanawewa	8.90	1	0	1
						309.33	17	1	16
	06. RANPATHWILA	NOT RECOMMENDED FOR MORE WELLS							
	10. GANGUREWA	NOT RECOMMENDED FOR MORE WELLS							
	11. MAHAKIRIMETIYAWA	78	39	1	Nikawewa	18.62	5	1	4
				2	Meegaswewa	6.07	2	0	2
				3	Nikakatuwewa	2.43	1	0	1
				4	Palugahagodawala	1.42	0	0	0
				5	Dahanekawewa	31.97	9	2	7
				6	Katorewa	3.24	1	0	1
				7	Dikwewa	2.83	1	0	1
				8	Wessiyaddewawewa	7.69	2	0	2
				9	Mukariyawa	21.85	6	1	5
				10	Kirimetikonwewa	9.31	3	1	2
				11	Rambewala	0.61	0	0	0
				12	Timbiriwewa	1.21	0	0	0
				13	Mahaweligollewa	4.45	1	0	1
				14	Kudaweligollewa	3.24	1	0	1
				15	Puliyankulama	1.21	0	0	0
				16	Mahakirimetiyawa	26.71	7	1	6
				17	Kiralegala Tottame	1.21	0	0	0
						144.07	39	6	33
	16. PANDARELLEWA	75	38	1	Kirimetiyawa	9.31	1	0	1
				2	Tharanagollewa	5.67	1	0	1
				3	Timbiriwewa	14.16	2	0	2
				4	Kumbukwewa	28.33	4	1	3
				5	Kayangollewa	0.91	0	0	0
				6	Talakoa wewa	8.90	1	0	1
				7	Pandithayawewa	4.76	1	0	1
				8	Palugaswewa	2.83	0	0	0
				9	Miminnawala	27.11	4	1	3
				10	Ambagahawewa	15.38	2	0	2
				11	Kurinnamkulama	5.67	1	0	1
				12	Aluthwewa	18.21	3	1	2
				13	Ihalagama	6.47	1	0	1
				14	Madurugoda	2.83	0	0	0
				15	Panwella	45.32	7	1	6
				16	Pandarellewakuda	2.02	0	0	0
				17	Pandarellewa	44.92	7	1	6
				18	Viharawewa	2.02	0	0	0
				19	Rathmalgaha	6.07	1	0	1
				20	KudaRathamagaha	1.21	0	0	0
						252.10	36	5	31

Table 5.4 Recommended well distribution among different tank environments

DETAILED WELL RECOMMENDATION

NORTH CENTRAL PROVINCE OF SRI LANKA

D.S. DIVISION	CASCADES NAME	RECOM. WELLS	POSSIBLE WELLS 50%	NAME OF TANK	TANK AREA ha.	WELL RECOMMENDATIONS TANK	Catchment 20%	Command 80%
13. KAHATAGASDIGILIYA Contd.	18. NELLUGOLLEKADA	144	72	1 Kurunduwewa	5.90	2	0	2
				2 Kurundugaswewa	9.30	3	1	2
				3 Weddewewa	1.60	1	0	1
				4 Ihalagama	5.30	2	0	2
				5 Kumbukgollewa	30.20	10	2	8
				6 Kodinnewa	12.10	4	1	3
				7 Digatipotana	27.90	9	2	7
				8 Nelugollakada	36.40	12	2	10
				9 Eswahawedunwewa	6.10	2	0	2
				10 Moragoda	9.30	3	1	2
				11 Wahagapuwewa	54.20	18	4	14
				12 Kudawewa	5.70	2	0	2
				13 Kendagaswewa	3.60	1	0	1
				14 Galgewewa	3.60	1	0	1
				15 Kayangollewa	5.90	2	0	2
					217.10	**72**	**13**	**59**
14. HOROWPATHANA	03. DUTUWEWA	233	117	1 Kirikongollewa	3.20	2	0	2
				2 Atuannawa	10.50	7	1	6
				3 Ambagaswewa	61.50	40	8	32
				4 Dikwewa	7.30	5	1	4
				5 Dutuwewa	79.30	51	10	41
				6 Palugaswewa	19.40	13	3	10
					181.20	**118**	**23**	**95**
	14. PULIYANKADAWALA	141	71	1 Siyambelawa	7.90	1	0	1
				2 Ulpath wewa	29.89	5	1	4
				3 Kongasyaya	3.95	1	0	1
				4 Kimbulpitiyawa	69.90	11	2	9
				5 Wassallagama	9.88	2	0	2
				6 Palugas wewa	5.93	1	0	1
				7 Timbiri wewa	4.94	1	0	1
				8 Welan wewa	5.93	1	0	1
				9 Ramba wewa	11.12	2	0	2
				10 Muwapenna wewa	17.04	3	1	2
				11 Aluthgama	2.96	1	0	1
				12 Meykonda (Ebri)	100.04	16	3	13
				13 Kanhindewa	76.08	12	2	10
				14 Puliyankada Ramba	7.90	1	0	1
				15 Puliyankadawla	54.09	9	2	7
				16 Galhiriyawa	6.92	1	0	1
				17 Kendabe wewa	33.10	5	1	4
					447.67	**73**	**12**	**61**
	19. DEMETAWEWA	76	38	1 Nitulgollewa	24.95	3	1	2
				2 Bellankadawala	27.91	3	1	2
				3 Marandamadua	41.99	5	1	4
				4 Ihala Halmillegala	28.90	4	1	3
				5 Pahala Halmillegala	23.96	3	1	2
				6 Ihala Demata wewa	12.10	2	0	2
				7 Demata wewa	58.05	7	1	6
				8 Panuwannagama	25.94	3	1	2
				9 Ihala Hapitiyagama	17.04	2	0	2
				10 Pahala Hapitiyagama	49.89	6	1	5
					310.73	**38**	**8**	**30**
	21. DIYATITHTHAWEWA	182	91	1 Talapth Kulama	57.06	15	3	12
				2 Diyatiththwewa	30.88	8	2	6
				3 Amunuwetiya	9.88	3	1	2
				4 Angunachchiya	91.88	24	5	19
				5 Katupothana	30.88	8	2	6
				6 Panditthayagame	9.88	3	1	2
				7 Bandara Kumbukwewa	41.00	11	2	9
				8 Welahiddakudawewa	11.12	3	1	2
				9 Walahiddawewa	66.94	17	3	14
					349.62	**92**	**20**	**72**

Table 5.4 Recommended well distribution among different tank environments

DETAILED WELL RECOMMENDATION

NORTH CENTRAL PROVINCE OF SRI LANKA

D.S. DIVISION	CASCADES NAME	RECOM. WELLS	POSSIBLE WELLS 50%		NAME OF TANK	TANK AREA ha.	WELL RECOMENDATIONS TANK	Catchment 20%	Command 80%
15. GALENBINDUNU WEWA	04. ICHCHANKULAMA	291	146	1	Ihala Kainattama	25.89	34	7	27
				2	Tenkuttiyawewa	5.26	7	1	6
				3	Ketakelewa	1.42	2	0	2
				4	Kudawewa	2.02	3	1	2
				5	Mawathawewa	3.24	4	1	3
				6	Pahala Kainattama	32.40	43	9	34
				7	Kudawewa	1.32	2	0	2
				8	Amunewewa	2.43	3	1	2
				9	Palugaswewa	0.91	1	0	1
				10	Karakolawewa	14.57	19	4	15
				11	Ichchankulama	19.42	26	5	21
				12	Pahala Kudawewa	1.62	2	0	2
						110.60	146	29	117
	05. HIMBUTUGOLLEWA	NOT RECOMMENDED FOR MORE WELLS							
	10. SIVALAKULAMA	119	60	1	Batalawewa	6.07	2	0	2
				2	Ihalaaliyawetunuwewa	9.71	3	1	2
				3	Pahalaaliyawetunu	7.28	2	0	2
				4	Palugollewa	25.01	7	1	6
				5	Weragala	1.62	0	0	0
				6	Aluthwewa	2.83	1	0	1
				7	Muriyakadawala	32.37	8	2	6
				8	Ihala Punchikulama	4.85	1	0	1
				9	Sembige wewa	3.24	1	0	1
				10	Rambewewa	4.86	1	0	1
				11	Wembuwewa	15.78	4	1	3
				12	Kudawembukulam	2.43	1	0	1
				13	Mahagalkulam	1.62	0	0	0
				14	Thamarakulama	36.42	9	2	7
				15	Aruccuwewa	5.67	2	0	2
				16	Kuratiyawewa	1.21	0	0	0
				17	Aralu	18.62	5	1	4
				18	Sivalakulama	32.37	8	2	6
				19	Ihalagalwaduwagama	0.41	0	0	0
				20	Pahalagalwaduwagama	12.94	3	1	2
				21	Pussellagama	4.45	1	0	1
						229.76	59	11	48
	11. KARUWALAGASWEWA	302	151	1	Indiwewa	2.83	15	3	12
				2	Ihalakaluwaragaswewa	6.47	32	6	26
				3	Pahalakaluwaragas	3.24	16	3	13
				4	Rambawala	3.24	16	3	13
				5	Ihalagalkulama	2.83	14	3	11
				6	Karambegama	11.44	57	11	46
	13. THAMMENNAWA	NOT RECOMMENDED FOR MORE WELLS				30.16	150	29	121
	17. DIWULWEWA	134	67	1	Kawarakkulama	2.02	1	0	1
				2	Pansalwewa	1.42	1	0	1
				3	Dambaulpatha	2.33	1	0	1
				4	Nelunwewa	7.28	3	1	2
				5	Kumbukwewa	2.23	1	0	1
				6	Belikuluma	5.26	2	0	2
				7	Grandiulpotha	3.64	1	0	1
				8	Kurinnankulama	3.87	1	0	1
				9	Tammannawaulpatha	3.44	1	0	1
				10	Ihalanithulgollewa	2.23	1	0	1
				11	Pahalanithulgollewa	7.69	3	1	2
				12	Diwulwewa	151.75	52	10	42
				13	Samagiwewa	1.52	1	0	1
				14	Meegaswewa	1.92	1	0	1
						196.60	70	12	58
16. THIRAPPANE	04. MAHAKANAMULLA	NOT RECOMMENDED FOR MORE WELLS							
	06. ULAGALLA	NOT RECOMMENDED FOR MORE WELLS							

Table 5.4. Recommended well distribution among different tank environments

DETAILED WELL RECOMMENDATION

NORTH CENTRAL PROVINCE OF SRI LANKA

D.S. DIVISION	CASCADES NAME	RECOM. WELLS	POSSIBLE WELLS 50%	NAME OF TANK	TANK AREA ha.	WELL RECOMENDATIONS TANK	Catchment 20%	Command 80%
16. THIRAPPANE Contd.,	08. PAHALA AMBATALE	193	97	1 Madugahawewa	16.06	11	2	9
				2 Siyambalawewa	3.95	3	1	2
				3 Timbiriwewa	2.96	2	0	2
				4 Alagollewa	24.95	17	3	14
				5 Pandithwewa	15.07	10	2	8
				6 Ihala Ambatale	18.03	12	2	10
				7 Pahala Ambatale	50.88	34	7	27
				8 Kudawewa	7.90	5	1	4
				9 Wirandagollewa	4.94	3	1	2
					144.74	**97**	**19**	**78**
	16. WANNANKULAMA	226	113	1 Ihalasiyambalawa	8.40	8	2	6
				2 Siyambalawa	27.91	28	6	22
				3 Uttimaduwa	21.80	22	4	18
				4 Berandiyagama	2.96	3	1	2
				5 Konwewa	18.03	18	4	14
				6 Wannankulama	31.86	32	6	26
				7 Nikaawewa	3.46	3	1	2
					114.42	**114**	**24**	**90**
17. PALUGASWEWA	01. MAHADIWULWEWA	147	74	1 Kumbukkadawala	2.80	2	0	2
				2 Ulpothwewa	2.40	2	0	2
				3 Pangurugaaswewa	4.90	3	1	2
				4 Maha Diwulwewa	78.90	48	10	38
				5 Indigas wewa	4.90	3	1	2
				6 Konwewa	19.60	12	2	10
				7 Kudakonwewa	6.50	4	1	3
					120.00	**74**	**15**	**59**
	08. PALUGASWEWA	228	114	1 Palugaswewa	24.70	8	2	6
				2 Elapathwewa	9.70	3	1	2
				3 Yakhandagaswewa	11.70	4	1	3
				4 Maha Borupanwila	10.90	4	1	3
				5 Diyamalan wewa	6.10	2	0	2
				6 Borupanwilawewa	6.70	2	0	2
				7 Kudalugaswewa	5.30	2	0	2
				8 Udakadawalawewa	45.70	15	3	12
				9 Kapugama	3.20	1	0	1
				10 Dumbullagala	2.40	1	0	1
				11 Thalakolawewa	2.80	1	0	1
				12 Horiwilawewa	218.50	72	14	58
					347.70	**115**	**22**	**93**
	10. WERAGALA	225	113	1 Weragala	23.96	21	4	17
				2 Rota wewa	20.01	17	3	14
				3 Indipitiya	6.92	6	1	5
				4 Haba Diwul wewa	41.00	35	7	28
				5 Gambirigas wewa	6.92	6	1	5
				6 Ihala wewa	7.90	7	1	6
				7 Eppawala wewa	16.06	14	3	11
				8 Milla Ulpothawewa	8.89	8	2	6
					131.66	**114**	**22**	**92**
21. PALAGALA	02. HAMMILLEWA	219	110	1 Wadugewewa	1.62	3	1	2
				2 Aliyamalgala	2.83	5	1	4
				3 Siyambalawewa	3.24	6	1	5
				4 Wedinigama	2.83	5	1	4
				5 Halmillewa	11.33	20	4	16
				6 Ihalabamunugama	8.90	16	3	13
				7 Karawilagala	13.76	25	5	20
				8 Galketiyagama	6.47	12	2	10
				9 Pahalabamunugama	2.43	4	1	3
				10 Kudahettiyagama	1.62	3	1	2
				11 Mirihanpitiya	3.64	7	1	6
				12 Mahahettigama	2.43	4	1	3
					61.30	**110**	**22**	**88**
	03. MEEGASWEWA	NOT RECOMMENDED FOR MORE WELLS						

Table 5.4. Recommended well distribution among different tank environments

Total 3591

6. POSSIBLE ENVIRONMENTAL IMPACTS DUE TO AGRO-WELLS

Since number of agro-wells is increasing continuously, over exploration of ground water through agro-wells can become problem in the future. It should be noted that more and more water is pumped during dry season and most of it is lost due to evaporation in the fields. Some chemical parameters have also shown increasing in concentration since construction of some wells indicating a trend leading to salinization of ground water in the dry zone of Sri Lanka.

References

Cooray, P.G. (1984)., "An introduction to geology of Sri Lanka". Sri Lanka Museum Publication.

Dharmasena, P.B. (1995).,"Integrated Water Resource Management Approach for Efficient use of Shallow ground water". [unpublished]

Institute of Hydrogeology (1978), Victoria Project, "Report on hydrological analysis" for Sir. Alexander Gibb and partners.

National Water Supply and Drainage Board (1995).,"Ground water monitoring programme status report, Anuradhapura".

National Water Supply and Drainage Board (1993).,"Ground water depletion in Anuradhapura district". [unpublished]

Senaratne, A. (1996).,"IFAD/IIMI Report No.1". [unpublished]

Dissanayake, C.B. (1992).,"A decade of hydrogeological contributions to community development in Sri Lanka". Jour. Geol. Soc. SL., 4;3-10.

"Natural Resources of Sri Lanka" (1991)., A report prepared for the Natural Resources, Energy and Science Authority of Sri Lanka (USAID) 279p.

Panabokke, C.R.(1959).,"A study of some soils in the dry zone of Ceylon", Soil Science, 87(2) 67-74.

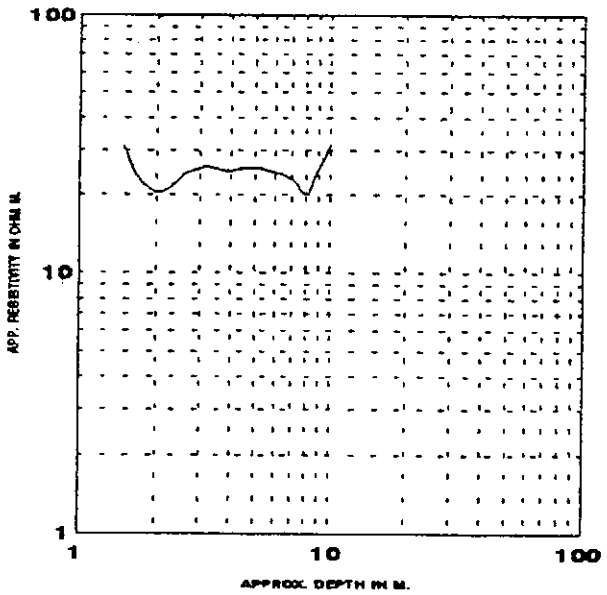
Appendix A - Resistivity graphs

HYDROGEOLOGICAL / GEOPHYSICAL SURVEY

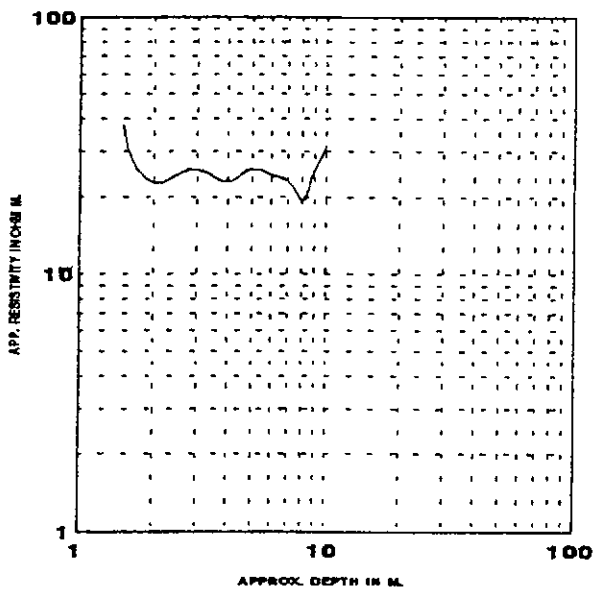
IFAD/NCP/IIMI/1996

RESISTIVITY DATA ANALYSIS

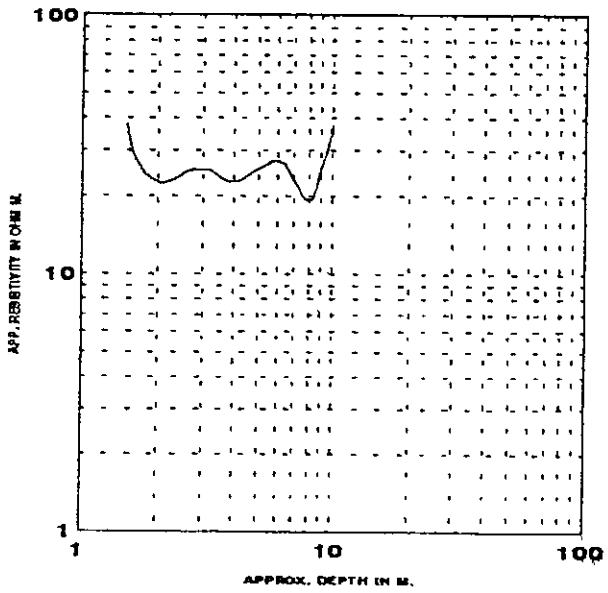
D.S. 03. MEDAWACHCHIYA
CASCADE: 23. PARANAHALMILLEWA



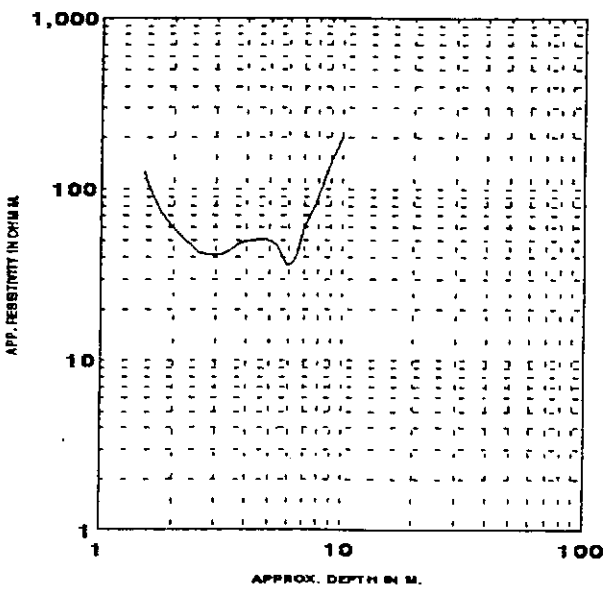
D.S. 11. MIHINTALE
CASCADE: 11. MANKULAMA



D.S. 12. RAMBEWA
CASCADE: 11. PIHIMBIYAGOLLEWA



D.S. 03. MEDAWACHCHIYA
CASCADE 01: MEKICHCHAWA

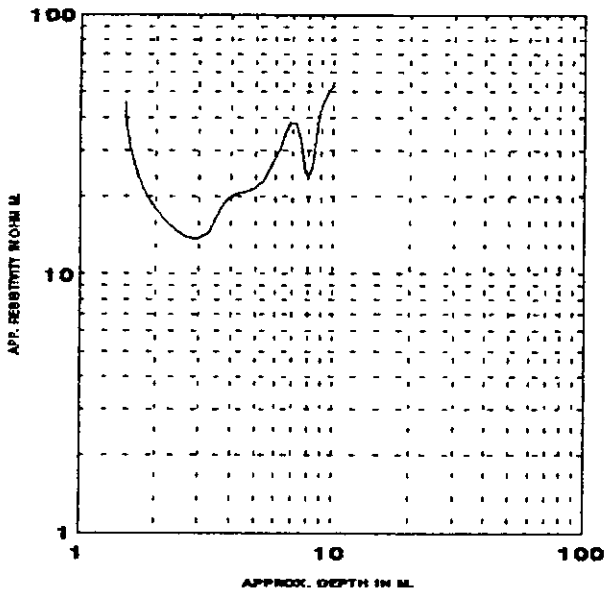


HYDROGEOLOGICAL / GEOPHYSICAL SURVEY

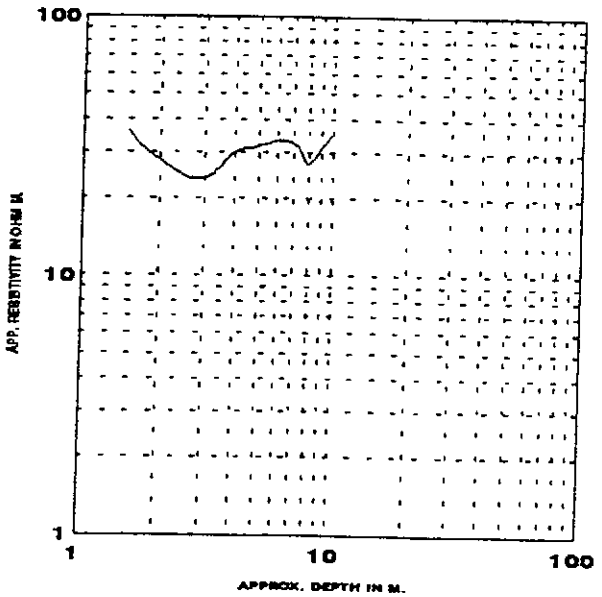
IFAD/NCP/IIMI/1998

RESISTIVITY DATA ANALYSIS

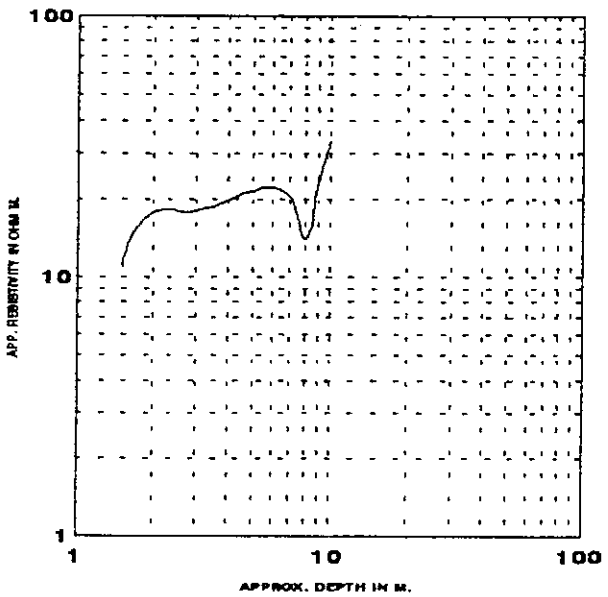
D.S. 04. NUWARAGAMPALATHA CENTRAL
CASCADE 07: GALPOTTEGAMA



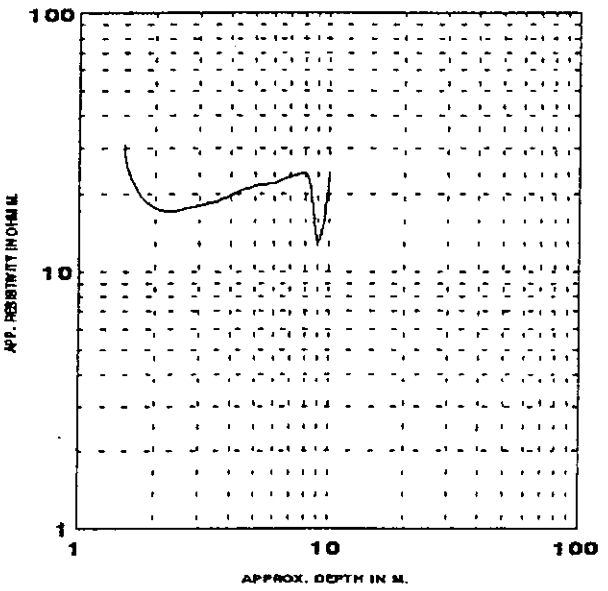
D.S. 04. NUWARAGAMPALATHA CENTRAL
CASCADE 22: BELLANKADAWALA



D.S. 04: NUWARAGAMPALATAHA CENTRAL
CASCADE 06: TAMMANNEWA



D.S. 02: RAMBEWA
CASCADE 14: KENDEWA

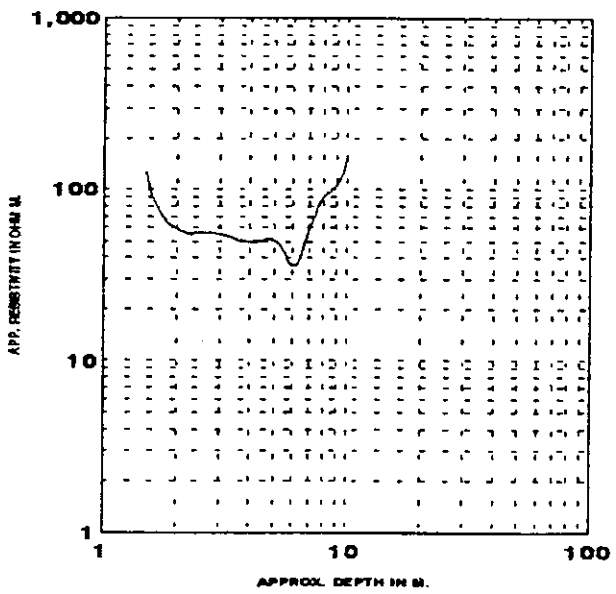


HYDROGEOLOGICAL / GEOPHYSICAL SURVEY

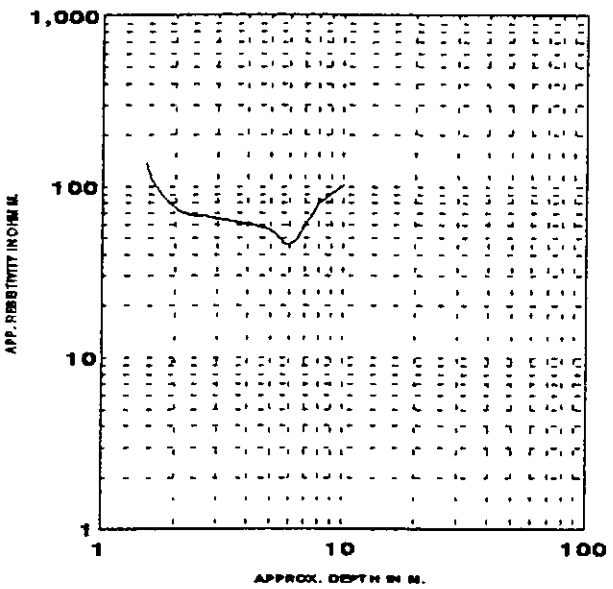
IFAD/NCP/IIMI/1996

RESISTIVITY DATA ANALYSIS

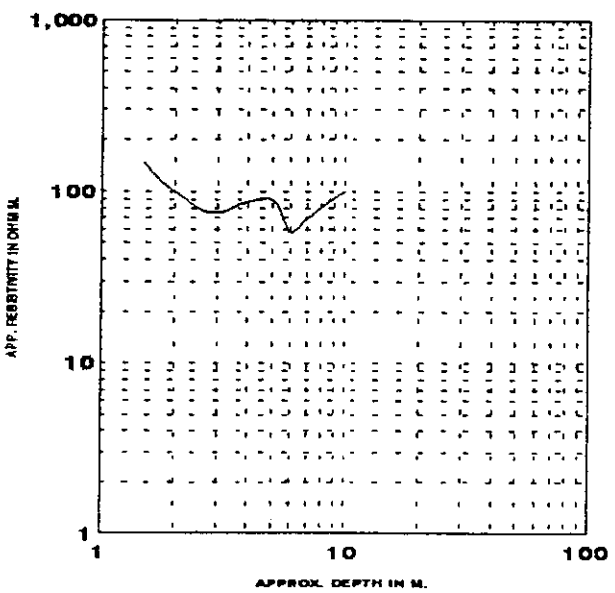
D.S. 06. HOROWPATHANA
CASCADE 19: DIYATITHTHAWEWA



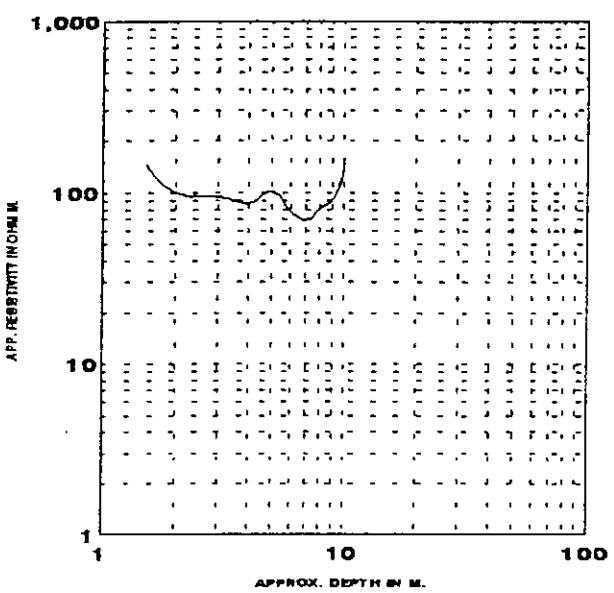
D.S. 06. HOROWPATHANA
CASCADE 03: DUTUWEWA



D.S. 17. PALUGASWEWA
CASCADE 01: MAHADIWULWEWA



D.S. 17. PALUGASWEWA
CASCADE 08: PALUGAEWEWA

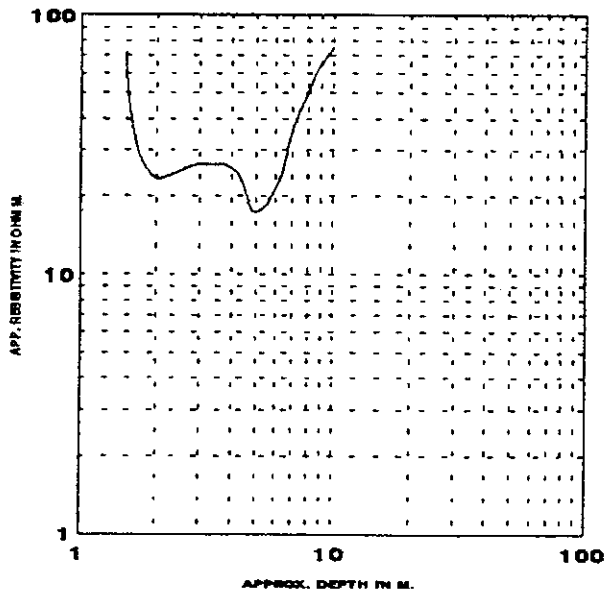


HYDROGEOLOGICAL / GEOPHYSICAL SURVEY

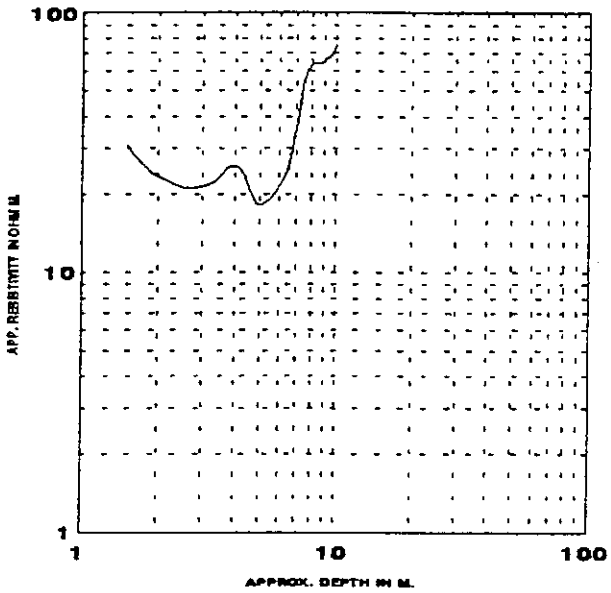
IEAD/NCP/IIMI/1996

RESISTIVITY DATA ANALYSIS

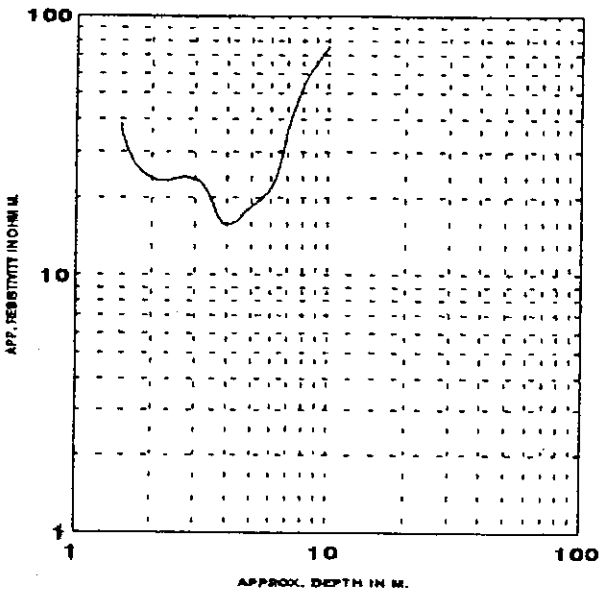
D.S. 11. MIHINTALE
CASCADE 10: KATUPOTHA



D.S. 11. MIHINTALE
CASCADE 12: MAHARAMBEWA



D.S. 15. GALENBINDUNUWEWA
CASCADE 13: TAMMANNEWA

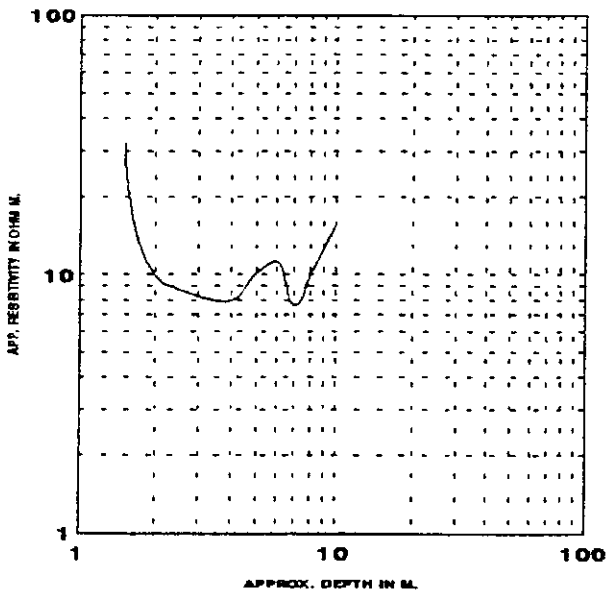


HYDROGEOLOGICAL / GEOPHYSICAL SURVEY

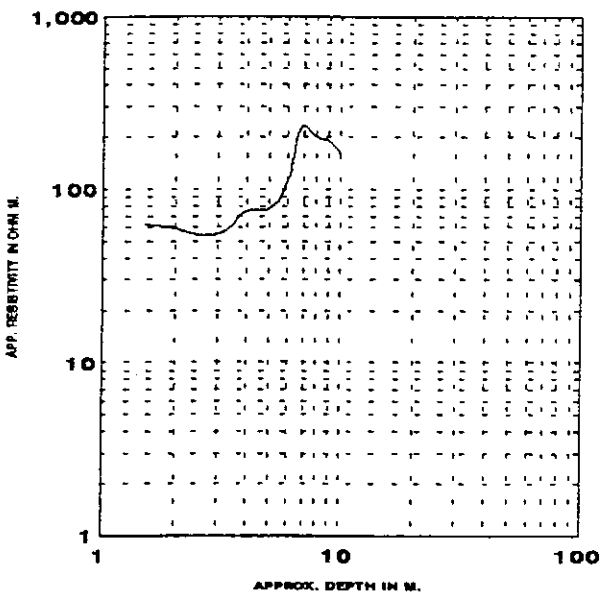
IFAD/NCP/IIMI/1996

RESISTIVITY DATA ANALYSIS

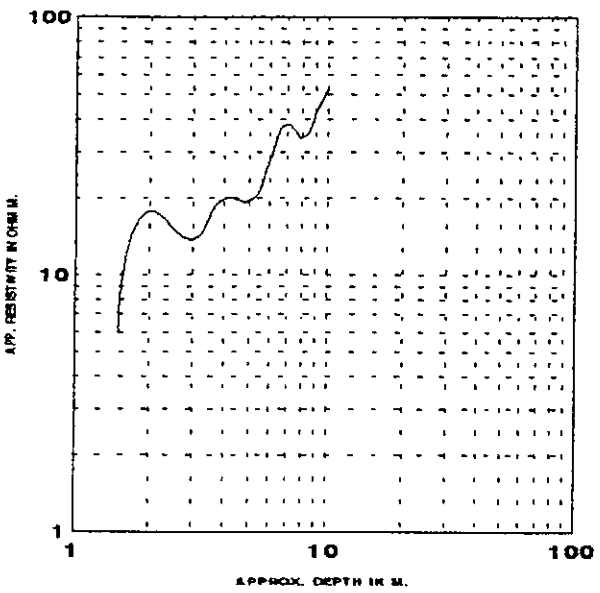
D.S. 10: NUWARAGAMPALATHA EAST
CASCADE 05: KUDAKALATHTHEWA /R1



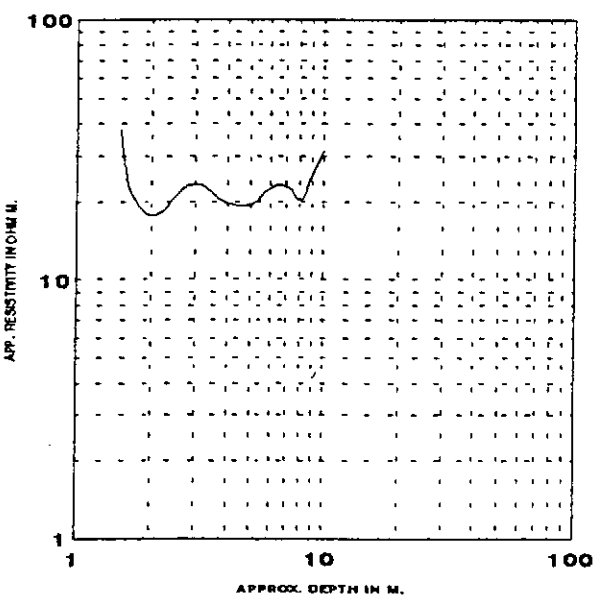
D.S. 10 : NUWARAGAMPALATHA EAST
CASCADE 05: KUDAKALATHTHEWA/R2



D.S. 03: MEDAWACHCHIYA
CASCADE 24: KONGOLLEWA/R1



D.S. 03: MEDAWACHCHIYA
CASCADE 24: KONGOLLEWA/R2

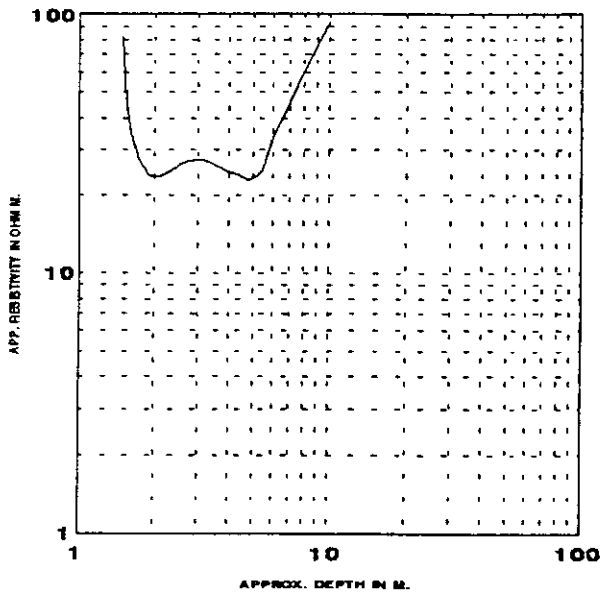


HYDROGEOLOGICAL / GEOPHYSICAL SURVEY

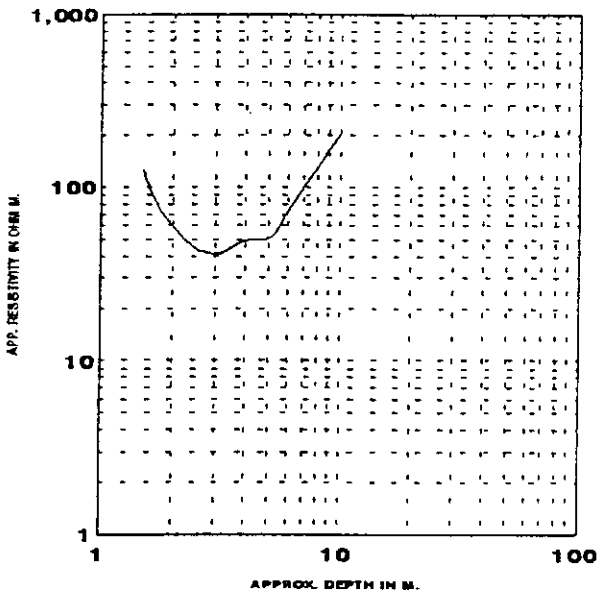
IFAD/NCP/IIMI/1996

RESISTIVITY DATA ANALYSIS

D.S. 01: PADAWIYA
CASCADE 01: NAWAGASWEWA/R1



D.S. 01: PADAWIYA
CASCADE 01: NAWAGASWEWA/R2



D.S. 03: MEDAWACHCHIYA
CASCADE 10: MARUTHAMADU/R1