ASSESSMENT OF GROUND WATER QUALITY OF PERAMBALUR AND ARIYALUR DISTRICTS, TAMIL NADU

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2013

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On

MANAGEMENT OF SALT AFFECTED SOILS AND USE OF SALINE WATER IN AGRICULTURE

Bulletin on

Assessment of Ground Water Quality of Perambalur and Ariyalur Districts, Tamil Nadu

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PREFACE

Water is essential for all forms of life, food production and economic development on this planet. Among the total water availability, only 0.5 % of water is available on earth surface making it more precious commodity on earth.

With the advancement in modern technologies and irrigation system, there is a tremendous pressure on groundwater quantity and quality. Monsoon failure, decline in storage capacities of tank due to encroachment leads to lowering of water table which in turn cause, sea water intrusion, the share of fresh water to Agriculture is decreasing, and hence farmers are forced to use available water irrespective of its quality. As a consequence, groundwater depth and quality are deteriorating at a alarming rate in many parts of the state. Quality of irrigation water is one of the main factors to be understood in irrigated Agriculture. Water used for irrigation varies greatly in quality depending upon type and quantity of dissolved salts. Injudicious irrigations even with good quality waters may also turn good soil into saline or alkaline condition. The use of saline water is unavoidable in areas where no alternate facility for irrigation is available. Such waters are being used knowing well that the quality of soil and yield of the crop would continuously decrease.

In the arid and semiarid regions, irrigation is essential for successful agriculture and in some areas particularly in arid zone, the main source of irrigation is groundwater that is usually saline with varying degree of salt concentration. Such waters have been in use for decades with adverse effects on soil productivity and crop growth.

Keeping all these in view and to combat these problems, this bulletin is prepared in comprehensive form which contains considerable information regarding the fluctuation and quality of groundwater being used by the farmers for irrigation purpose. In the present publication, Ground water quality of Perambalur and Ariyalur district of Tamil Nadu, attempts have been made to assess the quality of saline water, to categorize with respect to their suitability for crops and Soils. Also this bulletin is to update the relevant information and Technologies developed by the AICRP on management of Salt affected soils and use of saline water in agriculture, at Anbil Dharmalingam Agricultural College and Research Institute, Trichy have also been included for adoption by the farmers.

Inspiration and constant encouragement received from the Dean ADAC and RI, Trichy is greatly acknowledged. We express our deep sense of gratitude to Director, Central Soil Salinity Research Institute, Karnal 132 001, Haryana, India, Dr. S.K.Ambast, Project Coordinator, AICRP scheme on “Management of Salt Affected Soils and Use of saline water in Agriculture“ for their valuable guidance and financial assistance. Acknowledgment is also due to our colleagues working in the project for the help rendered by them. It is our sincere belief that this publication will be useful for the scientist, extension workers and farmers for managing saline water for sustainable crop production. We wish to record the gratitude to our field staff, office staff and all who rendered their support and services in various capacities throughout the preparation of this document.

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Date:27-05-2013

FOREWORD

Water is essential for all forms of life, food production and economic development. Only 0.5 % of water is available on earth surface making it more precious commodity on earth. The present trends of population dynamics, shrinking land holding and reduced water availability forces us to harness the available poor quality groundwater by evolving suitable technology and proper management practices. Due to overexploitation of groundwater, even the available water for irrigation is getting deteriorating in quality besides depletion in quantity.Utilization of such poor quality water buildup salinity, sodicity and toxicity in soils leading to low productivity. Hence it is inevitable to device proper irrigation management techniques. With the available information, groundwater quality of Tamil Nadu was already prepared by All India Coordinated research Project on management of salt affected soils, ADAC & RI, Trichy which is useful for macrolevel planning. Microlevel planning is also needed since each subgroup needs specific management practices at block level or village level. Hence an attempt has been made by the AICRP scientists at ADAC & RI, Trichy to evaluate specific management practices along with groundwater quality at block level. Adoption of these management practices by the farmers in the affected region will not only make it possible to obtain reasonable yields but save further degradation of land irrigated with such waters.The present bulletin on assessment of groundwater quality of Ariyalur and Perambalur district is very appropriate and would provide a stepping stone for enhancing the crop production and also for managing the poor quality water in the district.

I complement the authors for bringing out such a compilation of survey and management practices for poor quality water of Perambalur and Ariyalur districts of Tamil Nadu. I hope this publication will be useful not only to the farmers but also to the scientific community, developmental agencies and planners for enhancing the crop production with the available poor quality waters.

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1 INTRODUCTION

The importance of irrigation and its interlinking with agricultural prosperity was well understood. But presently Tamil Nadu is a water deficit state. The annual available water resource per capita in Tamil Nadu is estimated at 600 m^3, which is far below the national average of 2200 m^3. Due to overexploitation of ground water, even the available water for irrigation is getting deteriorated in quality besides depletion in quantity.

Indiscriminant use of poor quality water poses great risk to human and animal health, while deteriorating soil and environment. Utilization of such waters causes build up of salinity, sodicity and toxicity in soils impairing crop productivity and many a times turning land unfit for cultivation. In order to plan management strategies, there has been requirement of detailed survey of groundwater quality.

Information on chemical composition is necessary but this alone is not sufficient to decide its potential use for crop production at a specific location. Several other factors such as nature of crop to be grown, soil characteristics (texture and mineralogy), climate and other water management and cultural practices are equally important and should be taken into consideration. Based on the characteristic features of majority of ground waters in use by the farmers in different agro-ecological regions of the country and the above indices those describe the nature of hazards on soils and crops, irrigation water have been broadly grouped into four classes namely good, saline , alkali and toxic waters (AICRP – saline water,1991). By using the data base available with different agencies *viz.*, State Ground and Surface Water Resources Date Centre (SG & SWRDC) and Soil Testing Laboratories, Department of Agriculture and AICRP on management of salt affected soil, ground water quality of Tamil Nadu was already prepared by AICRP on Management of salt affected soils, ADAC& RI, Trichy (Fig 1). The water quality map of Tamil Nadu was prepared in 1:250,000 scale. The results indicated that 73.2% of water samples were found to be of good quality, 21.1% moderately saline and 5.7% were saline. Though this information will be useful for macro level planning, each subgroup needs specific management practices at micro level (block / village). Hence an attempt has been made to classify the ground water quality at revenue village / block level for each district of Tamil Nadu. In this process of ground water quality survey, Perambalur and Ariyalur districts were surveyed and classified.

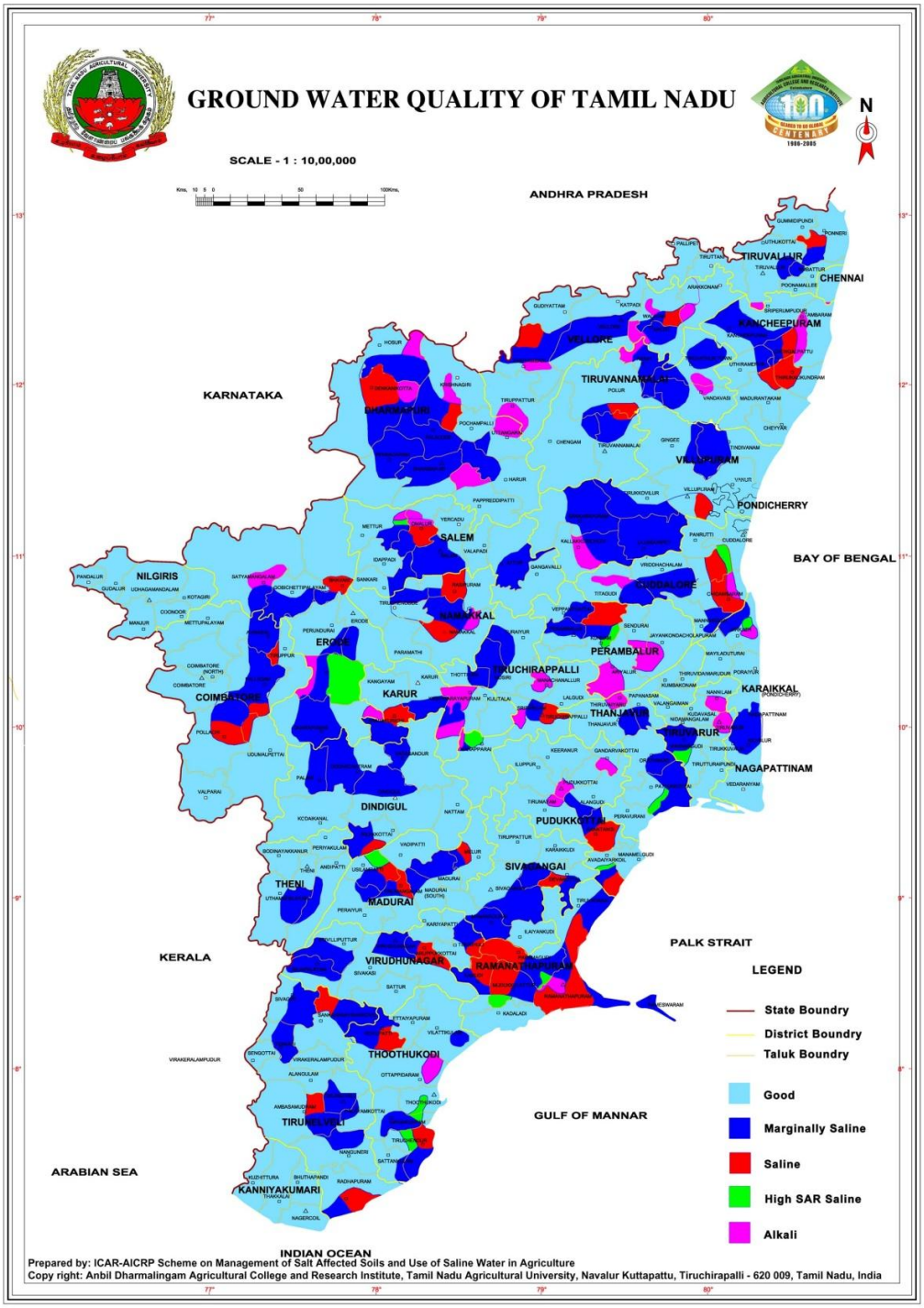


Fig.1 Ground water quality Map of Tamil Nadu

1.1. Location of Perambalur and Ariyalur District

Perambalur and Ariyalur districts are centrally located in Tamil Nadu (Fig 2) and are 267 KM away in southern direction from Chennai. Perambalur district is carved out from the erstwhile composite district of Tiruchirapalli with the headquarters at Perambalur. Later Perambalur district was bifurcated into two districts namely Perambalur distict with head quarters at Perambalur and Ariyalur distict with headquarters at Ariyalur. However the administrative set up towards agricultural activities is being operated combinedly with headquarters at Perambalur.

The landscape of composite Perambalur district is versatile with hill range, series of planins and valley bottoms. This composite district is bounded on the North by Cuddalore district, North-West by Namakkal district and South-West by Tiruchirapalli and South by Thanjavur districts. The district has an area of 3691.07 sq.km spread between $10.54^{'}$ and 11^{0} 30 degree Northen latitude and 78^{0} $38^{'}$ to 79^{0} $31^{'}$ degree of the Eastern longitude. It is an inland district without coastal line. The Pachamallai hill situated on the North boundary of Perambalur is the most important hill in the district.

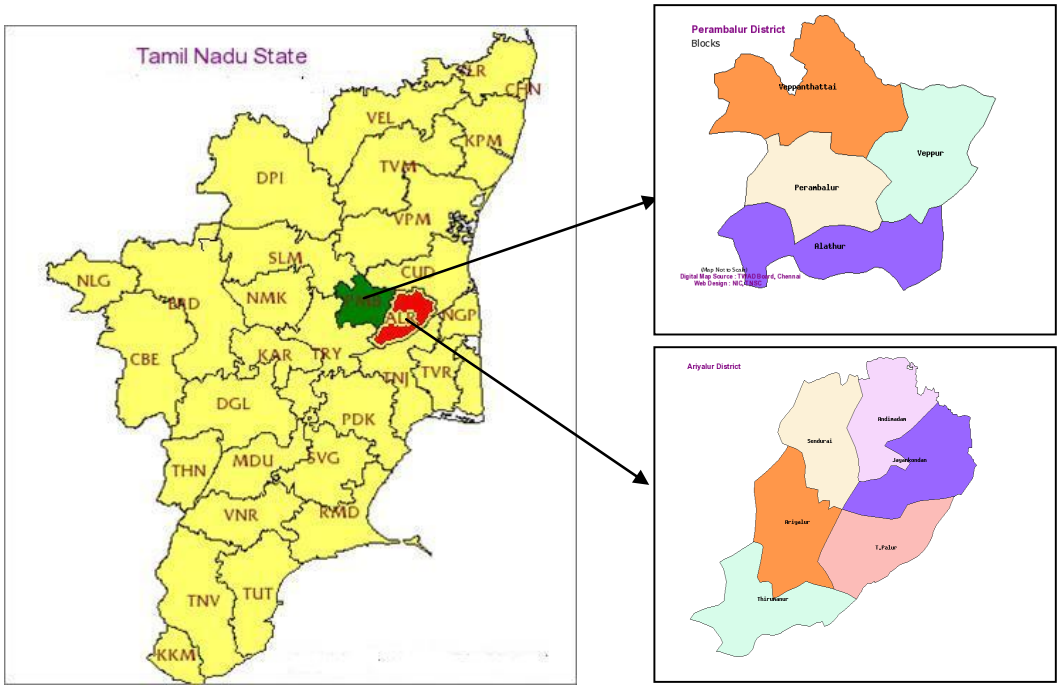


Fig. 2 Location map of Perambalur and Ariyalur districts

1.2. Geology

The composite Perambalur district is made up of Archean, cretaceous, tertiary and quartenary formation. Formations of upper Gondwana age are also found in a limited extent. The Archaeans consist of biotite, hornblende, gneisses and charnockites. To the south and north they are covered by alluvial deposits and to the east by the Cuddalore sand stone. The district is quite rich in minerals like limestone, clays, clayey sand stones etc., The details are given below

1.Clays:	These clays are used locally for superior type of pottery and also for the manufacture of salt glazed pipes, fine bricks and electrical insulators. Alluvial clays of Kollidam river and sandy clays occurring over Cuddalore sand stone, are used locally for bricks making.
2.Lime stone:	Sedimentary lime stone occurring as cretaceous formations and is estimated 2,26,000 tonnes of 50 % CaO found in this district
3. Garnet:	Garnet sand concretions occur on the Eastern and Northern sides. Massive garnet, is reported to occur in crystalline lime stone in Perambalur block.
4. Mineral pigments:	Pale yellow ocherous clays associated with cretaceous clays occur in Kunnam block.

1.3. Physiography

The general physiography of this district is versatile with hill ranges, series of plains, valley bottoms undulating upland area and broken chains of Eastern Ghats viz., Pachamalai hills. A part of Pachamalai hill is the important hill in Perambalur taluk of this district. The average height of Pachamalai hill is 600 meters though a few of the peaks raise to about 1020 meters above Mean Sea Level. But for this hill, Perambalur forms a gentle undulating upland and having hilly areas. In this district, vellar is the important river flowing and substantially benefiting agricultural activities. The vellar river rises from Salem district and forms boundary between Perambalur and Cuddalore district. Kallar and Chinnar, which are tributaries of Vellar and Marudaiyar rivers, traversing through Perambalur district.

1.4. Land Use Pattern

In this district, out of the total geographical extent of 3.69107 ha, only 2,38,814 ha (64.70 %) are used for agricultural purposes. A total of 32,933 ha (8.92 %) are kept as fallow lands. The lands put to non-agricultural purposes occupy 43,953(11.91 %) ha. The cultivable waste lands of 7,742 (2.10 %) ha can be brought in to agricultural uses by suitable measures. The major crops cultivated in the district are rice, millets, pulses, sugarcane, cotton and oil seeds. Rice is grown as rainfed crop. Oil seeds such as groundnut and gingelly are grown both under irrigated and rainfed conditions. Pulses like blackgram, greengram and redgram are grown in rice fallows.

1.5. Rainfall

The annual distribution of rainfall in Perambalur district over a period of 70 years (1927 – 1996) is furnished in table 1. In Perambalur district, North-East monsoon followed by South-west-monsoon are the main sources of water both for agricultural and drinking purposes. The district has a high mean temperature and low degree of humidity.

Table 1 Mean annual rainfall and temperature of Perambalur district.

S.No	Months	Mean Rainfall(mm)	Mean Temperature(^{0}C)
1.	January	16.0	25.5
2.	February	12.0	27.5
3.	March	12.0	29.0
4.	April	24.0	31.5
5.	May	55	33.0
6.	June	42	32.0
7.	July	48	31.0
8.	August	95	31.5
9.	September	129	30.0
10.	October	172	29.5
11.	November	223	28.0
12.	December	80	25.5

Season		**(mm)**
Winter (January &February)	=	28
Summer(March & May)	=	91
South West monsoon(June toSeptember)	=	314
North East monsoon(October to December)	=	475
Total	**=**	**908**

2. Ground water quality of Perambalur District

To characterize the ground water quality of Perambalur District, 680 water samples (open and bore wells) were collected from different parts of district. The water samples were analyzed for pH, EC, cations (Ca, Mg, Na and K) and anions (CO_3, HCO_3, Cl and SO_4). Quality parameters like SAR and RSC were calculated. Classification of water quality is done on the basis of EC, SAR and RSC values as suggested by CSSRI, Karnal (Table 3).

Table 3. Grouping of low-quality ground waters for irrigation in India

Water quality	**EC_{iw} (dS/m)**	**SAR_{iw} (m mol/L)**	**RSC (me/L)**
A. Good	<2	<10	<2.5
B. Saline			
i. Marginally saline	2-4	<10	<2.5
ii. Saline	>4	<10	<2.5
iii. High-SAR saline	>4	>10	<2.5
C. Alkali water			
i. Marginally alkali	<4	<10	2.5-4.0
ii. Alkali	<4	<10	>4.0
iii. Highly alkali	Variable	>10	>4.0

Perambalur District has four Blocks viz., Perambalur, Veppanthattai, Veppur and Alathur Block. Among the four blocks, the distribution of good quality samples were the highest in Perambalur Block (69.2%) and the lowest in Alathur (37.1 %) Block (Table 4). The occurrence of marginally saline water (13.3 to 42.8 %) was prevalent in all the Blocks. The saline waters were prevalent in Alathur (8.5 %) and Veppur (2.5 %) Blocks, while the occurrence of alkali waters were reported in Veppanthattai (15 %) and Alathur (2.5 %). The Marginally saline (13.3 to 42.8 %) and marginally alkali (2.5 to 25 %) waters are prevalent in almost all the blocks. High SAR saline water was reported in Alathur Block only (2.8 %). Among the total samples collected in Perambalur district, 52.4 % is coming under good quality, 26.8 is marginally saline, 10.88 % is marginally alkaline, 5.88 % is alkaline, 3.2 % is saline and 0.88 % is high SAR saline.

Table 4. Ground water quality of Perambalur District

S. No.	Block	No. of samples	Distribution %						
			Good	MS	Saline	HSS	MA	Alkali	HA
1	Perambalur	132	69.2	18.2	-	-	12.6	-	--
2	Veppanthattai	147	46.6	13.3	-	-	25.0	15	-
3	Veppur	210	64.1	30.7	2.5	-	2.5	-	--
4	Alathur	191	37.1	42.8	8.5	2.8	5.7	2.8	--
	Total /average	680	52.4	26.8	3.2	0.88	10.88	5.88	

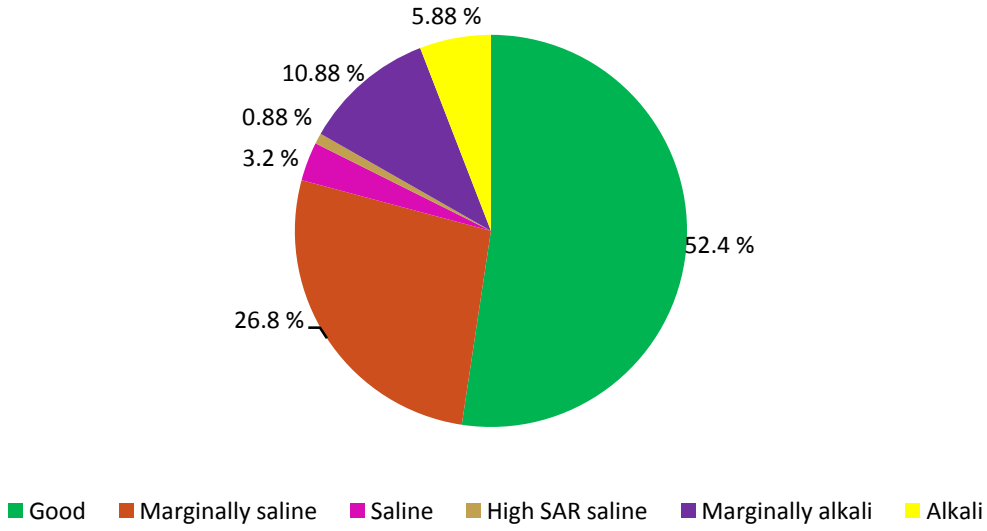


Fig. 3 Percentage distribution of ground water quality in Perambalur District

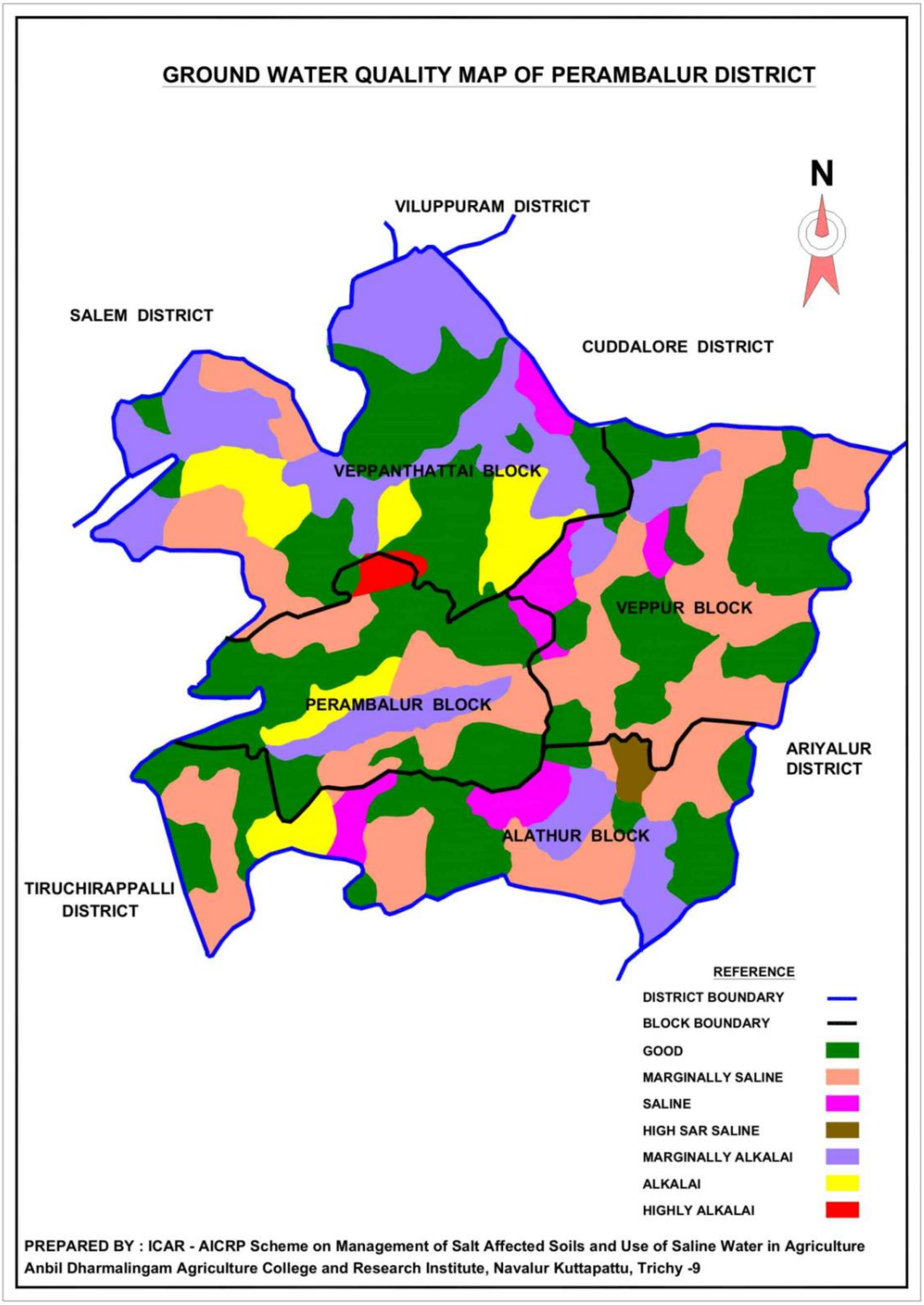


Fig. 4 Ground water quality map of Perambalur District

2.1. Chemical composition of ground waters

The pH, EC, anionic and cationic composition of irrigation waters were analysed and , sodium adsorption ratio (SAR) and residual sodium carbonate (RSC) were calculated. (Table 5, 6, 7). In general, the distribution of cations followed the order of Ca, Mg >Na > K. However in high RSC water samples, the distribution of cations followed the order of Na > Ca, Mg > K. Similarly the distribution of anions followed the order of HCO_3>Cl>SO_4 when the irrigation water quality is good (EC < 2 dSm^{-1}). But the distribution of anions followed the order of Cl>HCO_3>SO_4 in the EC range of 2 to 4 dS/m and Cl>SO_4>HCO_3 in the EC range >4.0 dS/m.

Table 5. Quality of ground waters in different blocks of Perambalur District

Name of the Block	pH			EC (dSm^{-1})			RSC (meq. l^{-1})			SAR		
	Minimum	Maximum	Mean	Minimum	Maximum	mean	Minimum	Maximum	mean	Minimum	Maximum	mean
Perambalur	7.59	8.73	8.13	0.52	3.04	1.27	nil	3.1	0.65	0.45	7.1	2.36
Veppanthattai	7.25	9.03	8.27	0.15	3.55	1.17	nil	7.4	0.72	0.42	7.2	4.21
Veppur	7.12	8.78	7.91	0.11	7.22	1.71	nil	3.0	0.48	0.14	5.33	1.98
Alathur	6.8	9.93	8.03	0.57	6.13	2.27	nil	4.6	0.69	0.7	10.22	3.2

Table 6. Cationic concentration (meq l^{-1}) of ground waters in different blocks of Perambalur District

Name of the Block	Ca			Mg			Na			K		
	Minimum	Maximum	mean	Minimum	Maximum	mean	Minimum	Maximum	mean	Minimum	Maximum	mean
Perambalur	1.2	16.8	5.42	1.8	20.3	6.25	0.8	14.6	4.55	0.02	0.26	0.07
Veppanthattai	0.8	14.8	4.47	0.5	14	4.2	0.4	11.8	5.93	0.01	1.31	0.08
Veppur	0.8	12.8	6.71	0.8	10.8	6.05	0.12	12.6	4.69	0.01	0.95	0.15
Alathur	1.4	24	4.42	1.8	18.8	7.16	1.08	28	7.20	0.02	0.82	0.12

Table 7. Anionic concentration (meq l^{-1}) of ground waters in different blocks of Perambalur District

Name of the Block	HCO_3			CO_3			SO_4			Cl		
	Minimum	Maximum	Mean	Minimum	Maximum	mean	Minimum	Maximum	mean	Minimum	Maximum	mean
Perambalur	1.2	16.8	5.32	0.06	6.2	2.41	0.4	7.36	1.65	1	19	5.69
Veppanthattai	1.0	9.8	5.20	0.2	4.4	2.34	0.13	8.22	1.50	0.6	21	3.36
Veppur	0.6	8.4	4.05	0.4	5.6	2.05	0.01	9.5	2.8	1	22	6.34
Alathur	1.8	12.8	7.5	0.6	6.4	2.6	0.22	18.6	4.2	2	25	8.6

2.2. Blockwise characterization of ground water quality

2.2.1. Perambalur Block

To characterize ground water quality of Perambalur Block 132 water samples were collected and analyzed (Table 9). The water table of open / bore wells varied from 18 to 90 feet. The pH and EC of water samples ranged from 7.59 to 8.73 and 0.52 to 3.04 dS/m, respectively (Table 5). The RSC of waters varied from nil to 3.1 meq. l^{-1} and SAR ranged from 0.45 to 7.1. Out of the total samples collected from Perambalur Block, 84.6 percent samples had RSC less than 2.5 meq. $l^{-1,}$ whereas 15.3 percent samples showed RSC between 2.5 to 4.0 meq. l^{-1} . About 86.2 and 13.8 percent water samples showed EC in the range of < 2.0 and 2- 4 dS/m, respectively. The percent distribution of good, marginally saline and marginally alkali categories were 69.2, 18.2 and 12.6 per cent water samples respectively (Table 4). Villages under different categories of water quality are presented in table 8

Table 8 Villages under different categories of water quality in Perambalur Block of Perambalur District

Water quality	Name of the villages
GOOD	Aranarai, Sokkanadhapuram, Alampadi, Cencheri, Aranari Chanankottakai, Ayalur, Kudikadu, Chathramanai, Esanai, Pappankarai, Alangeli, Elambalur, Indhranagar, Kothadimaikalani, Gurumbalur, Kalpadi, K.Eraiur, Erayachathram, Neduvasal, Kelakkarai, Perampalur, Pommanappadi, Vellur, Pudhu Vellur, Kelakkanavai, Thambiranpatti, Renganathapuram, Serukunam, Arumadal, Palappadi, Vadakkumadhavi, Somanadhapudhur, Govindhapuram
MA	Duraimangalam, Kalarampatti, Pudhu Naduvalur, Vilamuthur, Renganathapuram, Metlur, Pudhur, Sathanur, Gandhi Nagar, Notchiam, Cellipalaiyam.
MS	Melapuliyur, Navalur, Thirupaiyur, Siruvatchur.

2.2.2. Veppanthattai Block

In Veppanthattai Block, for studying the water quality 147 water samples were collected and analyzed (Table 11). The water table of open / bore wells varied from 12 to 80 feet. The variation in pH and EC ranged from 7.25 to 9.03 and 0.15 to 3.55 dSm^{-1}, respectively (Table 5). The RSC of waters varied from nil to 7.4 meq. l^{-1} and SAR ranged from 0.42 to 7.2. Out of the total samples collected from Perambalur Block, 60 percent samples had RSC less than 2.5 meq. l^{-1}, whereas, 25 per cent samples showed RSC between 2.5 to 4.0 meq. l^{-1} and 15 percent samples showed RSC > 4.0 meq. l^{-1}. About 86.6 and 13.3 percent water samples showed EC in the range of < 2.0 and 2- 4 dS/m, respectively. The percent distribution of good, marginally saline, marginally alkali and alkali water categories were 46.6, 13.3, 25.0 and 15.0 per cent respectively (Table 4). Villages under different categories of water quality are presented in table 10.

Table 9 Chemical characteristics of underground irrigation waters of Perambalur block of Perambalur distirct

S.No	Revinue village	No. of samples	P^H	EC dSm^{-1}	Ca meq l^{-1}	Mg meq l^{-1}	Na meq l^{-1}	K meq l^{-1}	CO_3 meq l^{-1}	HCO_3 meq l^{-1}	Cl meq l^{-1}	SO_4 meq l^{-1}	RSC meq l^{-1}	SAR
1	**Aranarai**	6	7.9-8.3	0.7-0.91	3.2-4.8	3.2-5.8	1.8-3.1	0.04-0.6	1.0-1.8	1.4-3.1	3-7	0.6-1.84	Nil	1.35-2.1
2	Aranarai(W)	4	7.9-8.3	0.69-0.77	2.0-3.8	2.2-5.0	0.95-1.8	0.03-0.05	0.8-1.4	1.2-2.8	2.0 -6.0	0.4-1.18	Nil	0.45-1.2
3	Aranarai(S)	5	7.6-8.13	0.9-1.97	3.8-4.4	3.2-8.2	3.6-6.05	0.02-0.07	1.8-2.1	2.8-7.1	2.6-8.0	0.8-1.22	Nil	1.65-2.8
4	Alankizhi	5	8.0-8.24	1.2-1.92	4.8-6.8	3.6-6.2	1.2-4.2	0.06-0.12	1.2-2.2	2.8-4.4	4-9	1.2-1.72	Nil	0.71-1.8
5	Ammapalayam	6	7.72-8.1-	0.69-1.1	2.8-4.2	4.0-6.8	0.8-1.67	0.02-0.08	0.8-1.2	3.2-4.2	2.0-6.0	1.7-2.69	Nil	2.26-0.8
6	Ayelur	5	7.59-7.9-	1.-1.5	4.8-7.0	4.2-10.2	1.2-6.2	0.05-0.10	0.09-2.6	3.6-9.8	3-7	2.26-1.85	Nil	0.55-1.0
7	Chathramanai	6	7.52-8.0	0.6-1.1	2.6-4.4	3.2-4.8	0.8-1.18	0.03-0.08	0.2-0.6	4.2-2.9	2-4	1.2-3.31	Nil	0.55-2.8
8	Dhuraimangalam	5	8.51-8.77	0.96-1.97	1.8-4.8	1.9-3.6	9.8- 14.6	0.02-0.06	2.8-4	5.6-7.2	2-10	0.08-1.86	Nil-3.1	1.24-7.1
9	Esanani	5	7.85-8.0	1.0-1.36	2.6-3.9	2.8-9.8	1.2-3.1	0.03-0.06	1.2-4.8	1.8-3	2-9	1.0-2.33	Nil	0.81-1.9
10	Elambalur	5	7.9-8.36	0.99-1.2	3.2-4.1	2.8-5.2	1.8-4.2	0.02-0.07	1.6-2.2	2.6-4.8	2-5	0.8-1.57	Nil	0.98-1.4
11	Kurumbalur(N)	5	7.83-8.2	0.99-1.2	1.9-4.2	2.6-6.4	0.08-2.26	0.02-0.06	1-1.4	2.1-4.2	2.1-6	1.0-1.68	Nil	0.8-1.36
12	Kurumbalur(S)	4	7.8-8.25	0.94-1.2	3.2-4.6	3.8-6.4	1.2-3.2	0.04-0.07	0.8-2.2	1.4-4.2	2.2-5	1.2-2.84	Nil	0.8-1.9
13	Kalpadi (N)	4	8.12-8.28	0.78-3.04	4.6-16.8	5.2-20.3	4.2-12.6	0.11-0.26	3.8-6.2	4--16.8	5-19	1.31-7.96	Nil	1.74-2.93
14	Kalpadi (S)	4	8.07-8.23	1.38-1.87	5.2-6.8	7.2-9.8	3.52-4.6	0.05-0.08	2.8-4.2	6.2-6.8	6-9	1.68-2.17	Nil-5	1.22-1.74

15	Kalarampatti	5	8.54-8.72	0.69-0.76	1.2-2.6	1.8-2.2	8.2-9.4	0.06-0.08	2.2-2.6	4.8-5.2	4--6	0.38-0.86	Nil-2.6	1.83-3.0
16	Keelakarai	6	7.9-8.2	1.22-1.32	4.8-5.4	3.2-4.2	2.6-4	0.04-0.08	1.2-2.2	4.2-4.8	4-6	0.64-1.24	Nil	1.3-1.88
17	Melapuliur(E)	6	7.68-7.92	1.92-2.25	7.0-8.6	8.0-10.4	4.6-5.8	0.05-0.10	2.8-3.4	3.6-4.8	8-14	1.8-2.65	Nil	2.6-3.81
18	Melapuliur(W)	6	7.94-8.14	2.10-2.24	5.2-6.4	6.4-8.8	3.2-3.8	0.04-0.06	1.8-2.2	4.6-6.4	10-16	1.15-2.9	Nil	2.8-3.42
19	Notchiam	6	8.47-8.63	0.77-0.94	2.8-3.2	4-4.8	4.2-8.4	0.03-0.06	2.6-3.4	6.8-7.2	2-5	0.43-0.46	1.8-3.0	2.1-4.43
20	Perambalur(s)	5	8.13-8.28	0.68-1.04	4.2-6.6	4.8-5.2	2.8-4.4	0.03-0.08	1.6-1.8	3.2-4.4	6-10	0.23-1.2	Nil	1.4-1.6
21	Puthu Naduvalur	6	8.63-8.73	0.79-0.94	4.4-4.8	4.2-4.6	4.98-9.13	0.04-0.03	2.4-2.8	8.2-9.2	2-4	0.62-2.56	2.6-2.9	1.58-3.4
22	Pommanappadi	5	7.95-8.49	1.32-1.84	4.2-8.6	5.6-9.8	4.2-6.8	0.08-0.17	2.6-4.2	4.8-8.9	4-8	1.27-2.49	Nil- 1.7	1.59-3.07
23	Chiruvatchur	6	7.89-8.28	0.76-3.04	4.8-14.8	4.2-10.6	2.4-6.14	0.03-0.05	1.2-4.2	2.6-8.4	6-13	1.63-5.99	Nil	0.75-1.13
24	Vellur	7	7.69-7.92	0.77-0.82	2-4.8	3.2-6.4	0.98-1.54	0.02-0.16	1.2-2.2	1.4-4.2	2-4	0.8-3.5	Nil	0.5-0.72
25	Serukunam	4	8.28-8.48	0.9-1.19	4-6.8	4.2-4.8	2.8-4.25	0.04-0.12	2.8-4.2	2-6.8	2-7	0.29-0.72	Nil	1.8-2.0
26	Perambalur (N)	6	8.23-8.25	0.52-0.98	1.6-5.8	2.6-4.2	2.7-3.69	0.52-0.07	1.2-2.2	2.3-4.8	3-5	0.77-1.91	Nil Nil	1.21

Table 10. Villages under different categories of water quality in Veppanthattai Block of Perambalur District

Water quality	Name of the villages
GOOD	Arukkur, Kudikadu, Eraiyur, Mettupaliyam, Pumithalam, Mutlu, Alagapuri, Bandhanavadi, Siruvayalur, Padhimapuram, Naikuppai, S.Pudhur, Prammadhesam, VRSS Puram, SVR Nagar, Anna Nagar, Selvanadhapuram, Pandagampadi, Pachumpalur, Peraiyur, Thaikkal, Periyavadakkarai, Mavilangai, Thiruvalandurai, Merukku Kalani.
MA	V. Kalathur, Kamaraj Nagar, Rayappa Nagar, V. Kalathur, Kelacheri, Mettucheri, Kaikalathur, Gandhi Nagar, Siru Nila, Perunila, Padhangai, Malaiyalappatti, Panampatti, S. Pudhur, Kottarai Kundru, Sasthira puram, Pumithelam, Pimpalur, Meravontham, Pulampatti, Venganour.
MS	Nudhapur, Nerkunam, Palaiyam, Thondamandevi, Vijayapuram, Thondappadi, Palaiyur, Vudumpiyam, Kelappatti, Naracingapuram.
A	Vengalam, Krishnapuram, Valikandapuram, Vallapuram, Thampai, Veppanthattai, Arasalur, Etchangadu, Viswaakudi, Pilliyarpaliyam, Pumpukar, Thaluthalai, Thalai Nagar, Arumbavur, Akaram, Inam Akaram.

2.2.3. Veppur Block

To study the ground water quality of Veppur Block 210 water samples were collected and analyzed (Table 14). The water table of open / bore wells varied from 10 to 68 feet. In Veppur, the variation in pH and EC ranged from 7.12 to 8.78 and 0.11 to 7.22 dSm^{-1}, respectively (Table 5). The RSC of waters varied from nil to 3.0 meq. l^{-1} and the SAR ranged from 0.14 – 5.33. Out of the total samples collected from Veppur Block, 97.3 percent samples had RSC less than 2.5 meq. l^{-1}, whereas 2.5 percent samples showed RSC between 2.5 to 4.0 meq. l^{-1}. About 66.6, 30.7 and 2.5 percent water samples showed EC in the range of < 2.0, 2- 4 and >4 dS/m, respectively . About 64.1, 30.7, 2.5 and 2.5 per cent water samples were found under good, marginally saline, saline and marginally alkali water categories, respectively (Table 4). Villages under different categories of water quality are presented in table 12.

Table 11. Chemical characteristics of underground irrigation waters of Veppanthattai block of Perambalur distirct

S.No	Revinue village	No. of samples	P^H	EC dSm^{-1}	Ca meq l^{-1}	Mg meq l^{-1}	Na meq l^{-1}	K meq l^{-1}	CO_3 meq l^{-1}	HCO_3 meq l^{-1}	Cl meq l^{-1}	SO_4 meq l^{-1}	RSC meq l^{-1}	SAR
1	Anukkur	6	8.11-8.18	0.59-1.29	2.6-3.4	2.2-4.4	0.94 -5.8	0.02 - 0.03	1.4-2.2	2.8-3.4	3-9	0.96-1.8	Nil-1.6	2.39-2.94
2	Akaram	5	8.47-8.93	0.86-1.53	2.6-3.6	3.2-4.2	4.4-5.8	0.03-0.06	2.2-4.2	5.8-8.	3-6	0.85-1.89	2.6-5	3.41-6.39
3	Arumbavur	5	8.86-8.87	1.51-1.58	2.8-3.4	3.4-4.6	11.5-11.8	0.06-1.31	3.8-4.2	7.6-8.4	6-7	1.16-1.91	4.2-4.8	5.9-6.8
4	Eraiyur	5	7.92-8.2-	0.62-0.98	3.6-4.4	2.4-5.2	0.76-1.6	0.03-0.08	1.2-1.8	2.8-3.6	2-2.8	0.79-1.8	Nil-2.5	0.44-0.77
5	V. Kalathur	6	8.17-8.68	0.66-1.17	2.2-3.6	1.8-4.2	1.22-6.2	0.02-0.04	1.2-2.2	2.4--4.9	1-6	0.64-1.84	Nil	2.77-3.14
6	Kaikalathur	6	7.59-8.7	1.16-1.23	3.2-4.8	3.8-4.2	4-5-11.8	0.02-0.03	1.4-4.2	2.8-6.4	3-8	1.32-2.23	Nil-3.5	2.05-6.31
7	Kariyanur	6	7.9-8.29	0.08-1.19	2.4-3.2	3.0-4.6	4.0-6.2	0.02-0.08	1.2-2.0	2.4-4	3.2-6	2.02	Nil	1.8-2.6
8	Malaiyalapati	4	8.52-8.69	0.68-0.81	1.2-2.8	0.8-1.4	4.6-7.2	0.06-0.09	1.2-2.0	2.1-3.6	0.6-1.0	0.2-0.8	2.6-2.9	3.6-4.6
9	Mettupalayam(N)	6	7.95-8.2	1.1-1.55	3.6-6.8	4.8-8.2	1.6-6.2	0.06-0.10	1.2-1.8	2.8-5.9	3.6-5.2	1.8-3.8	Nil-1.2	1.2-2.4
10	Mettupalayam(S)	6	7.6-8.3	0.88-1.2	2.2-3.8	3.6-5.4	2.0-4.8	0.02-0.03	1.2-2.4	2.8-6.8	3.8-8	2.1-6.92	Nil-1.3	1.4- 2.88
11	Neikuppai	5	8.21-8.42	0.62-0.98	2.6-4.8	3.1-5.6	1.8-5	0.02-0.06	1.2-2.4	3.6-8.3	1.5-4	0.48-0.76	0.82-Nil	1.79-2.1
12	Nuthapur	5	8.23-8.31	1.45-2.75	8-10.8	6.4-8.8	4.8-9.6	0.03-0.04	3.2-4.2	8.8-9.8	6-9	1.23-6.24	Nil	0.47-3.07
13	Prammathesam	4	7.34-8.42	0.52-1.29	2.8-7.8	2.4-6.4	0.99-5.4	0.01-0.03	0.8-2.4	1.8-7.4	4-7	0.41-2.63	Nil	0.9-3.23
14	Pandagampadi	5	7.97-8.2	1.2-1.79	3.6-6.4	4.2-7.8	4.0-8.6	0.02-0.05	1.8-2.4	3.8-6.7	3-8	2.8-5.75	Nil	1.73-2.6
15	Pasumpalur	5	8.2-8.35	1-1.4	3.2-5.38	4.4-6.4	2.8-4.2	0.03-0.06	1.6-2.4	3.2-6.8	1.2-3	1.81-3.81	Nil	1.41-2.2
16	Paraiyur	5	7.69-8.0	0.73-0.90	2.8-4.8	3-4.2	1.8-3	0.02-0.06	1.2-2.2	2.4-3.4	2-4	1.6-2.42	Nil	1.4-3.22

17	Periyavadakarai	6	8.1-8.4	1.0-1.3	2.8-7.2	4.2-6.4	3.6-8.4	0.02-0.04	1.2-2.8	2.4-3.8	1.6-3.4	0.82-2.2	Nil	1.3-2.8
18	Pimpalur	6	8.58-8.72	0.15-0.28	1.2-1.6	0.5-2.1	4.2-6.8	0.01-0.04	1.8-2.8	2.2-3.6	0.6-1	0.4-0.9	2.7-3.6	1.84-3.42
19	Poolampatti	5	8.24-8.64	0.45-0.89	1.8-3.6	2.1-4.2	4-4.77	0.04-0.06	2.2-2.4	4.4-4.8	2-3	0.13-1.64	Nil-2.7	2.03-3.42
20	Thaluthalai	6	8.56-8.88	0.15-0.85	1.2-2.2	0.8-2.4	3.2-6.8	0.04-0.08	1.2-2.4	3.4-6	1--3	0.8-0.34	2.6-4.2	3.2-4.93
21	Thirvaladurai	6	8.04-8.26	0.8-1.24	3.0-5.2	3.8-6.2	3.2-6.2	0.02-0.04	1.4-3.2	3.2-4.8	1.4-6	0.82-3.64	Nil-0.42	01.86-
22	Thondamandurai	4	7.91-8.2	2.65-3.28	8.6-	8.2-12.1-	6.4-8.6	0.04-0.08	2.2-2.8	4.8-6.7	8-12	3.6-5.78	Nil	2.46-8.8
23	Thondapadi	4	7.82-8.12	0.46-3.23	2-10.4	2.4-14	0.8-8.6	0.08-0.82	1-4-3	1.8-7.4	2-14	0.48-8.22	Nil	0.54-7.28
24	Veppanthattai(S)	7	7.51-9.03	0.36-1.63	0.8-4.8	1.2-2.2	1-10.8	0.04-0.08	0.2-2.4	1.2-9.4	1-4	0.44-1.88	Nil-7.4	1-4.56
25	Venganur	6	7.29-8.68	0.22-3.06	1-10.2	0.8-7.8	0.4-10.4	-0.06-0.2	0.4-4.4	0.6-8.8	1-21	0.26-6.83	Nil-2.	0.42-5.25
26	Udumpiyam	6	7.25-8.22	0.55-3.55	3.2-14.8	2.4-10.8	2.2-8.8	0.04-0.4	0.8-2.8	1.2-6.8	3-18	2.84-7.2	Nil-6.5	1.31-7.12
27	Valikandapuram	6	8.15-8.98	0.25-1.2	1.6-3.8	0.8-4.4	1.4-10.2	0.04-0.13	0.8-4	1-8.2	2-5	0.13-1.08	Nil-8.2	2.08-7.21
28	Venbavur	6	7.98-8.18	0.62-0.86	2.1-3.6	3.2-4	2.0-4.06	0.02-0.05	1.0-2.4	1.2-4.6	1.2-4	0.62-0.71	Nil	1.8-2.08
29	Vengalam	5	8.3-8.88	0.39-1.55	2-8.2	1.2-6.2	4.7-8.8	0.03-0.04	2.6-3.2	3.8-8	1-8	0.04-0.53	Nil-4.8	1.62-5.08
30	Veppanthattai(N)	6	7.92-8.4	1.4-1.87	6.6-9.2	5.2-8.4	2.4-4.8	0.03-0.06	2.0-2.8	4.6-6.8	4-8	2.6-4.83	Nil-0.62	1.19-3.4

Table 12. Villages under different categories of water quality in Veppur Block of Perambalur District

Water Quality	Name of the Villages
GOOD	Agaram Sekur, Kattalai, Vayalur, Thittakudiborder, Asour, Anthiyur, Pudhupattai, Kudikadu, Aduthurai, Andikurumpalur, Vaithiyanathapuram, Chithali, Pelavadi, Dhungapuram, Kelayapathu, Thenur, Govilpaliyam, Slumour, Karukkudi, Melavaraiyanallur, Alkudi, Kadur, Nallarikkai, Kelamathur, Kaiperambalur, Govindharajapattinam, Kelappuliur, Pudhut, Nannai, Kelaiyur, Olappadi, Veppur, Kallai, Karaipadi, Othiyam, Laxmipuram, Okalur, Kalanivasal, Thirumandurai, Perumathur, Kudikadu, Nallur, Perali, Muruvaathur, Panakkur, Vayalappadi, Keeranur, Perumathur
MA	Kunnam
MS	Cirumathur, Murunkankudi, S. Kudikadu, Ponnagaram, Narivodai, Namaiyur, Durgapuram, Thenur, Kovilpaliyam, Kelaperambalur, Velvimangalam, Kelapuliyur, Sirukudal, Silonkalani, Paravai, Chinnaparavai, Periyaparavai, Pudhuvettakudi, K. Pudhur, Dharangampadi, Periyammapaliyam, Karampiyam, Periyavenmani, Perumathur, Kudikadu, Pennakkonam, Kelakkudikadu, Vasistapuram, PaliyaKalingNallur, Paliya Rasamangalam, Vadakalur, Kathalimedu, V. Agaram.
S	Periyavenmani, Cinnavenmani, Pudukuducheri, Kotharasal.

2.2.4. Alathur Block

In Alathur Block, 191 water samples were collected and analyzed to characterize the ground water quality (Table 15). The water table of open / bore wells varied from 13 to 85 feet. The analysis results showed that, pH and EC of water samples ranged from 6.80 to 9.93 and 0.57 to 6.13 dS m^{-1}, respectively (Table 5). The RSC of waters varied from nil to 4.6 meq. l^{-1} and SAR ranged from 0.7 to 10.22. Out of the total samples collected from Alathur Block, 91.1 percent samples had RSC less than 2.5 meq. l^{-1},

whereas 5.7 percent samples showed RSC between 2.5 to 4.0 meq. l^{-1} and 5.6 per cent samples showed RSC > 4 meq. l^{-1}. About 45.6, 42.8 and 8.5 percent water samples showed EC in the range of < 2.0 2- 4 and > 4 dS/m, respectively. About 37.1, 42.8, 8.5 ,2.8, 5.7 and 2.8 per cent water samples were found under good, marginally saline, high SAR saline, marginally alkali and Alkali range categories, respectively (Table 4). Villages under different categories of water quality are presented in table 13

Table 13 Villages under different categories of water quality in Alathur Block of Perambalur District

Water Quality	Name of the Villages
GOOD	Aladhur, Alageripalayam, Kaarai, Pudhukutichi, Mavilangai, Nakkaselam, Pudhu Ammapalayam, Naranamangalem, Vijayagopalapuram, Marudhadi, Nattur Mangalam, Kuthaynur, Pungarayanallur, Pennakulam, Pudalur, Thiruvalakkuruchi, Therani, Varagupadi.
MA	Thondappadi, Allinagaram, Melahesanagaram, Kelahesannagaram, Thottiyappatti, Siruvaiyalur, Kurur, Mangur, Sillakkudi, Methal, Sathanur, S. Kudikadu, Pennakulam, Mealamathur, Thanganagaram, Kolathur, Kottarai, Jammen Athur, Irrur, Elathalampatti, Adaikkampatti, AlliNagaram, Alageripaliyam, Kelamathur, Mangalam, Seethapuram, Kadaikkanpatti, Varichaipatti.
MS	Kolakkanatham, Sillakkudi, Karaipadi
A	Cettikulam, Elandhangudi, Seeranatham.
S	Sirukanpur, Therukkumadevi, Nathakkadu.
HSS	Adhanur, Madhurakudikadu, Perumalpaliam.

Table 14. Chemical characteristics of underground irrigation waters of Veppur block of Perambalur distirct

S.No	Revinue village	No. of samples	P^H	EC dSm^{-1}	Ca meq l^{-1}	Mg meq l^{-1}	Na meq l^{-1}	K meq l^{-1}	CO_3 meq l^{-1}	HCO_3 meq l^{-1}	Cl meq l^{-1}	SO_4 meq l^{-1}	RSC meq l^{-1}	SAR
1	Agaram sesur	5	7.52-7.85	1.03-1.16	4.6-6.8	3.2-4.2	2.6-2.8	0.06-0.08	2-2.8	3.2-4.2	3-5	0.26-1.88	Nil	1.2-1.32
2	Asur	4	8.23-8.42	0.12-0.46	1.2-1.8	0.8-2.4	1.2-3.6	0.04-0.06	0.6-1.0	1-2.4	1.2-2	0.24-0.46	Nil-0.64	0.6-1.2
3	Anthiyur(s)	6	7.21-7.34	0.99-1.78	4.8-6.8	3.2-5.8	1.2-2.8	0.01-0.02	0.8-2.2	2.4-4.8	6-8	0.01-0.02	Nil	1.12-1.13
4	Adudhurai	6	7.3-8.01	0.59-2.32	2.6-12.8	1.8-7.8	1.8-3.6	0.1-0.08	0.8-1.2	2.4-2.8	2-12	1.13-8.28	Nil	1.23-1.46
5	Andi Kurumbalur	5	8.13-8.2	0.83-1.08	2.8	3.2-4.2	2.6-2.74	0.06-0.08	1.2-1.8	2.8-3.2	3-9	0.32-1.63	Nil	1.46-1.5
6	Chithali(e)	5	8.12-8.39	1.2-1.54	3.2-4.8	4.05.8	4.2-6.4	0.02-0.05	1.4-3.8	4.2-6.8	3-6	0.64-1.42	Nil	1.7-1.98
7	Cirumathur	5	7.42-7.77	1.43-2.73	5.2-12.6	4.8-10.8	3.8-4.2	0.08-0.1	2.8-3.6	4.2-4.6	4-12	2.88-7.5	Nil	1.23-1.29
8	Dhungapuram (N)	6	7.77-8.02	1.42-1.97	5.4-8.2	4.6-7.4	3.6-4.8	0.03-0.08	1.8-2.4	4.8-5.2	6-9	1.4-2.68	Nil	i.24-1.68
9	Dhungapuram (S)	5	8.24-8.46	2.25-2.6	5.8-6.66	7.6-8.2	11.4	0.06-0.08	3.2-5.6	4.2-8.4	4-7	1.64--3.88	Nil	2.1-3.4
10	Ezhumur (E)	5	7.84-7.9	0.65-1.3	2.4-4.6	1.8-3.8	1.22-4.31	0.03-0.07	1-1.8	3.6-3.8	2-6	1.18	Nil-0.4	0.46-0.84
11	Ezhumur (W)	6	7.82-8.44	1.08-0.98	3.4-5.4	3.2-4.2	0.96-3.48	0.2-0.06	1.2-2.4	4.2-6.8	1-4	0.360.94	Nil-1.6	1.6-1.79
12	Kadur (N)	6	8.2-8.42	1.26-1.58	3.8-5	4.2-6.3	3.8-5.8	0.04-0.08	1.8-2.8	4.0-6.2	2-4	1.12-2.18	Nil	0.5-1.28
13	Kadur (S)	7	7.85-8.36	1.32-1.68	4.8-6.4	5.2-6.4	1.2-5.9	0.08-0.14	1.2-2.8	3.6-4.2	3-8	1.24--2.08	Nil	0.99-2.12
14	Kelamathur (N)	6	8.04-8.42	0.7-1.2	2.2-4.4	1.8-3.6	1.4-4.8	0.04-0.08	0.6-1.2	2-2.8	4--6	2.8-4.6	Nil	1.19-2.86
15	Kelamathur (S)	6	8.11-8.32	0.77-1.2	2.4-3.2	2.8-4.2	2.17-3.4	0.04-0.08	0.8-1.2	2.8-3.3	3-5	1.71-1.89	Nil	1.19-2.14
16	Kelaperembalur	5	8.26-8.43	2.8-3.54	5.2-8.4	6.8-10.2	8-14	0.04-0.10	2.6-3.6	4.8-8	8-14	4.2-9.3	Nil	3.82-5.33

17	Kelapuliyur (N)	4	7.74-7.94	0.11-0.32	0.88-1.12	0.6-1.18	0.12-0.98	0.04-0.08	0.4-0.8	0.6-1.42	1-2	0.42-0.96	Nil	0.14-0.36
18	Kelapuliyur (S)	6	8.22-8.38	0.94-2.88	1.8-7/8	5.2-8.8	3.83-7.42	0.04-0.27	1.4-1.6	2.3-3.6	5-22	0.86-2.17	Nil	2.6-3.85
19	Kunnam	7	8.52-8.78	0.98-1.23	2-4.2	0.8-2.8	4.6-6.8	0.05-0.10	1.2-2.8	4.2-6.2	2-4	1.16-2.89	2.6-3.0	2.96-4.2
20	Nannai (E)	4	7.21-7.88	0.99-1.32	2.4-2.8	2.2-3.8	6.0-9.73	0.12-0.95	1.8-2.4	2.2-3.1	2-5	2.2-4.6	Nil	0.74-3.6
21	Olappadi (E)	6	8.5-8.32	0.62-0.76	1.8-2	3.2-4	1.29-2.8	0.03-0.06	1.8-2.4	1.3-2.8	1.3	0.62-0.30	Nil	1.14-1.85
22	Olappadi (W)	6	7.64-7.84	0.80-1.31	2.8-3.6	6-4.2	2.2-2.49	0.03-0.08	1.2-1.6	2.0-2.4	2-5	1.8-3.12	Nil	1.4-1.82
23	Othiyam	6	7.98-8.26	0.85-0.92	2.4-3.2	2.0-2.8	3.4-4.63	0.04-0.09	1-2.0	2.2-4.2	2-4	0.88-1.47	Nil	1.12-1.84
24	Okalur	5	7.62-7.9	1.67-1.9	5.4	7.2-8.8	2.8-3.2	0.04-0.08	1.2-2.2	3.4-4.8	6-9	3.68-4.84	Nil	0.98-1.12
25	Thirumandhurai	6	7.23-7.86	1.42-1.75	4.2-8	6.4-7.2	2.6-5.6	0.04-0.12	1.2-1.8	2.6-3.2	3-7	3.4-5.84	Nil	0.94-2.48
26	Paravai (E)	6	8.11-8.36	2.24-3.48	6.8-12.8	8.2-10.4	6.8-12.6	0.06-0.14	2.2-4.1	2.8-4.4	18	4.8-8.6	Nil	2.19-4.04
27	Paravai (W)	5	7.9-8.3	2.12-2.51	6.0-9.8	6.7-8.4	6.6-9.4	0.08-0.1	2.8-3.4	3.2-4.6	6-11	4.2-7.9	Nil	0.34-2.2
28	Pudhuvettakkudi	4	8.16-8.38	0.56-2.88	2.8-14.2	3.4--9.8	0.59-4.8	0.05-0.08	1.2-2.8	2.4-3.6	3-14	0.24-8.48	Nil	1.39-2.04
29	Periyammapalayam	4	8.02-8.28	2.2-3.62	7.2-14	8.8-12.4	7.4-9.2	0.1-0.14	2.1-3.2	3.4-4.2	8-17	5.6-9.5	Nil	1.33-2.12
30	Periyavenmani (E)	6	7.41-7.96	24-2.45	6.8-12.8	7.2-8.2	4.3-6.8	0.08-0.14	2.2-3.6	2.8-4.8	6.6-14	2.8-4.38	Nil	1.45-2.42
31	Periyavenmani (W)	5	6.78-7.4	4.2-7.22	12.4-38.2	14.8-28.6	8.4-13.6	0.64-1.2	4.2-1.8	2.27.2	27-36	20-28	Nil	2.01-4.8
32	Perumathur (N)	5	8.22-8.46	1.20-1.59	4.0-6.6	3.2-4.8	4.8-6.0	0.04-0.08	1.2-2.2	3.8-4.6	4.2-8	0.89-2.24	Nil	1.04-1.46
33	Perumathur (S)	4	7.42-8.22	1.43-1.49	4.8-7.2	4.4-5.4	2.6-4	0.06-0.08	1.6-2.4	4.2-4.8	6-7	1.48-3.46	Nil	1.58-1.66
34	Pennakonam (N)	5	7.12-7.96-	2.12-2.68	12.8-8.6	8.8-10.4	5.2-6.5	0.08-0.12	1.8-2.2	3.2-4.8	7-11	5.64-8.88	Nil	1.41-2.39
35	Perali (N)	5	7.96-8.25	1.2-1.6	4.0-5.4	3.2-4.8	5.4-6.8	0.04-0.08	1.8-2.6	4.4-6.2	3-5	1.84-2.6	Nil	1.22-1.86

36	Perali (S)	5	8.12-8.34	0.8-1.2	3.4-4.2	2.8-5.6	2.14-3.9	0.06-0.16	1.2-2.2	3.6-4.3	1.6-3	0-1.20	Nil	1.44-2.2
37	Vasishtapuram	6	7.44-7.92	1.80-2.35	8.0-10.2	8.4-9.8	4.4-6.6	0.1-0.08	1.8-2.2	3.4-4.8	1-3	2.1-4.5	Nil	2.63-4.2
38	Vadakalur	6	7.78-8.31	2.4-3.43	8.6-10.8	10.2-14.8	8.2-9.4	0.08-0.12	2.6-3.2	5.2-6.1	12-14	0.62-2.2	Nil-1.6	1.5-4.2
39	Vayalappadi	6	8.60-8.72	1.2-1.56	3.8-5.6	4.2-6.4	3.2-6.8	0.04-0.12	1.8-3.2	2.4-3.8	4-6	2-4.4-2	Nil	1.28-3.6

Table 15. Chemical characteristics of underground irrigation waters of Alathur block of Perambalur distirct

S.No	Revinue village	No. of samples	P^H	EC dSm^{-1}	Ca meq l^{-1}	Mg meq l^{-1}	Na meq l^{-1}	K meq l^{-1}	CO_3 meq l^{-1}	HCO_3 meq l^{-1}	Cl meq l^{-1}	SO_4 meq l^{-1}	RSC meq l^{-1}	SAR
1	Adhanur	6	7.63-9.93	1.77-4.18	5.4-16.5	6.8-14.2	4--28	0.1-0.13	1.4-6.4	2.8-12.8	6-16	3.7.9	1.8-04.2	1.43 – 10.22
2	Alagripaliyam	5	7.37-8.6	1.11-2.16	3.6-12.2	1.8-7.8	4.2-7.8	0.38-0.08	1-2.6	3.8-5.8	4-14	1.04-5.08	Nil -2.8	1.33 – 4.66
3	Allinagaram(s)	5	7.63-8.12	2.22-3.89	6.2-18.2	9.2-12.8	5.6-6.8	0.08-0.12	1.8-3.2	4.8-6.2	12-16	8.2-12.8	1.43	1.31 – 2.84
4	Aladhur	6	7.90-8.13	1.04-1.68	3.2-5.2	4.4-6.8	2.56-5.9	0.08-0.13	1-2.4	2.9-3.6	6-10	0.39-2.2	Nil	1.31 – 2.84
5	Alageripalayam(n)	4	7.22-7.90	0,86-1.27	1.8-4,2	6,4-10.4	4,8-6,9	0.14-0.38	1-2.4	3.1-5.7	4-9	1.32-3.4	Nil	1.28 -2.88
6	Elanthalampatti	5	7.85-8.24	2.11-2.49	5.2-7.6	8.2-10.4	4.8-8.6	0.12-0.48	2.8-4.2	3.6-6.8	6-8.4	2.8-5.2	Nil	1.2 – 2.4
7	Irur	6	7.8-8.42	2.2-3.8	6.2-9.8	8.4-14.8	6.9-12.4	0.12-0.16	2.2-3.4	2.8-4.6	8.6-18.6	6.8-12.6	Nil	2.4 3.8
8	Jameen Athur	6	8.15-8.42	2.36-3.59	6.6-10.8	8.4-12.4	8.6-11.4	0.12-0.43	2.4-3.6	2.9-4.8	12.8-25	3.53-6.5	Nil	1.46 – 3.75
9	Kottarai	5	7.8-8,15	2.26-3.59	6.6-10.8	9.6-12.4	8.6-10	0.21-0.43	1.1-2.4	1.9-4.0	13-21	8.76-10	Nil	2.2 – 4.8
10	Karai (W)	5	7.65-8.12	1.25-1.68	4.2-6.4	4.0-8.2	4.2-6.0	0.08-0.12	1.2-2.0	1.8-3.2	5-8	2.6-6.0	Nil	1.8 – 3.2

11	Kolakkanatham	7	8.56-8.72	0.89-1.39	1.4-2.4	2.2-3.4	8.2-9.39	0.16-0.28	2.4-3.2	6.0-7.1	2-5	0.68-0.96	Nil	2.8 – 4.6
12	Kolathur	6	7.32-7.86	2.8-3.1	7.2-10.6	8.8-12.6	7.2-9.2	0.10-0.16	2.0-3.2	1.8-3.8	13-22	6.5-9.8	Nil	2.6 – 4.2
13	Kuthur	6	6.8-8.0	4.8-6.03	18.2-24.2	20.0-28.6	10.2-14.4	0.28-0.38	2.8-4.6	3.0-5.4	3.2-19	18-24	Nil	2.2-3.6
14	Melamathur	6	7.16-7.78	2.4-3.27	8.6-14.4	9.8-16.9	8.8-10.4	0.18-0.26	2.0-3.8	2.6-4.4	10-18	8.6-12.4	Nil	3.2-4.8
15	Mavilangai	5	8.03-8.36	0.98-1.34	3.2-4.8	2.4-6.5	3.6-6.4	0.12-0.18	1.2-3	1.8-3.4	6.0-10.4	2.8 – 4.6	Nil	1.43-2.4
16	Nakka Selam	6	7.84-8.2	0.86-1.13	2.6-3.2	3-4.4	1.3-4.8	0.02-0.10	1-3.4	1.2-3.8	2-3	1.4 - 2.12	Nil	1.25-2.9
17	Naranamangalam	6	8.03-8.49	0.57-1.34	2.24-2.8	2.2-6.0	1.27-4.80	0.03-0.18	0.6-1.2	3.2-3.3	3-7	1.80 – 4.48	Nil	0.75-1.35
18	Nattarmangalam	4	7.96-8.22	0.75-1.12	2.8-3.6	3.4-4.8	2.38-4.0	0.04-0.10	1.8-2.8	2.0-3.6	4.0-5.8	0.22 – 2.8	Nil	1.35-2.4
19	Pungarayanallur	6	8.03-8.36	0.91-1.28	1.4-3.9	2.6-5.0	1.08-4.8	0.05-0.09	0.6-2.4	3.7-4.8	3-6.0	1.4 – 2.4	Nil – 0.3	0.76-1.86
20	Pennakkulam (N)	5	7.34-8.2	0.8-1.2	2.2-4.8	3.6-5.2	2.1-3.4	0.08-0.12	0.8-1.2	1.8-3.2	4-7	4.0 - 7.0	Nil	1.2-1.86
21	Pennakkulem (S)	6	7.12-8.0	2.12-2.68	6.4-8.6	7.2-9.2	2.8-6.5	0.12-0.18	2.2-3.6	3.2-4.8	6-9	4.8 – 7.2	Nil	2.0-3.4
22	Pudhu Ammapaliyam	6	6.9-7.7-8	1.97-6.13	8.0- 24.0	12.2-18.8	6.8-18.0	0.26-0.82	2.2-4.8	3.6-8.4	16.8-32	4.8 – 18.6	Nil	2.52-4.8
23	Padalur (E)	5	7.7-8.2	0.72-I.97	1.8-4.2	4.8-12.4	2.8-6.0	0.08-0.1	0.4-0.8	2.6-3.2	3.8-13	2.4 – 4.39	Nil	1.35 -2.6
24	Padalur (W)	6	8.22-8.48	0.75-1.12	2.8-4.2	3.4-4.8	2.38-4.6	0.04-0.10	1.2-2.8	2.6-4.2	3-5	0.22 – 2.60	Nil	3.07-1.4
25	Sathanur	6	8.56-8.85	1.21-1.49	2.2-2.8	1.8-3.4	6.8-14.6	0.04	2.4-3.2	6.09	3-4.8	1.10 – 1.72	2.6 -3.4	2.8-5.07

26	Sillakkudi (W)	5	8.05-8.32	2.03-2.47	6.8-9.4	7.2-12.6	8.6-12.0	0.120.46	3.8-5.6	4.2-6.0	12-17	4.2 – 3.15	Nil	2.0-4.3
27	Sillakkudi (S)	5	8.54-8.68	1.10-1.45	2.8-4.2	3.2-4.0	6.94-9.0	0.100.31	2.6-3.2	7.9-8.6	1.3-4	0.68 - 0.90	2.7 -3.0	35.-4.8
28	Sirukanpur	5	7.94-8.25	0.58-4.69	1.6-9.2	2.2-11.4	3.69-20.2	0.09-0.52	1.2-4.2	2.3-8.0	3-18	1.51 – 12.0	Nil	2.68-8.3
29	Siruvaiyalur	4	7.90-8.29	2.6-3.98	5.2-12.0	8.0-14	4.2-12.0	0.100.24	0.8-3.6	3.28.0	13-17	3.8 – 9.6	Nil	3.6- 6.8
30	Thenur	5	8.12-8.46	1.85-2.25	5.2-9.2	4.8-10.4	5.6-9.8	0.12-0.19	1.4-2.8	3.6-6.5	3.0-9.0	1.8 – 4.2	Nil	3.13-4.8
31	Therani	5	8.16-8.42	1.71	4.2-6.1	4.7-8.0	6.64-8.1	0.16-0.39	1.6-4.2	3.6-5.4	2-6	1.8 – 3.6	Nil – 4.9	2.4-3.2
32	Thimmur	5	8.56-8.78	2.21-1.20	1.4-3.0	1.8-3.6	6.13-12.4	0.21-0.81	2.2-3.6	4.6-6.1	1.4-4	0.65 - 1.0	2.7 - 3.2	2.4-4.6
33	Thondappadi	6	7.63-8.16	2.68-3.89	8.4-14.6	9.2-12.8	8.4-13.6	0.14-0.32	2.8-4.2	3.2-5.4	12-16	4.6 -9.4	Nil	3.2-5.8
34	Cettikulam	6	7.85-8.93	0.66-2.49	3.4- -4	4.4 - 12.6	1.45 -17.5	0.06-0.12	0.8-2.6	0.5-12.8	5-14	1.3 – 5.1	Nil – 4.6	2.6-7.3
35	Varaguppadi	5	7.84-8.2	2.1-3.32	4.6-8.4	11.8-14.6	6.6-9.8	0.06-0.25	0.8-1.6	3.1-5.8	17-21	6.69 – 8.5	Nil	3.89-6.5

3. Ground water quality of Ariyalur District

To characterize the ground water quality of Ariyalur District 835 water samples (open and bore wells) were collected from different parts of Ariyalur district. The water samples were analyzed for pH, EC, cations (Ca, Mg, Na and K) and anions (CO_3, HCO_3, Cl and SO_4). Quality parameters like SAR and RSC were calculated. Classification of water quality is done on the basis of EC, SAR and RSC values as suggested by CSSRI, Karnal (Table 3). Among the total samples collected, 67.8 % is coming under good quality, 6.35 % is marginally saline, 19.9% is marginally alkaline, 3.59 % is alkaline, 2.04 % is saline and 0.48 % is highly alkaline. (Table 16 and Fig 5).

Ariyalur District has six Blocks viz., Ariyalur, Thirumanur, Andimadam, Jayankondam, T.Palur and Senthurai. Among the six blocks, the distribution of good quality samples were the highest in Andimadam Block (73.4 %) and the lowest in Jayankondam (56.5 %) Block (Table 16). The occurrence of marginally Alkali water (8.72 to 30.4 %) was prevalent in all the Blocks. Marginally saline water is prevalent in Ariyalur (8.72 %), Thirumanur (15.4 %), Jayankondam (8.7 %) and Senthurai (4.17 %) Blocks. The saline waters were prevalent in Ariyalur (3.49 %), Thirumanur (3.36 %) and Senthurai (5 %) blocks, while the occurrence of alkali waters were reported in Ariyalur (2.91 %), Thirumanur (3.36 %), Jayankondam (4.35), T.Palur (3.65 %) and Senthurai (8.33 %) Blocks. Highly alkali water was reported only in Ariyalur Block (2.33 %).

Table 16. Water quality distribution (%) in Ariyalur district.

S.No	Block	No.of samples	Good	MS	Saline	HSS	MA	Alkali	HA
1	**Ariyalur**	172	68.0	8.72	3.49	-	14.53	2.91	2.33
2	**Thirumanur**	149	69.13	15.4	3.36	-	8.72	3.36	-
3	**Andimadam**	142	73.4	-	-	-	24.6	-	-
4	**Jayankondam**	115	56.5	8.70	-	-	30.4	4.35	-
5	**T.Palur**	137	68.6	-	-	-	27.7	3.65	-
6	**Senthurai**	120	65.8	4.17	5.00	-	16.7	8.33	-
	Total /average	835	67.8	6.35	2.04	-	19.9	3.54	0.48

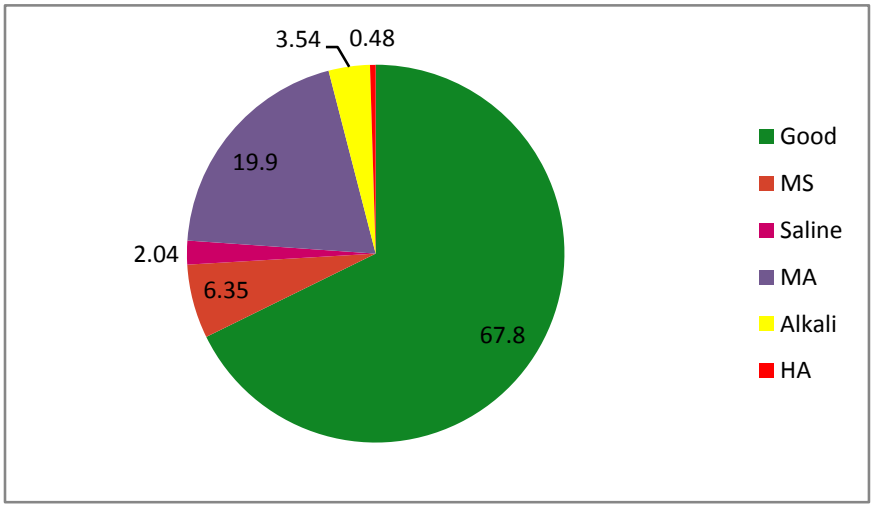


Fig.5. Water quality distribution (%) in Ariyalur district.

3.1. Chemical composition of ground waters

The pH, EC, anionic and cationic composition of irrigation waters were analysed and, sodium adsorption ratio (SAR) and residual sodium carbonate (RSC) were calculated. (Table 17, 18, 19). In general, the distribution of cations followed the order of Ca, Mg >Na > K. However in high RSC water samples, the distribution of cations followed the order of Na > Ca, Mg > K. Similarly the distribution of anions followed the order of HCO_3 + CO_3 >Cl>SO_4 when the irrigation water quality is good (EC < 2 dSm^{-1}). But the distribution of anions followed the order of Cl > HCO_3 + CO_3>SO_4 in the EC range of 2 to 4 dS/m and Cl>SO_4>HCO_3 in the EC range >4.0 dS/m.

Table 17. Quality of ground waters in different blocks of Ariyalur District

Name of the Block	pH			EC (dSm^{-1})			RSC (meq. l^{-1})			SAR		
	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean
Ariyalur	7.12	9.21	7.66	0.30	4.76	1.05	Nil	7.8	0.66	0.21	11.2	2.48
Thirumanur	7.04	8.92	7.70	0.31	4.15	1.12	Nil	5.6	0.43	0.18	7.2	1.46
Andimadam	7.41	8.61	7.98	0.28	1.19	0.78	Nil	2.9	0.74	0.65	6.4	3.29
Jayankondam	7.15	8.84	7.85	0.25	3.85	1.58	Nil	4.1	0.89	0.38	7.2	4.12
T.Palur	7.53	8.86	8.00	0.25	0.88	0.71	Nil	4.2	0.70	0.28	7.8	3.90
Senthurai	7.21	8.88	7.92	0.24	4.85	0.88	Nil	4.8	0.74	0.18	6.8	3.98

Table 18. Cationic composition of ground water in different blocks of Ariyalur district.

Name of the Block	Ca^{2+}			Mg^{2+}			Na^{+}			K^{+}		
	Minimum	Maximum	Mean	Minimum	Maximum	mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean
Ariyalur	0.20	20.6	4.09	0.7	16.7	2.64	0.6	10.8	2.64	0.01	1.09	0.17
Thirumanur	0.60	13.8	4.32	0.4	10.6	3.30	0.60	8.60	3.14	0.01	1.10	1.15
Andimadam	0.4	8.2	3.96	0.3	6.8	2.61	0.8	4.8	2.88	0.01	0.13	0.06
Jayankondam	0.6	7.8	3.87	0.2	4.8	2.58	0.6	8.8	2.54	0.02	0.42	0.12
T.Palur	0.6	9.6	2.83	0.3	5.4	1.88	0.5	4.2	2.02	0.01	0.21	0.15
Senthurai	0.6	19.4	3.8	0.3	15.2	2.47	0.4	8.6	2.22	0.01	0.30	0.13

Table 19. Anionic composition of ground waters in different blocks of Ariyalur district.

Name of the Block	CO_3^{2+}			HCO_3^{-}			Cl^{-}			$SO4^{2-}$		
	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean
Ariyalur	0.06	3.8	1.51	1.0	18.4	3.91	0.40	23.8	4.77	0.22	5.5	2.86
Thirumanur	0.8	3.2	1.69	1.0	14.4	4.69	0.6	17.2	4.05	0.12	6.8	1.18
Andimadam	0.4	3.2	1.62	0.8	5.8	3.45	0.40	8.1	4.08	0.18	2.2	2.88
Jayankondam	0.62	4.2	1.59	1.1	13.1	3.73	0.2	20.3	3.56	0.12	2.52	0.93
T.Palur	0.60	3.0	1.54	0.80	5.3	2.48	0.10	7.90	2.77	0.13	1.86	0.90
Senthurai	0.40	3.2	1.43	0.70	16.4	2.93	0.40	24.4	3.70	0.22	6.90	1.04

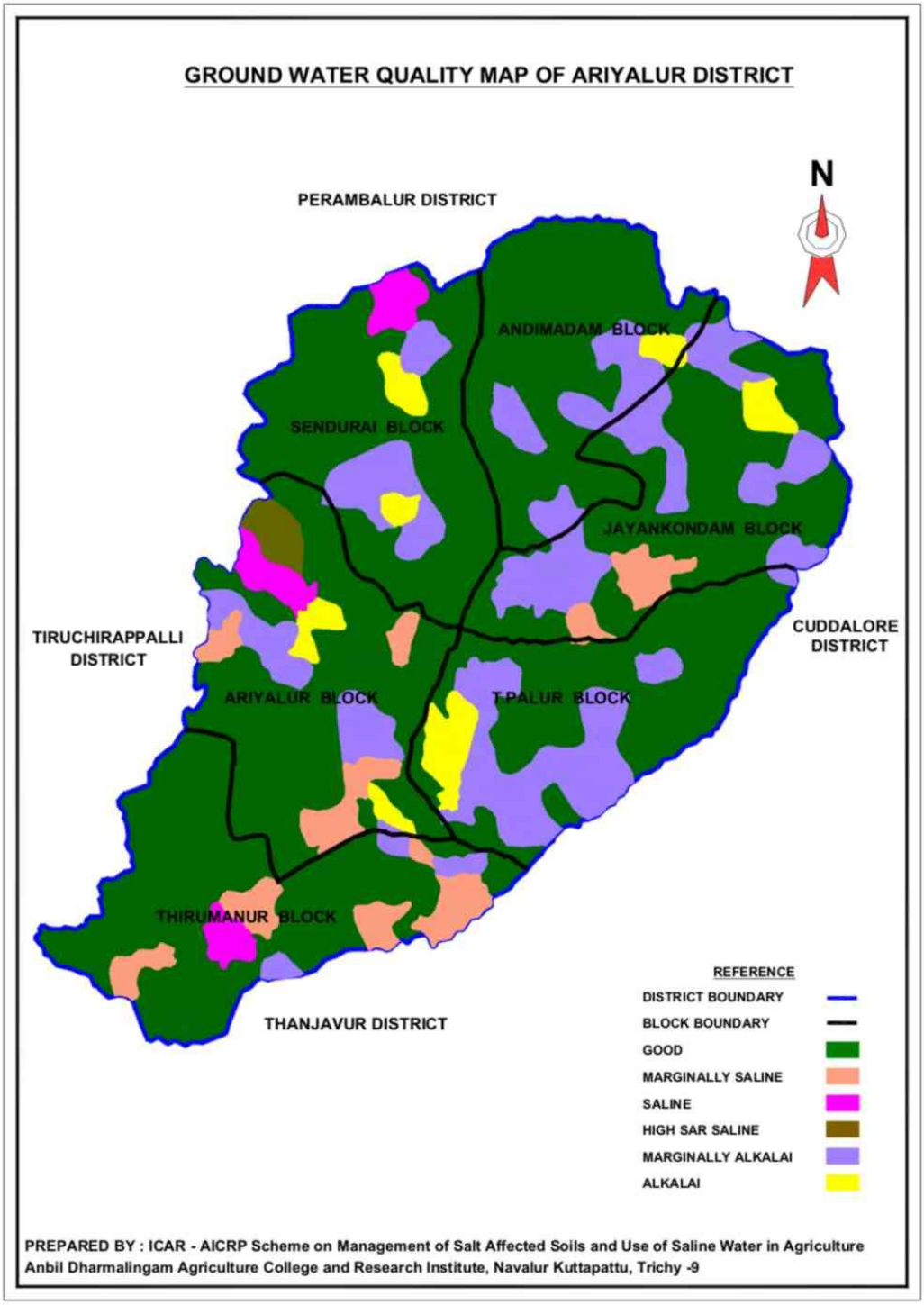


Fig.6. Ground water quality map of Ariyalur district.

3.2. Blockwise characterization of ground water quality

3.2.1. Ariyalur Block

In Ariyalur Block, 172 water samples were collected and analyzed to characterize the ground water quality (Table 21). The water table of open / bore wells varied from 25 to 80 feet. The analysis results showed that pH and EC of water samples ranged from 7.12 to 9.21 and 0.30 to 4.76 dS m^{-1}, respectively (Table 17). The RSC of waters varied from nil to 7.8 meq. l^{-1} and SAR ranged from 0.7 to 11.2. Out of the total samples collected from Ariyalur Block, 80.2 percent samples had RSC less than 2.5 meq. l^{-1}, whereas 14.5 percent samples showed RSC between 2.5 to 4.0 meq. l^{-1} and 5.24 per cent samples showed RSC > 4 meq. l^{-1}. About 85.7, 8.72 and 3.49 percent water samples showed EC in the range of < 2.0, 2- 4 and > 4 dS/m, respectively. About 68.02, 8.72, 14.53, 2.91, 3.49 and 2.33 per cent water samples were found under good, marginally saline, marginally alkali, Alkali, saline and highly alkali range categories, respectively (Table 16). Villages under different categories of water quality are presented in table 20.

Table 20. Villages under different categories of water quality in Ariyalur Block of Ariyalur District

Water quality	Name of the villages
GOOD	Alandhuraiyar kattalai, Arungal, Govinthapuram, Manakkal , Manakkudi, Melakkaruppur, Periyanagalur, Pottaveli, Puthupalaiyam, Punkuzhi, Rayampuram, Rettipalaiyam, Cennivanam, Suppurayapuram, Sundakkudi, Thamaraikulam, Thavutthaikulam, Thelur, Aminapath, Valajanagaram**,** V. Krishnapuram, Velangudi
MA	Antipattakkadu,, Edayathankudi, Eruthukaranpatti, Kayarlapath, Nagamangalam
MS	Ariyalur, Karuppelankattalai, Kavanur, Srinivasapuram, Periyathirukkonam.
A	Katukur,
S	Ottakkovil
HA	Iluppaiyur

Table 21. Chemical characteristics of underground irrigation waters of Ariyalur block of Ariyalur distirct

S.No	Revenue village	No. of samples	pH	EC dSm^{-1}	Ca meq l^{-1}	Mg meq l^{-1}	Na meq l^{-1}	K meq l^{-1}	CO_3 meq l^{-1}	HCO_3 meq l^{-1}	Cl $meql^{-1}$	SO_4 meq l^{-1}	RSC meq l^{-1}	SAR
1	Alandhuraiyar kattalai	5	7.42-8.07	0.62-0.85	3.0-3.2	2.4-2.6	1.4-1.8	0.04-0.10	1.0-0.82	1.6-2.6	4.2- 4.8	0.60-0.98	Nil	0.84-1.08
2	Antipattikkadu	4	7.79-.52.	0.50-1.02	1.0-5.2	0.8-4.0	2.8-3.2	0.06-0.12	0.80-1.6	2.8-3.3	1.2- 6.2	0.12-0.82	Nil-2.6	1.31-3.37
3	Ariyalur	5	7.81-8.02	1.27-3.31	6.2-5.0	4.0-9.6	2.6-6.4	0.03-1.9	1.02-4.8	5.2-9.2	6.8-16.1	0.92-2.8	Nil	1.15-1.82
4	Arungal	6	7.23-8.11	0.48-0.82	1.9-2.0	1.0-1.2	1.6-3.6	0.1-0.02	2.0-0.62	1.8-2.4	1.2-2.0	0.25-0.28	Nil-1.1	2.85-1.33
5	Edayathankuti	5	7.12-7.96	0.36-1.40	1.6-5.8	1.2-4.4	1.0-2.2	0.02-.09	0.82-1.6	1.0-3.4	2.0-8.1	0.22-0.45	Nil	0.97-0.85
6	Eruthukaranpatti	5	7.89-8.43	0.45-1.04	1.6-5.2	0.7-4.0	2.9-2.8	0.10-0.06	0.4-0.72	3.2-3.3	0.9-6.2	0.09-1.42	Nil-1.3	2.70-1.31
7	Govinthapuram	4	7.15-7.22	0.44-1.02	1.6-5.2	1.4-4.0	1.0-2.8	0.03-0.40	0.82-1.1	1.3-3.4	1.8-6.3	0.20-1.22	Nil	0.82-1.31
8	Iluppaiyur	4	8.26-9.21	0.78-1.35	1.6-3.8	1.0-3.0	2-10.8	0.18-0.32	1.0-2.4	2.3-8.8	4.2-0.6	0.62-1.42	Nil-8.6	1.08-9.47
9	Katukur	5	7.50-8.96	0.52-0.83	2.2-3.8	1.0-2.7	1.0-1.9	0.5-0.6	1.2-1.3	1.6-2.9	2.4-4.0	0.22-0.70	Nil	0.78-1.05
10	Karuppelangkattalai	5	7.46-8.02	1.36-3.06	6.2-3.2	4.0-1.1	2.6-6.4	0.04-0.25	1.02-3.1	5.2-6.4	6.8-18.8	1.12-2.4	Nil	1.15-1.84
11	Kavanur	4	7.35-8.15	1.2-3.49	5.8-5.6	4.0-2.4	2.2-8.0	0.07-0.10	1.12-3.4	5.0-3.1	6.4-18.2	1.18-3.82	Nil	0.99-2.14
12	Kayarlapath	5	7.89-8.58	0.83-1.48	2.2-6.6	1.8-3.8	3.0-4.7	0.02-0.4	1.5-1.6	5.2-5.6	1.1-7.5	0.35-1.35	Nil-3.1	1.32-3.32
13	Manakkal	5	7.22-7.67	0.44-0.58	1.8-2.0	1.4-1.8	1.0-1.6	0.16-0.25	0.80-1.1	1.4-2.0	2.0-2.2	0.45-0.61	Nil	0.79-1.16
14	Manakkuti	5	7.46-7.91	0.45-0.62	1.9-2.4	1.0-2.0	1.4-1.6	0.12-0.22	0.62-1.2	1.0-2.2	2.6-3.0	0.31-080	Nil	0.94-1.33
15	Melakkatuppur	4	7.48-7.61	0.87-1.86	8.2-3.2	0.8-2.8	2.0-3.1	0.03-0.07	1.4-1.6	2.8-7.5	3.6-8.9	0.24-0.42	Nil-0.1	1.15-1.46
16	Ottakkovil	6	8.16-7.14	1.22-4.76	5.8-0.6	4.01-.7	2.6-6.3	0.4-0.03	0.82-2.0	5.2-8.4	6.8-23.8	1.2-5.4	Nil	1.17-1.46

17	Periyanagalur	6	7.77-7.81	0.74-1.21	3.4-5.8	2.6-3.9	1.3-2.6	0.10-0.12	0.90-1.0	2.8-5.0	3.2-6.9	0.52-1.18	Nil	0.75-1.18
18	Periyathirukkonam	5	7.26-8.28	0.68-2.47	0.2-3.0	2.2-8.6	0.6-6.1	0.04-0.14	1.0-1.4	2.4-9.2	3.21-4.8	2.58-0.50	Nil-1.8	0.37-2.91
19	Pottaveli	5	7.64-8.12	0.82-1.47	3.8-5.4	2.7-3.1	1.9-3.8	0.16-0.18	1.2-3.1	2.9-5.7	4.0-6.8	0.75-1.2	Nil-0.3	1.05-1.84
20	Puthuppaliyam	4	7.94-8.02	0.43-1.54	1.8-7.4	1.6-6.3	1.0-2.8	0.02-0.05	1.2-1.6	1.6-6.7	2.0-7.8	0.60-1.10	Nil	0.77-1.07
21	Punganguli	3	7.84-8.23	0.52-1.04	2.2-4.2	1.4-3.8	1.0-2.1	0.06-0.22	1.1-1.8	1.6-3.8	2.6-4.4	0.45-1.12	Nil	0.75-1.05
22	Rayampuram	5	7.34-8.08	0.3-1.12	1.4-4.8	1.2-3.4	0.8-2.6	0.01-0.12	0.80-1.0	1.2-4.0	1.65.2	0.40-1.22	Nil	0.70-1.28
23	Rettipaliyam	5	7.68-8.10	0.82-1.30	3.3-5.8	2.8-3.9	1.2-2.6	0.14-0.17	1.09-1.2	2.6-5.2	3.0-7.0	0.48-1.08	Nil	1.18-
24	Cennivanam	5	7.26-7.81	0.74-1.21	3.8-6.0	2.7-3.7	1.6-2.6	0.11-0.21	0.9-1.6	3.1-5.0	4.0-6.9	0.80-1.25	Nil	0.89-1.18
25	Srinivasapuram	4	7.56-8.40	0.35-0.68	1.4-1.8	0.8-1.6	0.8-3.4	0.03-0.12	1.0-3.2	1.2-2.1	0.40-1.3	0.42-0.45	Nil-3.1	0.61-3.24
26	Suppurayapuram	5	7.59-8.08	0.54-1.0	2.2-5.2	1.4-3.6	1.0-1.6	0.13-0.80	1.1-3.2	1.6-5.5	2.0-3.2	0.60-1.0	Nil	0.75-0.76
27	Sundakkuti		7.59-8.21	0.82-1.43	2.8-6.8	1.7-4.2	3.3-3.9	0.16-0.16	1.0-2.4	2.9-3.8	4.2-6.2	0.80-2.0	Nil	1.41-2.60
28	Thamaraikulam	6	7.41-7.96	0.30-0.43	1.5-1.8	0.8-1.4	0.7-1.0	0.01-0.12	0.4-0.42	0.7-1.4	1.6-2.0	0.60-1.0	Nil	0.65-0.79
29	Thavutthaikulam	4	7.89-7.94	0.54-0.78	2.1-3.8	1.8-2.4	1.2-1.8	0.02-0.12	1.1-2.2	1.5-3.4	0.80-2.0	0.72-1.21	Nil	0.86-1.02
30	Thvur	5	7.91-8.05	0.62-0.99	2.8-3.8	2.2-2.9	1.0-2.2	0.02-0.04	1.1-2.4	2.3-3.0	3.0-3.9	0.50-1.10	Nil	0.63-1.20
31	Aminapath	5	7.56-8.23	0.35-1.45	1.8-3.8	1.2-1.9	0.6-5.6	0.05-0.10	0.65-3.6	1.0-5.2	1.7-2.8	0.45-1.20	Nil-31	0.49-3.32
32	Valaganagaram	5	7.14-8.16	0.82-1.47	2.8-3.8	1.6-1.7	3.9-5.6	0.18-0.25	3.0-3.8	4.7-5.6	0.80-2.2	0.45-1.85	3.3-3.9	2.63-3.38
33	V. krishnapuram	4	7.59-8.09	0.56-1.02	3.2-5.2	1.4-3.6	1.0-1.6	0.08-0.13	1.1-3.2	1.6-5.5	2.0-3.2	0.62-0.85	Nil	0.66-0.76
34	Velanguti	6	7.64-8.25	0.35-1.11	1.5-5.1	1.1-3.3	1.0-2.7	0.02-0.18	0.60-.28	1.6-4.9	1.4-4.2	0.48-1.21	Nil	0.88-1.32

3.2.2. Thirumanur Block

To characterize ground water quality of Thirumanur Block, 149 water samples were collected and analyzed (Table 23). The water table of open / bore wells varied from 15 – 60 feet. The pH and EC of water samples ranged from 7.04 to 8.92 and 0.31 to 4.15 dS/m, respectively (Table 17). The RSC of waters varied from nil to 5.6 meq. l^{-1} and SAR ranged from 0.18 to 7.2. Out of the total samples collected from Thirumanur Block, 87.93 percent samples had RSC less than 2.5 meq. l^{-1}, whereas 8.72 percent samples showed RSC between 2.5 to 4.0 meq. l^{-1} and 3.36 percent samples showed RSC above 4.0 meq. l^{-1}. About 81.2, 15.44 and 3.36 percent water samples showed EC in the range of < 2.0, 2- 4 and >4 dS m^{-1}, respectively . The percent distribution of good, marginally saline, marginally alkali, alkali, and saline water categories were 69.13, 15.4, 8.72, 3.36 and 3.36 per cent water samples respectively (Table 16). Villages under different categories of water quality are presented in table 22.

Table 22. Villages under different categories of water quality in Thirumanur Block of Ariyalur District

Water quality	Name of the villages
GOOD	Annimangalam, Ayansuthamalli, Cinnappattakkadu, Elanthakkudam, Kandiratherttham, Karaiyavetti,, Kezhapazhur, Kezhakolathur, Kezhaiyur, Kovilur, Kulamanikam, Manchamedu, Melapazhur, Palinganatham, Parpanacherry, Poondi, Puthukottai, Kannanur, Sathamangalam, Sembiakudi, , Thirumalappaadi, Thuthur, Vadukapalayam, Varanavasi, Vizhupanakurichi, Venganur
MA	Kamarasavalli, Komaan, Thirumaanur
MS	Alagiyamanavalam, Elakkurichi, Kovil Yesanai, Kuruvadi, Vetriyur
A	Sullankudi,
S	Kezhakkuatankurichi

Table 23. Chemical characteristics of underground irrigation waters of Thirumanur block of Ariyalur distirct

S.No	Revenue village	No. of samples	pH	EC dSm^{-1}	Ca meq l^{-1}	Mg meq l^{-1}	Na meq l^{-1}	K meq l^{-1}	CO_3 meq l^{-1}	HCO_3 meq l^{-1}	Cl $meql^{-1}$	SO_4 meq l^{-1}	RSC meq l^{-1}	SAR
1	Alagiyamanavalam	5	7.35-8.16	0.96-2.26	1.8-4.2	1.2-2.8	0.6-2.0	0.07-0.18	0.05-1.4	1.0-2.8	1.7-3.6	0.42-0.45	Nil	0.49-1.07
2	Annimangalam	5	8.02-7.28	0.45-0.93	2.0-3.7	1.4-2.4	1.0-2.2	0.16-0.18	0.80-.21	1.4-2.7	2.0-4.2	0.61-1.10	Nil	0.77-1.26
3	Ayyansuthamalli	4	7.37-8.30	0.92-1.10	2.8-4.8	2.6-3.4	2.8-3.1	0.13-0.15	2.1-3.2	4.0-4.8	0.62-4.7	0.61-1.0	Nil-2.6	1.38-1.89
4	Cinnappattakkadu	4	7.28-8.0	0.62-0.78	2.6-3.3	2.0-2.8	1.2-1.6	0.02-0.17	1.2-1.2	2.2-2.6	2.6-3.0	0.38-0.48	Nil	0.69-1.06
5	Elakkurichi	5	7.29-7.81	1.21-2.16	5.8-8.8	3.9-6.8	2.6-5.6	0.12-0.32	0.90-2.8	5.0-7.4	6.9-9.0	1.18-1.88	Nil	1.18-2.01
6	Elanthakkudam	5	7.04-7.42	0.77-1.40	3.4-5.6	2.0-4.3	1.6-3.8	0.18-0.21	1.0-1.20	2.0-4.0	3.1-5.9	1.0-1.40	Nil	0.97-1.71
7	Kamarasavalli	4	7.99-8.52	0.580.85	0.8-2.8	0.4-1.6	3.0-3.9	0.18-0.20	1.6-3.0	2.8-4.7	0.8-0.80	0.20-0.45	3.2-3.3	2.63-3.87
8	Kandrathittham	4	7.62-7.80	0.76-0.98	3.3-4.0	2.8-3.6	1.2-2.2	0.17-0.21	1.0-1.40	2.6-3.0	3.0-3.8	0.92-1.48	Nil-0.8	0.69-1.06
9	Karaiyavetti	5	7.30-8.26	0.68-0.81	1.4-3.4	0.6-2.6	2.0-3.6	0.07-0.12	1.34-2.0	2.2-2.6	1.82.8	0.80-1.21	Nil-2.6	1.18-2.01
10	Kezhakvatankurichi	5	7.17-8.21	1.86-4.15	6.2-6.4	4.8-4.2	5.7-8.6	0.16-1.10	2.40-4.2	10-14	3.0-20.4	1.96-6.8	Nil-3.6	0.97-1.71
11	Kezhapazhur	5	7.97-8.24	0.53-1.23	2.0-4.2	1.8-3.7	1.6-4.8	0.05-0.10	1.0-2.6	2.0-6.4	2.4-4.1	0.62-0.85	Nil-1.1	1.16 2.42
12	Kezhakolathur	4	8.02-7.28	0.45-0.93	2.0-3.7	1.4-2.4	1.0-2.2	0.16-0.18	0.8-1.21	1.4-2.7	2.0-4.2	0.61-1.10	Nil	1.07
13	Kezhaiyur	6	7.29-8.23	0.76-0.85	2.8-3.4	1.6-2.0	1.6-3.9	0.18-0.18	1.2-03.0	2.0-4.7	0.8-3.1	0.45-1.40	Nil-3.3	0.97-2.63
14	Kovil Yesanai	5	7.69-8.04	0.96-2.10	4.5-8.7	2.6-6.6	1.8-6.2	0.15-0.17	1.4-1.8	2.8-9.0	3.6-9.2	0.68-1.7	Nil	0.96-2.24
15	Kovilur	5	8.24-7.58	0.98-1.23	4.0-4.4	3.4-3.6	2.2-4.8	0.08-0.21	1.40-2.6	3.0-6.8	3.8-3.2	1.22-1.48	Nil1.6	1.13-2.43
16	Komaan	4	8.51-7.89	0.31-1.27	0.8-5.8	1.6-3.9	2.7-2.8	0.06-0.10	0.9-1.4	2.7-5.0	0.6-6.9	0.12-1.18	Nil-1.7	1.23-2.56

17	Guruvadi	5	7.89-8.04	0.48-2.09	2.6-8.1	1.1-7.2	1.0-6.2	0.07-0.12	1.3-2.0	1.6-8.2	2.4-8.8	0.32-1.32	Nil	0.74-2.24
18	Kulamanikam	5	7.38-7.81	0.93-1.21	3.8-5.8	2.6-3.9	2.2-2.6	0.12-0.16	0.9-1.42	2.8-5.0	3.2-6.9	1.18-1.82	Nil	1.18-1.23
19	Manchamedu	6	7.29-7.42	0.70-0.90	2.7-3.2	2.0-2.8	1.9-2.4	0.02-0.21	1.2-1.31	1.8-2.6	2.2-3.6	0.68-1.20	Nil	1.24-1.39
20	Melapazhur	4	7.16-8.38	0.66-1.28	2.8-4.4	2.2-3.4	1.1-4.6	0.18-0.08	1.4-2.6	1.8-6.4	2.4-2.6	1.62-0.46	Nil-1.2	0.70-2.33
21	Palinganatham	5	7.90-8.21	0.71-1.12	3.0-3.8	2.4-3.0	1.6-4.8	0.10-0.22	1.40-2.6	1.9-6.4	2.5-2.4	0.62-0.62	Nil-2.2	0.97-2.60
22	Parpanacherry	4	7.52-8.40	1.08-1.16	2.8-4.0	2.0-3.2	4.7-4.8	0.10-0.12	2.4-2.8	3.1-6.6	1.6-4.4	1.01-1.82	1.8-1.1	2.48-3.10
23	Poondi	5	7.54-7.77	0.90-1.20	3.2-4.8	2.8-4.0	2.4-3.2	0.31-0.40	1.31-1.8	2.6-3.8	3.6-4.2	0.68-1.32	Nil	1.39-1.53
24	Pudhukottai	5	7.61-8.28	0.52-1.00	2.6-3.8	1.1-3.5	1.0-2.6	0.07-0.21	1.3-1.5	1.6-3.3	2.4-4.2	0.32-1.1	Nil	0.74-1.36
25	Kannanur	6	7.51-8.18	0.82-1.42	3.6-6.8	2.8-3.8	*1.8*-2.6	0.08-0.09	0.8-1.0	2.4-5.2	3.6-8.0	0.61-1.05	Nil	1.01-1.13
26	Sathamangalam	4	7.76-8.08	0.68-1.38	2.8-5.4	2.0-4.6	1.6-3.8	0.02-0.27	1.2-1.2	2.2-3.8	2.6-4.1	0.38-2.10	Nil	1.03-1.70
27	Sembiakudi	5	7.45-8.21	0.80-1.23	3.4-4.4	2.6-3.4	2.2-4.6	0.1-2.106	1.2-2.6	2.6-6.4	2.0-3.8	0.92-1.94	Nil-1.2	1.27-2.33
28	Sullankudi	5	8.01-8.98	0.80-1.23	0.6-4.0	0.3-3.0	5.1-6.4	0.08-0.12	1.2-2.8	3.8-5.9	1.9-3.2	0.82-1.85	4.1-1.7	2.73-9.54
29	Thirumaanur	5	7.53-8.14	0.92-3.16	4.2-3.8	2.8-10	2.0-6.8	0.04-0.07	1.4-2.2	2.8-7.5	3.0-17.2	0.42-4.4	Nil	1.07-1.95
30	Thirumalappaadi	4	7.31-8.17	0.40-0.96	1.9-3.8	1.0-2.7	1.6-2.4	0.19-0.21	0.62-1.3	1.1-2.4	3.0-3.6	0.52-0.85	Nil	1.33
31	Thuttur	4	7.30-7.44	1.04-1.16	4.2-4.6	3.9-4.0	3.2-3.4	0.08-0.12	1.8-2.1	3.3-3.4	4.0-4.1	1.10-1.60	Nil	1.54-1.69

3.2.3. Andimadam Block

In Andimadam Block, for studying the water quality 142 water samples were collected and analyzed (Table 25). The water table of open / bore wells varied from 25 to 60 feet. The variation in pH and EC ranged from 7.41 to 8.61 and 0.28 to 1.19 dSm^{-1}, respectively (Table 17). The RSC of waters varied from nil to 2.9 meq. l^{-1} and SAR ranged from 0.65 to 6.4. Out of the total samples collected from Andimadam Block, 73.4 percent samples had RSC less than 2.5 meq. l^{-1} and 24.7 per cent samples showed RSC between 2.5 to 4.0 meq. l^{-1}. All the samples showed EC values below 2.0 dSm^{-1}. The percent distribution of good and maginally alkali water categories were 73.4 and 24.7 per cent respectively (Table 16). Villages under different categories of water quality are presented in table 24.

Table 24. Villages under different categories of water quality in Andimadam Block of Ariyalur District

Water Quality	Name of the Villages
GOOD	Anikuthichan**,** Alagapuram**,** Ayyur**,** Devanur**,** Idaiyakkurichi**,** Ilaiyur**,** Karukkai**,** Kavarampalayam**,** Kodukkur**,** Kolathur, Melur, Nagampanthal, Olaiyur, Periyathukurichi, Puthukudi, Rangiyam**,** Sriraman, Silampur, Thirukalapur, Vallam, Variyankaval,Vilanthai
MA	Andimadam**,** Katathur**,** Kovilvazhkai, Koovathur, Kuvagam, Maruthur, Periyakrishnapuram,

Table 25. Chemical characteristics of underground irrigation waters of Andimadam block of Ariyalur distirct

S.No	Revenue village	No. of samples	pH	EC dSm^{-1}	Ca meq l^{-1}	Mg meq l^{-1}	Na meq l^{-1}	K meq l^{-1}	CO_3 meq l^{-1}	HCO_3 meq l^{-1}	Cl $meql^{-1}$	SO_4 meq l^{-1}	RSC meq l^{-1}	SAR
1	Andimadam	5	7.42-8.52	0.59-1.61	1.0-8.2	0.5-4.8	3.2-3.2	0.08-0.10	1.8-1.8	4.0-4.8	1.2-7.9	0.18-2.0	Nil-4.3	1.26-3.66
2	Anikuthichan	5	7.38-8.26	0.28-1.52	1.2-7.2	0.8-4.8	0.6-3.2	0.02-0.04	0.4-1.8	0.8-4.8	1.0-7.9	0.22-2.2	Nil	0.60-1.31
3	Alagapuram	5	7.42-8.26	0.92-1.32	3.6-5.9	1.7-3.9	2.8-4.8	0.04-0.06	1.09-3.1	4.6-5.2	0.92-7.0	1.48-1.84	Nil-2.4	1.26-2.95
4	Ayyur	5	7.18-8.21	0.82-0.98	2.6-4.2	1.7-2.8	2.0-4.8	0.03-0.04	1.18-3.0	2.6-3.7	0.90-3.8	1.821.92	Nil-2.4	1.07-3.27
5	Devanur	4	8.30-7.52	0.80-1.42	2.8-5.8	1.6-4.4	3.6-3.8	0.02-0.07	1.4-3.0	0.24.7	1.928.0	0.81-1.24	Nil-3.3	1.59-2.56
6	Idaiyakkurichi	5	7.20-8.15	0.96-1.02	3.8-4.2	2.0-3.0	2.8-4.0	0.03-0.04	0.82-3.0	3.4-4.6	1.5-6.3	1.22-1.64	Nil-1.8	1.48-2.35
7	Ilaiyur	5	7.52-8.00	0.56-1.08	2.6-5.6	1.8-3.6	1.2-1.4	0.04-0.08	0.82-1.1	2.8-3.4	2.1-6.8	0.62-1.20	Nil	0.65-0.74
8	Karukkai	6	7.49-8.28	0.92-1.19	3.6-5.8	1.7-4.1	2.8-4.8	0.03-0.06	3.0-3.0	4.6-4.7	0.92-1.5	1.02-1.60	Nil-2.4	1.26-2.95
9	Kavarampalayam	5	7.82-8.25	0.38-1.42	2.2-5.7	1.4-4.6	0.8-3.5	0.02-0.13	0.62-1.4	1.2-5.2	2.0-8.0	0.40-1.24	Nil	0.60-1.54
10	Kaatathur	5	7.42-8.52	0.68-1.64	1.4-8.2	0.6-4.8	3.2-4.4	0.08-0.12	1.8-1.8	3.4-4.8	1.5-7.9	0.52-2.0	Nil-3.2	1.26-4.40
11	Kodukur	4	7.49-8.08	0.64-1.28	3.8-6.8	2.2-3.4	2.2-3.3	0.03-0.07	1.02-1.8	3.8-5.2	4.8-6.8	0.42-1.02	Nil	0.97-1.91
12	Kolathur	5	7.52-8.20	0.62-1.02	1.4-5.2	0.8-4.0	2.8-4.2	0.02-0.03	0.82-1.8	3.4-3.4	1.6-6.3	0.54-1.22	Nil-3.0	1.31-4.00
13	Kovilvazhkai	56	7.89-8.60	0.40-1.26	0.9-6.0	0.6-4.1	2.8-2.8	0.03-0.11	1.0-3.1	2.2-4.6	0.70-1.5	0.24-1.62	Nil-1.7	1.25-3.23
14	Koovathur	5	7.43-8.50	0.36-1.64	0.6-7.7	0.3-4.0	2.3-3.9	0.04-0.12	1.0-1.8	2.4-5.8	0.60-7.9	0.22-2.0	Nil-2.5	1.61-3.43
15	Kuvagam	5	7.82-8.61	0.68-1.21	3.0-5.9	2.1-3.9	1.3-2.8	0.04-0.08	1.0-1.8	2.44.8	1.87.9	1.602.2	Nil	0.81-1.26
16	Maruthur	5	8.52-7.62	0.54-1.04	1.0-5.6	0.4-3.6	1.4-3.6	0.04-0.05	0.82-3.0	1.8-3.4	0.55-6.6	1.24-0.42	Nil-3.4	0.65-4.30

17	Melur	5	8.02-7.31	1.42-0.64	1.4-5.7	0.8-4.6	3.5-4.2	0.01-0.07	1.6-1.8	2.8-5.8	4.8-8.1	0.42-1.82	Nil	1.54-4.00
18	Nagampanthal	4	7.22-8.16	0.43-1.52	1.9-7.2	1.4-4.8	0.8-3.2	0.04-0.11	1.0-1.8	1.2-4.8	1.5-7.9	0.87-2.2	Nil-2.4	0.62-1.31
19	Olaiyur	4	7.41-8.31	0.72-1.19	2.6-5.2	1.3-4.4	2.2-3.8	0.02-0.07	1.2-2.0	3.0-4.7	1.92-4.2	0.81-1.35	Nil-2.8	1.00-2.72
20	Periyathukurichi	4	7.26-8.38	0.42-1.49	2.5-6.0	1.1-4.4	0.8-3.6	0.02-0.04	1.4-1.8	2.4-5.2	0.60-8.0	0.82-1.64	Nil-0.6	0.60-1.58
21	Periyakrishnapuram	5	7.89-8.50	0.36-1.40	0.6-5.8	0.4-3.9	2.5-3.2	0.01-0.09	2.0-2.2	1.4-5.2	0.40-8.1	0.25-1.24	Nil-2.6	1.45-3.54
22	Puthukudi	5	7.24-8.00	0.56-0.92	2.8-4.2	3.4-1.2	1.1-1.7	0.04-0.06	1.0-1.18	1.8-2.8	2.1-3.8	1.02-1.60	Nil	0.73-0.91
23	Rangiyam	5	7.38-8.25	0.37-1.24	0.9-6.4	0.4-3.2	2.4-3.1	0.3-0.04	0.9-1.02	2.4-5.0	0.70-6.8	0.18-1.02	Nil-2.0	1.10-3.85
24	Sriraman	6	7.41-8.02	0.62-1.0	1.2-1.3	0.7-3.0	2.8-4.2	0.02-0.07	0.82-1.8	2.4-2.8	4.7-6.3	0.10-1.22	Nil-2.6	1.93-4.20
25	Silampur	5	7.28-8.12	0.94-1.40	4.0-5.5	2.8-4.6	1.7-3.5	0.01-0.06	1.18-1.6	2.9-5.0	3.8-8.1	1.82-1.92	Nil	0.92-1.56
26	Thirukalapur	5	8.24-7.82	0.32-1.04	1.5-5.6	1.3-3.4	0.8-1.5	0.04-0.12	0.82-1.0	1.1-3.4	1.2-6.0	0.10-1.24	Nil	0.68-0.71
27	Vallam	5	7.16	1.36	4.2-5.3	2.8-3.8	1.7-3.6	0.2-0.04	2.0-1.18	4.2-2.6	3.4-8.1	1.02-1.24	Nil	0.91-1.69
28	Vaariyankaval	5	8.28-7.28	0.30-1.06	1.6-5.6	1.0-3.6	0.8-9.4	0.04-0.10	0.8-0.82	1.2-3.0	1.0-6.8	0.62-1.20	Nil	0.70-4.38
29	Vilanthai	5	7.04-8.24	0.62-1.23	1.3-5.8	0.7-4.3	2.8-4.2	0.01-0.3	3.0-3.2	2.8-4.8	0.75-1.5	0.70-1.56	Nil-4.0	1.25-4.20

3.2.4. Jayankondam Block

To study the ground water quality of Jayankondam Block 115 water samples were collected and analyzed (Table 27). The water table of open / bore wells varied from 40 to 70 feet. In Jayankondam block, the variation in pH and EC ranged from 7.15 to 8.84 and 0.25 to 3.85 dSm^{-1}, respectively (Table 17). The RSC of waters varied from nil to 4.1 meq. l^{-1} and the SAR ranged from 0.38 – 7.2. Out of the total samples collected from Jayankondam Block, 65.2 percent samples had RSC less than 2.5 meq. l^{-1}, 30.4 percent samples showed RSC between 2.5 to 4.0 meq. l^{-1} and 4.35 percent samples showed RSC between 2.5 to 4.0 meq. l^{-1}. About 91.3 and 8.7 percent water samples showed EC in the range of < 2.0 and 2- 4 dS/m, respectively . About 56.5, 8.70, 30.43 and 4.35 per cent water samples were found under good, marginally saline, marginally alkali and alkali water categories, respectively (Table 16). Villages under different categories of water quality are presented in table 26.

Table 26. Villages under different categories of water quality in Jayankondam Block of Ariyalur District

Water Quality	Name of the Villages
GOOD	Aalathipallam**,** Aamanakkanthondi**,** Angarayanallur**,** Thevamangalam, Ilayaperumanallur**,** Eravankudi**,** G.K. Solapuram**,** Guruvayapparkovil, Kazhumangalam, Kazhuvanthondi, Kattagaram, Melanikuzhi, Padanilai, Pappakudi**,** Pilichikuzhi, Pillapalayam, Prancheri, Pichanur, Saluppai, Thazhuthalai medu, Thathanur, T. Solankurichi, Utkottai, Vunkudi
MA	Jeyamkondam, Udaiyarpalayam, Kundaveli, Periyavalayam,, Kachi perumal, Thandalai,Idaiyar
MS	Kallathur Vanathirayanpattinam
A	A.Nayakanpettai

Table 27 Chemical characteristics of underground irrigation waters of Jeyamkondam block of Ariyalur distirct

S.No	Revenue village	No. of samples	pH	EC dSm^{-1}	Ca meq l^{-1}	Mg meq l^{-1}	Na meq l^{-1}	K meq l^{-1}	CO_3 meq l^{-1}	HCO_3 meq l^{-1}	Cl $meql^{-1}$	SO_4 meq l^{-1}	RSC meq l^{-1}	SAR
1	Aalathipalam	4	7.54-8.19	0.41-0.56	1.9-3.2	1.4-1.8	1.0-1.6	0.08-0.21	0.62-1.1	1.1-1.6	2.0-3.0	0.50-0.85	Nil	0.66-1.18
2	Amanakthanthondi	5	7.42-8.02	0.53-1.02	2.3-5.2	1.6-3.6	1.2-1.6	0.13-0.18	1.0-3.2	2.8-5.5	1.6-3.2	0.61-0.62	Nil	0.76-0.86
3	Angarayanalur	5	7.74-8.17	0.40-1.43	1.9-6.8	1.0-3.8	1.6-2.6	0.09-0.21	0.62-1.0	1.1-5.2	3.0-8.0	0.52-1.05	Nil	1.13-1.33
4	A.Nayakanpettai	5	7.92-8.80	0.54-1.12	0.8-5.2	0.3-4.0	2.8-4.2	0.02-0.06	0.82-3.6	2.8-3.3	0.28-6.2	0.28-0.82	Nil-5.3	1.31-5.56
5	Devamangalam	6	7.72-8.29	0.75-1.52	3.8-6.0	2.7-4.2	1.6-5.7	0.12-0.16	1.6-4.2	3.1-9.1	2.1-4.0	0.80-0.92	Nil	0.89-2.52
6	Idaiyar	5	8.51-8.53	0.36-0.40	0.6-0.8	0.2-0.3	2.6-3.2	0.01-0.10	1.2-1.5	2.4-2.4	0.2-0.30	0.10-0.32	2.7-2.9	3.88-4.53
7	Ilaiyaperuma nallure	5	7.89-8.23	0.40-1.04	1.8-5.2	1.3-4.0	1.0-2.1	0.03-0.21	0.5-0.82	1.6-3.4	1.5-6.3	0.80-1.22	Nil	0.80-0.98
8	Eravankudi	4	7.20-8.32	0.35-1.62	1.0-7.6	0.4-4.8	2.9-3.7	0.07-0.12	1.8-1.8	2.2-5.8	0.28-7.7	0.181.20	Nil-2.6	1.49-3.47
9	G.K. Solapuram	5	7.38-8.04	0.88-1.24	3.6-6.2	2.8-3.8	2.0-2.4	0.02-0.31	1.02-1.8	2.6-5.2	3.0-6.8	0.92-1.6	Nil	1.07-1.12
10	Guruvayappar kovil	4	7.38-8.17	0.40-1.26	1.7-6.0	1.2-3.8	1.0-2.4	0.06-0.13	0.5-1.02	1.6-5.0	1.5-6.4	0.80-1.32	Nil	0.83-1.08
11	Jeyamkondam	5	7.02-8.51	0.25-1.62	1.2-7.6	0.8-4.8	0.6-3.1	0.07-0.21	0.4-1.8	1.3-5.8	0.5-7.7	0.41-1.23	Nil	0.64-1.24
12	Kallathur	3	7.57-8.18	0.62-2.06	2.6-8.1	2.0-6.2	1.6-6.0	0.02-0.30	1.2-2.20	2.2-7.8	2.6-8.0	0.58-2.52	Nil	1.06-2.24
13	Kalumangalam	5	7.74-8.32	0.80-1.73	3.8-7.9	3.0-6.2	2.0-3.2	0.18-0.42	1.6-2.14	2.3-6.8	4.2-7.7	0.62-1.89	Nil	1.08-1.21
14	Karuvan thaadi	5	7.35-8.21	0.82-1.26	3.6-5.2	2.7-4.0	1.8-2.2	0.07-0.13	1.2-1.6	3.4-5.0	2.2-6.4	0.80-1.18	Nil	1.01-1.03
15	Kachi perumal	6	7.56-8.52	0.31-1.06	0.5-5.2	0.3-4.0	2.4-2.8	0.06-0.11	0.82-1.1	2.0-3.3	0.30-6.2	0.18-0.82	Nil-2.3	1.31-3.79
16	Kaatagram	5	6.90-8.01	0.92-1.65	4.8-7.8	2.6-4.8	1.8-3.2	0.07-0.16	1.4-1.8	2.8-5.8	3.6-7.7	1.68-1.92	Nil	0.94-1.27

17	Kundaveli	5	8.53-8.54	0.41-0.56	0.5-0.8	0.2-0.3	3.0-4.2	0.02-0.17	2.8-3.6	1.6-2.8	0.3-0.82	0.28-0.48	3.7-5.3	5.07-5.66
18	Melanikuzhi	5	7.75-8.12	0.75-1.48	3.8-6.0	2.7-4.2	1.6-5.7	0.16-0.21	1.6-4.2	3.1-9.1	2.1-4.2	0.89-0.92	Nil-3.1	0.89-2.52
19	Padanilai	4	8.29-8.40	0.35-0.44	1.4-2.6	1.1-1.4	1.0-0.6	0.12-0.20	1.2-1.6	2.4-2.4	0.2-0.58	0.1-0.42	Nil-1.1	0.42-0.89
20	Pappakudi	4	7.88-8.28	0.46-1.43	2.6-6.0	1.2-4.1	1.0-5.6	0.02-0.12	1.8-3.6	2.4-8.1	1.0-2.1	0.82-1.52	0.4-1.6	0.73-2.49
21	Periyavalayam	4	7.42-8.54	0.47-1.62	0.9-7.7	0.5-4.0	3.0-3.9	0.12-0.14	1.8-2.2	1.8-5.8	0.60-7.9	0.31-2.0	Nil-2.6	1.61-3.59
22	Pilichikuzhi	5	7.28-8.16	0.39-1.20	1.7-6.2	1.0-3.6	0.8-2.2	0.03-0.26	0.62-1.0	1.1-5.2	3.0-6.8	0.50-1.02	Nil	0.69-0.99
23	Pillapalayam	6	7.58-8.43	0.45-1.40	1.4-6.6	0.8-3.6	2.2-2.6	0.02-0.13	0.80-1.0	2.4-5.2	0.8-8.0	0.40-1.24	Nil-1.0	1.15-2.10
24	Prancheri	4	7.42-8.26	0.82-1.36	2.8-5.9	1.6-3.9	2.8-3.9	0.14-0.08	3.0-1.09	4.7-5.2	0.90-7.0	1.48-1.82	Nil-3.3	1.26-2.63
25	Pichanur	4	8.01-8.22	0.69-0.92	2.8-3.6	1.8-2.0	1.8-4.8	0.02-0.06	1.6-2.8	2.3-4.8	1.2-4.2	0.68-1.42	Nil-2.2	1.16-2.92
26	Salupai	5	7.21-8.12	0.92-1.41	2.8-5.8	2.0-3.9	3.8-4.8	0.04-0.09	1.0-3.0	4.6-5.2	1.5-8.0	1.24-1.64	Nil-2.8	1.73-3.10
27	Thandalai	5	8.25-8.54	0.32-0.33	0.6-1.5	0.4-1.3	0.8-2.0	0.12-0.12	1.0-1.8	1.0-1.6	0.60-1.2	0.24-0.82	Nil-2.4	0.68-2.83
28	Thazhuthalai medu	5	7.20-8.40	0.31-1.52	1.3-7.2	0.9-4.8	0.6-3.2	0.04-0.21	0.72-1.8	1.2-4.8	1.1-7.9	0.45-2.0	Nil	0.57-1.31
29	Thathanur	5	7.81-8.15	0.27-0.61	1.2-2.7	0.8-1.2	0.7-1.2	0.08-0.12	0.8-1.1	1.2-1.8	0.6-2.4	0.25-0.31	Nil	0.70-0.86
30	T. Solankurichi	5	7.91-8.38	0.29-0.43	1.2-1.8	0.8-1.2	1.0-1.2	0.02-0.03	0.8-1.0	1.8-1.9	0.4-1.4	0.12-0.30	Nil-0.6	0.82-1.20
31	Udaiyarpalayam	5	7.56-8.64	0.36-1.42	0.4-6.6	0.2-3.8	2.9-3.0	0.02-0.08	1.0-1.6	2.6-5.2	0.12-7.5	0.10-1.48	Nil-3.0	1.32-5.29
32	Utkottai	4	8.28-8.16	0.34-0.39	1.6-1.8	1.0-1.2	0.7-0.8	0.10-0.30	0.8-1.0	1.2-1.1	1.0-1.4	0.62-0.80	Nil	0.57-0.70
33	Vanathirayanpatinam	4	8.38-7.15	3.85-0.92	3.6-16	1.7-13	4.8-8.8	0.06-0.15	3.0-2.12	4.7-13	0.92-0.3	1.08-3.40	14-2.4	2.34-2.95
34	Vunkudi	5	7.92-8.23	0.91-1.24	4.8-5.8	2.6-3.6	1.8-2.0	0.07-0.16	1.09-1.4	2.8-4.8	3.6-6.0	1.02-1.68	Nil	0.92-0.94

3.2.5. T. Palur Block

In T.Palur Block, 137 water samples were collected and analyzed to characterize the ground water quality (Table 29). The water table of open / bore wells varied from 25 to 65 feet. The analysis results showed that, pH and EC of water samples ranged from 7.53 to 8.86 and 0.25 to 0.88 dS m^{-1}, respectively (Table 17). The RSC of waters varied from nil to 4.2 meq. l^{-1} and SAR ranged from 0.28 to 7.8. Out of the total samples collected from Alathur Block, 68.61 percent samples had RSC less than 2.5 meq. l^{-1}, 27.74 percent samples showed RSC between 2.5 to 4.0 meq. l^{-1} and 3.65 per cent samples showed RSC > 4 meq. l^{-1}. All the water samples (100 %) showed EC in the range of < 2.0 dS/m, respectively. About 68.6, 27.7 and 3.65 per cent water samples were found under good, marginally alkali and Alkali range categories, respectively (Table 16). Villages under different categories of water quality are presented in table 28.

Table 28. Villages under different categories of water quality in T.Palur Block of Ariyalur District

Water quality	Name of the villages
GOOD	Aathichanur**,** Anaikudam**,** Sinthamani**,** Kovinthaputhur**,** Kunamangalam**,** Irugaiyur, Karkudi, Kadampur, Kaaduvetankurichi, Kodalikarupu, Kodankudi**,** Managathi, Naduvalur, Nayakanaipiripal,
	Porpathinthanallure,, Sozhamadevi, Suthamalli, T. Palur, Thenkachiperumalnatham, Udayanatham, Ulliyakudi, Vazhaikurichi, Vembukudi,
MA	Anikurichi**,** Idankani**,** Kasankottai, Kezhanatham, Parukkal, Sathampaadi,, Sripuranthan**,** Venmankondan
A	Ambapur

Table 29. Chemical characteristics of underground irrigation waters of T.Palur block of Ariyalur distirct

S.No	Revenue village	No. of samples	pH	EC dSm^{-1}	Ca meq l^{-1}	Mg meq l^{-1}	Na meq l^{-1}	K meq l^{-1}	CO_3 meq l^{-1}	HCO_3 meq l^{-1}	Cl $meql^{-1}$	SO_4 meq l^{-1}	RSC meq l^{-1}	SAR
1	Aathisalur	4	7.89-7.78	0.61-0.69	2.7-2.8	1.1-5.9	1.0-1.2	0.8-0.9	1.0-1.1	1.8-2.0	2.2-2.4	1.25-1.32	Nil	0.68-0.79
2	Ambapur	5	8.86-7.82	0.49-1.42	0.7-5.7	0.4-4.6	3.5-3.6	0.01-0.13	1.6-2.6	2.2-5.0	0.80-7.2	0.75-1.86	Nil-3.7	1.54-4.85
3	Anaikudam	5	7.52-8.16	0.50-1.18	1.1-5.4	0.6-3.2	2.0-3.2	0.03-0.06	2.8-3.0	2.0-4.6	0.52-1.5	0.42-1.60	Nil-3.1	0.96-3.47
4	Anikurichi	6	8.52-8.50	0.33-0.48	0.8-0.8	0.4-0.7	1.9-2.2	0.14-0.22	1.8-2.4	1.3-1.9	0.2-0.40	0.12-0.31	1.9-2.8	2.45-2.54
5	Sinthamani	4	7.76-8.24	0.48-1.31	2.8-3.3	1.5-3.6	0.50-.6	0.02-0.07	0.60-.09	1.8-4.8	2.1-6.0	0.62-1.02	Nil	0.34-3.55
6	Idankani	4	7.88-8.57	0.88-1.43	6.2-3.6	2.8-3.9	2.0-3.4	0.04-0.09	1.8-2.0	3.02-.2	2.2-8.0	1.24-1.70	Nil	1.12-1.51
7	Kovindaputhur	5	7.21-8.13	0.35-1.82	0.7-9.6	0.2-5.2	2.3-3.1	0.08-0.21	1.8-4.9	1.4-5.0	0.6-10.5	0.17-1.80	Nil-2.3	1.14-3.43
8	Kunamangalam	5	8.03-8.22	0.64-0.65	2.8-3.0	2.0-2.1	1.3-1.3	0.02-0.04	1.0-1.0	1.6-1.8	2.2-2.4	1.42-1.60	Nil	0.81-0.84
9	Irugaiyur	5	8.09-8.29	0.25-0.50	1.2-2.1	0.8-1.7	0.5-1.1	0.05-0.07	0.68-1.0	0.9-1.3	1.1-1.5	0.22-0.50	Nil	0.50-0.80
10	Karkudi	6	7.73-7.88	0.68-0.52	2.3-2.8	1.5-1.6	1.2-1.2	0.9-0.18	1.0-1.0	1.4-2.0	2.0-2.3	0.21-0.32	Nil	0.82-0.86
11	Kasankottai	5	7.62-8.54	0.57-1.28	1.2-6.6	0.9-4.3	3.8-2.8	0.07-0.03	2.8-3.0	2.0-4.8	0.9-2.5	0.36-1.56	Nil	0.71-1.20
12	Kadampur	6	7.28-8.12	0.34-0.62	1.6-2.8	1.0-2.0	0.8-1.3	0.01-0.02	0.8-1.0	1.2-1.6	0.6-2.2	0.311.42	Nil	0.70-0.84
13	Kaduvetankurichi	5	7.52-8.10	0.62-1.62	2.8-7.8	2.0-5.4	1.3-3.4	0.02-0.04	1.0-1.8	1.6-4.8	2.2-7.9	1.43-2.2	Nil	0.84-1.32
14	Kezhanatham	5	8.52-8.51	0.42-0.84	1.2-3.3	0.8-2.1	0.5-2.0	0.02-0.04	0.80-1.6	1.0-3.2	0.30-2.2	0.50-1.70	Nil	0.50-1.22

15	Kodalikarupu	5	7.94-8.23	0.58-0.48	1.1-1.9	0.03-1.4	1.0-1.8	1.9-0.11	2.1-1.0	0.8-1.2	1.5-2.0	0.82-0.89	Nil-.77	1.33-1.40
16	Kodankudi	5	7.84-8.24	0.58-0.92	2.9-4.2	1.1-2.8	1.7-3.0	0.06-0.21	1.18-2.0	2.8-3.4	0.62-3.8	0.80-1.02	Nil-1.4	0.91-2.12
17	Managathi	5	7.53-8.22	0.52-0.62	1.4-2.8	0.8-2.2	1.0-3.2	0.02-0.20	1.1-1.8	2.1-3.4	1.6-3.2	0.54-0.72	Nil-3.0	0.63-3.05
18	Naduvalur	5	8.07-7.82	0.48-0.42	1.8-1.9	1.4-1.4	0.8-1.0	0.02-0.07	1.0-1.0	1.2-1.2	1.5-2.0	0.70-0.80	Nil	0.97-0.62
19	Nayankanaipiripal	4	8.02-7.42	0.81-1.0	3.8-4.2	2.4-3.0	1.8-2.6	0.04-0.18	0.82-1.4	2.4-2.8	3.6-6.3	1.22-1.68	Nil	1.02-1.37
20	Parukkal	3	7.92-8.60	0.38-1.12	0.9-6.0	0.4-3.8	2.2-2.5	0.03-0.06	1.02-2.8	1.1-5.2	0.10-6.8	0.13-1.02	Nil-2.6	0.99-3.10
21	Porpathinthanallure	5	8.21-8.16	0.14-0.57	2.0-2.8	1.3-1.8	0.7-1.1	0.08-0.08	1.0-1.1	1.6-1.8	1.1-2.1	0.72-1.6	Nil	0.54-0.73
22	Sathampaadi	5	8.75-8.57	0.72-0.66	1.4-1.8	1.0-1.2	2.3-3.8	0.02-0.20	3.1-3.4	2.9-3.2	0.60-0.9	0.27-0.32	3.5-3.6	2.10-3.10
23	Sozhamadevi	5	7.01-8.02	0.44-1.26	2.1-4.6	1.4-3.2	0.8-2.6	0.02-0.11	0.82-1.0	1.2-2.4	1.5-6.3	0.89-1.22	2.4-2.5	0.60-1.32
24	Sripuranthan	4	8.53-8.51	0.39-0.40	0.6-0.6	0.3-0.4	2.7-2.8	0.02-0.08	2.3-2.4	1.0-1.1	0.38-0.4	0.42-0.62	Nil	3.82-4.17
25	Suthamalli	4	8.17-7.37	0.35-1.47	1.4-6.2	1.0-3.9	0.9-3.4	0.04-0.09	0.80-2.0	1.0-5.2	1.4-8.0	0.74-1.24	Nil	0.82-1.51
26	T.Palur	6	7.96-7.93	0.44-0.35	1.3-1.8	1.1-1.4	0.8-1.0	0.05-0.16	0.75-0.8	1.0-1.4	1.5-2.0	0.32-0.61	Nil	0.73-0.97
27	Thenkachiperum alnatham	5	7.34-8.21	0.62-0.89	1.5-4.2	0.6-2.4	1.8-4.1	0.03-0.07	1.18-1.8	2.4-2.6	2.0-3.8	0.62-1.02	Nil-2.1	0.99-4.00
28	Udayanatham	4	7.91-8.32	0.36-0.48	1.0-1.4	0.8-1.1	0.7-2.8	0.02-0.44	0.72-2.0	1.2-1.8	0.9-1.3	0.26-0.65	Nil-2.0	0.63-2.95
29	Ulliyakudi	5	7.71-8.12	0.39-0.64	1.8-3.0	1.2-2.1	0.7-1.3	0.04-0.30	1.0-1.0	1.1-2.8	1.4-2.4	0.81-0.82	Nil	0.57-0.57
30	Vembukudi	5	7.18-8.20	0.62-1.48	1.4-6.2	0.8-3.9	3.4-4.1	0.02-0.08	1.8-1.8	2.8-5.3	2.7-8.0	0.70-1.28	Nil-2.4	1.51-3.91
31	Venmankondan	3	7.48-7.99	0.88-1.08	5.9-4.8	3.6-2.8	1.5-1.7	0.02-0.04	0.8-1.08	2.6-3.4	3.4-6.8	1.02-1.20	Nil	0.69-0.87

3.2.6. Senthurai Block

In Senthurai Block, for studying the water quality 120 water samples were collected and analyzed (Table 31). The water table of open / bore wells varied from 30 to 75 feet. The variation in pH and EC ranged from 7.21 to 8.88 and 0.24 to 4.85 dSm^{-1}, respectively (Table 17). The RSC of waters varied from nil to 4.8 meq. l^{-1} and SAR ranged from 0.18 to 6.8. Out of the total samples collected from Senthurai Block, 75.0 percent samples had RSC less than 2.5 meq. l^{-1}, 16.67 per cent samples showed RSC between 2.5 to 4.0 meq. l^{-1} and 8.33 per cent samples showed RSC > 4.0 meq. l^{-1}. About 90.8, 4.17 and 5.00 percent water samples showed EC in the range of < 2.0, 2- 4 and > 4 dS/m, respectively .The percent distribution of good, marginally saline, marginally alkali, alkali and saline water categories were 65.83, 4.17, 16.67, 8.33 and 5.00 per cent respectively (Table 16) . Villages under different categories of water quality are presented in table 30.

Table 30. Villages under different categories of water quality in Senthurai Block of Ariyalur District

Water quality	Name of the villages
GOOD	Athanakurichi**,** Alathiyur**,** Ananthavaadi**,,** Ayanthathanur**,** Irumpulikurichi**,** Kulumur, Kumiliyam, Manapathur, Maruvathur, Nathalkudi, Nakkamvazhi**,** Nallampalayam, Namankulam, Palaiyakudi, Paranam, urichi, Pillakkurichi, Ponparappi, Thullar, Vanchinapuram, Veerakkan, Senthurai, Sirukadampur, Siruleathur
MA	Sendurai, Kezhamaaligai, Manakudiyan,
A	Anveerankudikaadu**,** Unchini
S	Thalavaai,

Table 31. Chemical characteristics of underground irrigation waters of Senthurai block of Ariyalur distirct

S.No	Revenue village	No. of samples	pH	EC dSm^{-1}	Ca meq l^{-1}	Mg meq l^{-1}	Na meq l^{-1}	K meq l^{-1}	CO_3 meq l^{-1}	HCO_3 meq l^{-1}	Cl $meql^{-1}$	SO_4 meq l^{-1}	RSC meq l^{-1}	SAR
1	Athanakurichi	4	7.42-7.70	0.47-0.49	1.8-2.0	1.0-1.1	1.6-1.8	0.04-0.12	0.62-0.8	1.1-1.4	2.9-3.0	0.28-0.8	Nil	1.29-1.52
2	Alathiyur	6	7.50-7.68	0.45-0.50	2.0-2.6	1.2-1.6	1.0-1.0	0.02-0.01	1.06-1.0	2.2-1.5	1.2-2.0	0.6-0.88	Nil	0.73-0.75
3	Ananthavaadi	5	7.21-8.44	0.89-1.23	3.0-5.8	1.8-3.9	2.7-3.9	0.01-0.18	0.90-5.0	4.0-5.1	0.8-0.92	0.72-.92	Nil-4.2	1.23-2.52
4	Anveerankudikaadu	5	7.92-8.88	0.67-1.24	0.9-6.2	0.4-3.6	2.8-4.0	0.110.13	0.9-3.0	2.3-5.0	0.80-6.9	0.8-1.46	Nil-4.0	1.26-4.96
5	Ayanthathanur	5	7.21-8.02	0.52-1.26	2.0-6.0	1.6-4.1	1.2-2.5	0.02-0.11	0.9-1.1	1.5-5.0	3.0-6.8	0.6-1.42	Nil	0.89-1.11
6	Irumpulikurichi	5	7.87-8.24	0.23-1.12	1.0-4.0	0.6-3.2	0.5-4.5	0.10-0.12	0.4-1.6	0.7-6.4	1.6-4.1	0.6-0.85	Nil	0.56-2.37
7	Kezhamaaligai	6	7.50-8.50	0.51-1.02	0.8-5.9	0.3-3.6	1.5-4.2	0.02-0.06	1.20-3.2	2.8-3.5	0.28-3.2	0.62-2.4	0.8-4.9	0.69-5.66
8	Kulumur	4	7.73-8.01	0.75-0.89	2.8-3.8	1.8-2.4	1.8-3.9	0.02-0.18	1.2-3.0	2.2-4.7	0.80-3.4	0.45-0.6	Nil-3.1	1.02-2.57
9	Kumiliyam	5	7.75-7.85	0.24-0.32	1.6-1.2	0.9-0.6	0.6-0.4	0.12-0.23	0.42-0.6	0.7-0.8	1.6-1.0	0.6-0.23	Nil	0.42-0.54
10	Manakudiyan	4	7.64-8.56	0.82-0.38	3.8-0.6	0.3-2.7	1.9-2.9	0.6-0.08	1.2-2.3	1.0-2.9	0.4-24.0	0.62-0.7	Nil	1.05
11	Manapathur	5	7.62-8.40	0.62-1.48	1.8-7.0	0.6-4.5	3.3-3.5	0.12-0.16	1.0-3.2	2.1-2.9	0.40-4.2	0.56-1.5	Nil-2.9	1.46-3.01
12	Maruvathur	4	7.41-8.22	0.62-1.04	3.0-4.2	2.1-3.8	1.3-2.1	0.04-0.22	1.0-1.8	2.8-3.8	2.4-4.4	0.8-1.12	Nil	0.81-1.05
13	Nathalkudi	6	7.18-8.20	0.48-1.58	2.1-6.8	1.7-4.8	1.1-2.2	0.05-0.09	1.0-1.6	1.3-3.4	1.5-8.1	0.2-0.45	Nil	0.80-0.91
14	Nakkamvazhi	5	7.50-8.18	0.52-1.86	2.7-9.6	1.3-5.4	1.0-3.2	0.02-0.08	1.0-1.9	1.3-5.0	1.51-0.5	0.22-1.8	Nil	0.71-1.17
15	Nallampalayam	5	7.28-8.32	0.60-1.01	1.8-5.2	1.0-3.4	1.5-3.2	0.02-0.04	1.8-0.82	3.4-3.6	1.9-6.8	0.54-1.9	Nil-2.6	0.72-2.70

16	Namankulam	6	7.52-8.16	0.97-0.99	4.0-4.4	2.3-2.8	1.6-1.7	0.03-0.06	1.2-1.18	2.9-3.0	4.8-5.2	1.0-1.92	Nil	0.87-0.92
17	Pallaiyakudi	5	7.74-8.07	0.47-0.93	2.3-2.6	1.4-1.7	0.9-4.8	0.03-0.08	0.62-3.0	1.2-3.7	3.0-0.90	0.3-1.82	Nil-2.4	0.66-3.27
18	Paranam	5	7.82-7.85	0.32-1.10	1.4-5.9	1.1-3.6	0.7-1.5	0.02-0.4	0.7-0.82	1.2-3.4	1.3-6.8	0.26-1.2	Nil	0.63-0.69
19	Periyakurichi	4	7.66-8.32	0.40-0.62	1.8-1.9	0.6-1.4	0.8-3.8	0.11-0.12	1.0-3.2	1.2-2.1	0.40-1.5	0. 6-0.9	Nil-2.9	0.62-3.47
20	Pillakkurichi	5	7.83-8.08	0.38-0.72	1.8-3.8	1.2-2.0	0.7-1.8	0.02-0.30	1.0-1.6	1.1-2.3	1.4-3.2	0.68-0.8	Nil	0.57-1.06
21	Ponparappi	4	7.79-8.24	0.34-0.48	1.6-2.6	1.0-1.4	0.8-0.8	0.10-0.13	0.62-0.7	0.8-1.2	1.0-2.2	0.40-0.4	Nil	0.57-0.70
22	Sannasinallur	5	7.60-8.18	1.04-2.28	4.2-9.2	3.8-6.4	2.1-6.0	0.22-0.30	1.82.20	3.8-7.8	4.4-8.4	1.1-3.52	Nil	1.05-2.15
23	Senthurai	7	7.94-8.59	0.45-0.38	0.6-2.4	0.3-1.4	0.8-2.9	0.08-0.1	1.0-2.3	1.0-1.2	0.42-1.5	0.6-0.87	Nil-2.4	0.58-4.32
24	Sirukadambur	5	7.76-8.01	0.29-0.92	1.6-4.2	0.8-2.8	0.4-1.7	0.06-0.10	0.7-1.18	0.8-2.8	1.0-3.8	0.4-1.02	Nil	0.37-0.91
25	Sirukalathur	4	7.21-8.28	0.42-1.52	2.2-6.8	1.2-4.6	0.8-3.4	0.09-0.13	0.62-2.0	1.2-5.2	2.2-8.0	0.4-1.24	Nil	0.61-1.42
26	Thalavaai	6	7.86-8.18	1.01-4.85	4.2-19.4	3.8-15	2.0-8.6	0.22-1.10	1.8-2.40	3.6-16	4.02-4.4	6.8-1.00	Nil	1.00-2.07
27	Thullar	5	7.21-8.26	0.38-1.90	2.2-9.7	1.0-5.5	0.6-3.3	0.08-0.13	0.62-1.9	1.2-5.0	1.71-0.3	0.4-1.82	Nil	0.47-1.20
28	Unchini	4	7.98-8.83	0.76-0.92	1.0-4.2	0.5-2.8	1.6-5.6	0.07-0.13	1.17-3.2	2.6-2.8	0.75-4.0	0.95-1.0	Nil-4.5	0.86-6.47
29	Vanchinapuram	5	8.01-7.78	0.96-1.24	4.0-6.2	2.8-3.6	1.7-2.8	0.06-0.11	0.9-1.18	2.9-5.0	5.2-6.9	1.46-1.9	Nil	0.92-1.26
30	Veerakkan	5	7.52-7.85	0.32-1.02	1.4-5.2	1.1-4.0	0.7-2.8	0.03-0.4	0.72-.82	1.2-3.4	1.3-6.3	0.26-1.2	Nil	0.63

4. Management of Poor Quality Ground Waters in Agriculture

Appropriate selection of crops, improvement in water management and maintenance of soil structure/permeability are necessary for sustaining irrigation with these poor quality waters (Minhas et al, 1998). A committee of consultants recommended the guidelines for utilising poor quality waters in 1990 for their wider applicability in different agro-ecological zones of India (Table 32).

Table 32. Guidelines for using poor quality ground waters for irrigation in India
a. Saline water (RSC < 2.5 me/L)

Soil texture (% clay)	Crop Tolerance	ECw (dS/m) limit for rainfall region < 350	350-550	> 550 mm
Fine (>30)	Sensitive	1.0	1.0	1.5
	Semi-tolerant	1.5	2.0	3.0
	Tolerant	2.0	3.0	4.5
Moderately fine (20-30)	Sensitive	1.5	2.0	2.5
	Semi-tolerant	2.0	3.0	4.5
	Tolerant	4.0	6.0	8.0
Moderately coarse (10-20)	Sensitive	2.0	2.5	3.0
	Semi-tolerant	4.0	6.0	8.0
	Tolerant	6.0	8.0	10.0
Coarse (<10)	Sensitive	--	3.0	3.0
	Semi-tolerant	6.0	7.5	9.0
	Tolerant	8.0	10.0	12.5

b. Alkali waters (RSC > 2.5 me/L, EC_{iw} < 4.0 dS/m)

Soil texture (%clay)	SAR (mmol/l) ½	Upperlimit ofRSC (me/L)	Remarks
Fine (> 30)	10	2.5 - 3.5	Limits pertain to *kharif* fallow/*Rabi* crop rotation when annual rainfall is 350-550 mm. When the waters have Na < 75% (Ca+Mg > 25%) or rainfall is 550 mm, the upper limit of the RSC range becomes safe, RSC neutralization with gypsum is essential based on quantity of water used during the rabi season. Grow low water requiring crops during kharif.

Moderately fine	10	3.5 - 5.0	
Moderately coarse	15	5.0 - 7.5	
Coarse (> 10)	20	7.5 - 10	

4.1. Management of Saline Waters

Plant growth is affected adversely with saline irrigation primarily through the impacts of excessive salts on osmotic pressures of the soil solution. Under the field situations, the first reaction of plants to the use of saline waters is reduction in the germination but the most conspicuous effect is the growth retardation of crops. A general conclusion can be that the detrimental effects of salinity include reduced initial growth resulting in smaller plants. These smaller plants with lesser leaf area in turn are able to produce lesser assimilates for their conversion to seeds.

4.1.1. The management options for successful use of saline water are as follows:

- For successful utilisation of saline waters, crops those are semi-tolerant to tolerant (mustards, wheat, cotton), as well as those with low water requirement are recommended while crops like rice, sugarcane and berseem, those require liberal water use, should be avoided. In low rainfall areas (< 40cm), mono-cropping is recommended for maintaining salt balances.
- The accumulation of salts vis-à-vis tolerance limits to the use of saline waters gets modified with soil texture, annual rainfall and ionic constituents of salinity. As a 'thumb rule' accumulation of salts is nearly one half that of irrigation water in coarse textured soils (loamy sand and sand). It is equal to that of irrigation water in medium textured sandy loam to loam soils and more than two times in fine textured soils (clay and clay loam). In other terms, irrigation with water of salinity 8 dSm^{-1} would result in soil salinity of about 4, 8 and 16 dSm^{-1} in loamy sand, sandy loam and clay loam soils, respectively. Thus, waters of as high salt concentration as having an EC of 12 dSm^{-1} can be used for growing tolerant and semi-tolerant crops in coarse textured soils, provided the annual rainfall is not less than 400 mm. But in fine textured soils, waters with EC more than 2 dSm^{-1} would often create salinity problems.

- One of the fortunate situations with continental monsoon climate of India is the concentration of rains in a short span of 2-3 months. In Tamil Nadu during North East monsoon (October- December) majority of rainfall is received. Thus, if the water penetrating into soils during this period exceeds the evapo-transpiration demands of crops, it induces leaching of salts added through saline irrigation to summer or *Kharif* winter crops or in low rainfall regions. The amount and frequency of rains basically govern the salt leaching occurring during monsoon season but soil texture has also been shown to influence leaching.
- Predictions show that removal of 80% of the salts accumulated during the period preceding monsoons would require 1.85, 0.95 and 0.76 cm of rainwater per cm soil depth in fine, medium and coarse textured soils. Thus, in areas with annual rainfall less than 250 mm, saline waters of EC about 4 dSm^{-1} will cause salt toxicity in most of the crops. But in areas where annual rainfall exceeds 500 mm, waters up to an EC of 16 dSm^{-1} could be gainfully utilised for saline tolerant crops in coarse textured soils. Such waters, however, should not be used for raising *kharif* or summer season crops.
- Chlorides, being more toxic tend to reduce the tolerance limits of crops to the use of saline water by 1.2-1.5 times as compared with sulphate rich waters). Similarly, more salts tend to accumulate in soils when irrigated with waters of high SAR and thus these also tend to reduce the limits of saline water use.
- All crops do not tolerate salinity equally well at different stages of their growth *e.g*. germination and early seedling establishment being the most critical stage followed by the phase changes from vegetative to reproductive *i.e*. heading and flowering to fruit setting. Therefore, the use of saline waters should be avoided during initial stages of crop growth.
- In addition to intergenic variations, crop cultivars also vary in their tolerance to salinity. Such cultivars have been identified on their rating for high yield potential, salt tolerance and stability under saline environments

4.1.2. Salt tolerance of crops

Category	Crops
Sensitive	
Field crops	Field bean, green gram, lentil
Fodders (Forage)	Red clover, white clover, guar (cluster bean)
Vegetables	Celery, radish (English var), green bean
Fruits	Peach, apricot, pear, apple, plum, strawberry, blackberry
Semi salt tolerant	
Field crops	Oats, rice, sorghum, maize, pearl millet, wheat (improved var.), pigeon pea, gram, castor, flax, soybean, rye, castor bean
Fodders (forage)	Senji (Melilotus sp.), mentha, sorghum, maize, berseem, cowpea, ryegrass, sudan grass, oat
Vegetables	Tomato, cabbage, cauliflower, lettuce, potato, radish, carrot, onion, lady finger, pea, cucumber, pumpkin, sweet potato, squash
Fruits	Grape, olive, fig, guava, mango, banana, pomegranate, orange, grape fruit, lemon, almond, pineapple
Salt tolerant	
Field crops	Barley, dhaincha (Sesbania sp.) sugarbeet, tobacco, cotton, wheat (some local var), sugarcane, rapeseed Salt grass, dubgrass (Cyanodon sp.),
Fodders (Forage)	Rhodes grass, Bermuda grass
Vegetables	Beetroot, asparagus, spinach, kale, turnip
Fruits	Date palm, coconut, falsa (Grewia sp)

4.1.3. Irrigation and leaching management

Arid areas would need 15 to 20 percent more water to be applied as irrigation for meeting out the leaching requirements. To maximise the benefit from enhanced quantity of irrigation water, attempts should be simultaneously made to minimise the water applied *i.e.* saline

irrigation should be applied more frequently. Nevertheless, in areas with rainfall more than 400 mm and having monsoon type of climate, no extra leaching is usually required and the conventional irrigation practices may be followed. In the years of sub-normal rainfall, a heavy pre-sowing irrigation with saline water should be applied so that the salts accumulated during the preceding season are pushed beyond the root-zone.

The distribution of water and salts in soils vary with the method of irrigation. A shift towards micro-irrigation systems such as drip and sprinklers, where a better control on salt and water distributions can be achieved, hold promise for enhancing the use efficiency of saline waters especially for high value crops. Pre-emergence application of saline water through sprinklers helps to keep soluble salt concentrations low in seedbed during germination and thus better establishment of the crops (Plate 1)

Plate 1. Drip irrigation system for vegetable crops

The existing fresh and saline water supplies could be suitably combined in several ways.

- First option is to blend the two supplies such that the salinity attained after mixing is within the permissible limits, based upon soil type, climate of the area and the nature of crop to be irrigated.

- Application of the two waters separately, so that higher salinity water is avoided at sensitive growth stages/crops *viz*., the germination and seedling establishment stage. Therefore, the better quality water should be utilised for pre-sowing irrigation and early stages of crop growth.

4.1.4. Role of amendments and fertilizers

Farmyard manure (FYM): FYM and other organic materials play an important role in structural improvements, which further influences leaching of salts and reduce their accumulation in the root zone. .

Fertilizers: Application of nutrients is important for obtaining good yields with saline irrigation.

- Response to applied nitrogen is rather reduced under saline irrigation. Thus, additional doses of nitrogenous fertilisers are recommended to compensate for volatilisation losses.
- Soils irrigated with chloride rich waters respond to higher phosphate application, because the chloride ions reduce availability of soil phosphorus to plants.
- For sulphate rich waters, no additional application of phosphate fertilisers is required and the dose recommended under normal conditions may be applied.
- For micro-nutrients such as zinc, the recommended doses based on soil test values should be applied.

4.1.5. Other cultural practices

To ensure better populations following measures are suggested

- Reduce inter/intra row spaces and use 20-30% extra seed than required under normal conditions.
- Dry seeding and keeping the surface soil moist through sprinkler/ post-sowing saline irrigation helps in better establishment of crops.
- Modifications in seedbed *e.g*. sowing near the bottom of the furrows on both sides of the ridges and applying irrigation in alternate row recommended. For the larger seeded crops, the seeds can be planted in the furrows.
- Adoption of measures for better intake of rainwater and its conservation in soil via checking unproductive evaporation losses is recommended during monsoon season.

4.2. Management of alkali waters

These waters are characterised by low total salt concentration (EC < 4 dSm^{-1}) while the proportion of Ca and Mg salts is much smaller as compared with Na that often constitutes > 70 per cent of the total cations. Such waters usually have sodium bicarbonate as the predominant salt such that their RSC > 2.5 me L^{-1}. In certain cases, the calcium salts may be nearly absent. Irrigation with alkali waters leads to increase in alkalinity and sodium saturation in soils. The increase in exchangeable sodium percentage (ESP) adversely affects soil physical properties including water infiltration and soil aeration. On drying soils become very hard and on wetting the soil particles get dispersed and clog the soil pores, which affect root respiration and development. The waters with low Ca^{2+} (<2 me L^{-1}) and high amounts of carbonates result in specific toxicity symptoms on plants. These include scorching and leaf burning at the early seedling development stage of crops.

4.2.1. Crop selection

As is the case with salinity, considerable variations also exist in the tolerance of crops to sodicity in soils and the crops may be accordingly selected as per the expected sodicity build up from the use of particular alkali water.(Table 33)

Table 33. Relative tolerance of crops to alkalinity /sodicity in soils.

ESP Range	Crops
10-15	Safflower, peas, pigeon-pea, blackgram, greengram
16-20	Bengal gram, soybeans
20-25	Ground nut, cowpea, onion, pearl-millet
25-30	Garlic, guar
30-50	Sunflower
50-60	Sesbania
60-70	Rice

- Cultivation of high water requiring crops like sugarcane and rice should be avoided with alkali waters as these aggravate the sodicity problems.
- In low rainfall areas (average annual rainfall < 400 mm) if the good quality canal water is not available, it is advisable to keep the fields fallow during *kharif* season. During *rabi*, only tolerant and semi-tolerant crops should be grown.
- For areas having rainfall > 400 mm/annum, it is ensured that sowing, particularly of *kharif* crops is done with rain water or good quality canal water. Besides, not more than 2 to 3 irrigations should be applied with alkali waters in the *kharif.*
- Alkali waters should not be used for growing summer crops in the month of April to June.

4.2.2. Amendment needs

Adverse effect of alkali waters on physical properties of the soil can be mitigated, provided calcium-bearing amendments like gypsum is used. It is considered as the cheapest source of calcium and is available in large quantity in the country. Acids or the acid forming substances such as sulphuric acid or pyrites can also be used which on reaction with soil $CaCO_3$ release Ca^{2+}. However, by virtue of low cost and ease in handling, gypsum is by far the most suitable amendment for creating favourable sodium to calcium ratio and the crop growth is highly improved.

Quantity of gypsum: Application of gypsum has earlier been recommended when RSC of irrigation water exceeds 2.5 me/L (Plate 2). However later on it has been shown that factors such as the level of the existing deterioration of the soil, cropping intensity and the water requirements of the crops to be raised will ultimately decide the amount of gypsum required. Field observations are that gypsum helps in maintaining the yields of the crops irrigated with alkali waters (RSC > 5 me/L) especially when paddy is grown in rotation and rainfall of the area being is < 50 cm. In wheat-fallow rotation, no response to gypsum has been reported on light textured (sandy loam) soils when irrigated with waters having RSC upto 10 me/L. Once the role of amendments is established for raising crops with alkali waters, questions regarding its mode, amount and time of application have to be answered.

Plate 2. Gypsum application

- Gypsum requirement to neutralise residual alkalinity of water: The quantity of agricultural grade gypsum (70% purity) for neutralization of each me/L of RSC is 90 kg/ha per irrigation of 7.5cm depth. The quantity of gypsum is thus determined by the quality of water (RSC to be neutralised) and the quantity of water required for irrigation during a growing season or on yearly basis.
- Gypsum requirement of soil: Since knowing the gypsum requirement of irrigation water alone is not sufficient in case the soils which are previously deteriorated soils either due to irrigation with alkali water or for some other reason is alkali in nature, gypsum requirement of the soil should be determined separately. Hence during the first year, gypsum should be added both on the basis of soil as well as irrigation water. Subsequently, application of gypsum is needed on the basis of irrigation water only. Since the same water is to be used year after year, application of gypsum has also to be repeated.

Time of application: The best time for application of gypsum is after the harvest of crops, preferably in the month of May or June if some rain has occurred. Otherwise, if no rain is received during these months, its application should be postponed till the first good monsoon showers are received. Gypsum could be applied even in the standing water, as it will hasten leaching of salts and the reclamation process. The soil should be subsequently ploughed, upon attaining proper soil moisture condition.

Method of application: Gypsum is preferably added to the soil, being easier to accomplish, than treating the water itself. The ISI grade gypsum may be applied through broadcast in requisite quantity on a previously graded field and mixed in a shallow depth of soil with a cultivator or disc. Proper levelling of the fields is another important pre-requisite. Fields should be provided with 35 to 40 cm high strong bunds for retaining the entire rainwater. Bunds also prevent the entry of water from outside.

Use of gypsum beds: It requires some mechanism for dissolution of gypsum in the irrigation water itself. Such a practice will also eliminate the costs involved in powdering, bagging and proper storage before its actual use. In view of the costs involved, the dissolution of gypsum directly in water through the use of gypsum beds or its application to the irrigation channels, appears an economical preposition. Dissolution of gypsum is affected by factors such as size distribution of gypsum fragments, flow velocity, salt content and chemical composition of water. For flowing water to pick up Ca through dissolution of gypsum, special gypsum bed has been designed. Nevertheless it is pointed here that gypsum bed water quality improvement technique may not dissolve > 8 me/l of Ca^{2+}. (Plate 3)

Plate 3. Gypsum bed treatment of alkali water

At Tiruchirapalli, a new model of gypsum bed was designed using RCC rings of 0.9 m diameter and 0.3 m height to treat alkali water using phosphor-gypsum. Totally four RCC rings were used to achieve the structural dimension of 1.2 m height and 0.9 m diameter (Fig.8) which is closed at the bottom with inlet (50mm size) in the bottom ring and other in the upper most ring, so as to enable the water coming from the PVC conveyance pipes in the farmers holdings to pass through the gypsum beds. The phospho –gypsum was placed in cloth bags over the iron mesh provided in between the third and fourth ring. The cost of one such structure is estimated at Rs.4,000/- and therefore it should it should be possible for the farmer to construct the same at their fields.

4.2.3. Fertilizer application

Since alkali waters cause a rise in soil pH that leads to greater nitrogen losses through volatilisation and denitrification, extra nitrogen may have to be added to meet the requirement of the crops. Similarly, the availability of zinc and iron is also low due to their precipitation as hydroxides and carbonates.

- Application of 25% extra nitrogen is needed as compared to the normal conditions.
- Zinc sulphate @ 25 kg/ha should be added, particularly to the *rabi* crops.
- Phosphorus, potassium and other limiting nutrients may also be applied on the basis of soil test values.
- Some alkali waters may be rich in nutrients like nitrogen, potassium and sulphur. Such waters should be analysed and the fertiliser dose of concerned nutrient reduced accordingly.

4.2.4. Irrigation practices

Emphasis should be to minimise the irrigation with alkali water as deterioration of soil directly depends on the quantities of irrigation water. The 'sodic hazard' is reduced considerably if the water are used alternatively or mixed with canal water. Besides reducing the gypsum requirement of the soil, conjunctive use of alkali and canal water will help in bringing more area under protective irrigation and also in controlling rise in groundwater table and the associated problem.

4.2.5. Alternate Land Uses

In some cases, it is neither feasible nor economical to use saline waters for crop production especially on lands those are already degraded. Best land use under such situations is to retire such areas to permanent vegetation. To establish plantations and to improve biomass production from such lands, pit auger hole technology was developed (Plate 4, 5).

Plate 4. Planting technique using Auger hole

Plate 5. Alternate land use of growing tree crops

This technology consists of making a pit of size with auger of 30 cm diameter 120 cm deep. If the excavated soil is alkali, soil should be amended with Gypsum @ 50 % GR or Gypsum @ 25 % GR + 75 ml DSW / kg of soil or DSW @ 150 ml / kg of soil. Preferred choice for tree species should be; *Tamarindus indica, Bambusa bamboo. Lueceana leucocephala, Prosopis juliflora, Acacia leucophloea, , Azardirachta indica and Dalbergia sisoo* (Plate 6).

5. SUMMARY

Perambalur and Ariyalur districts are centrally located in Tamil Nadu wherein the ground water is the major source of irrigation. The major crops cultivated in the district are rice, millets, pulses, sugarcane, cotton and oil seeds. Rice is grown as rainfed crop. Oil seeds such as groundnut and gingelly are grown both under irrigated and rainfed conditions. Pulses like blackgram, green gram and redgram are grown in rice fallows. The mean annual rainfall of the district is 908 mm. Due to over-exploitation of ground water for irrigation water and also due to pressure from others like industry and domestic use, the quality of irrigation water is becoming poorer. In order to plan management strategies, detailed survey of groundwater quality is required. Hence an attempt has been made to classify the ground water quality at revenue village / block level for each district of Tamil Nadu. In this process of ground water quality survey, Perambalur and Ariyalur districts were surveyed and classified.

The ground water quality of Permabalur District (680 samples) and Ariyalur District (835 samples) of Tamil Nadu were characterized by collecting water samples from both open and borewells.

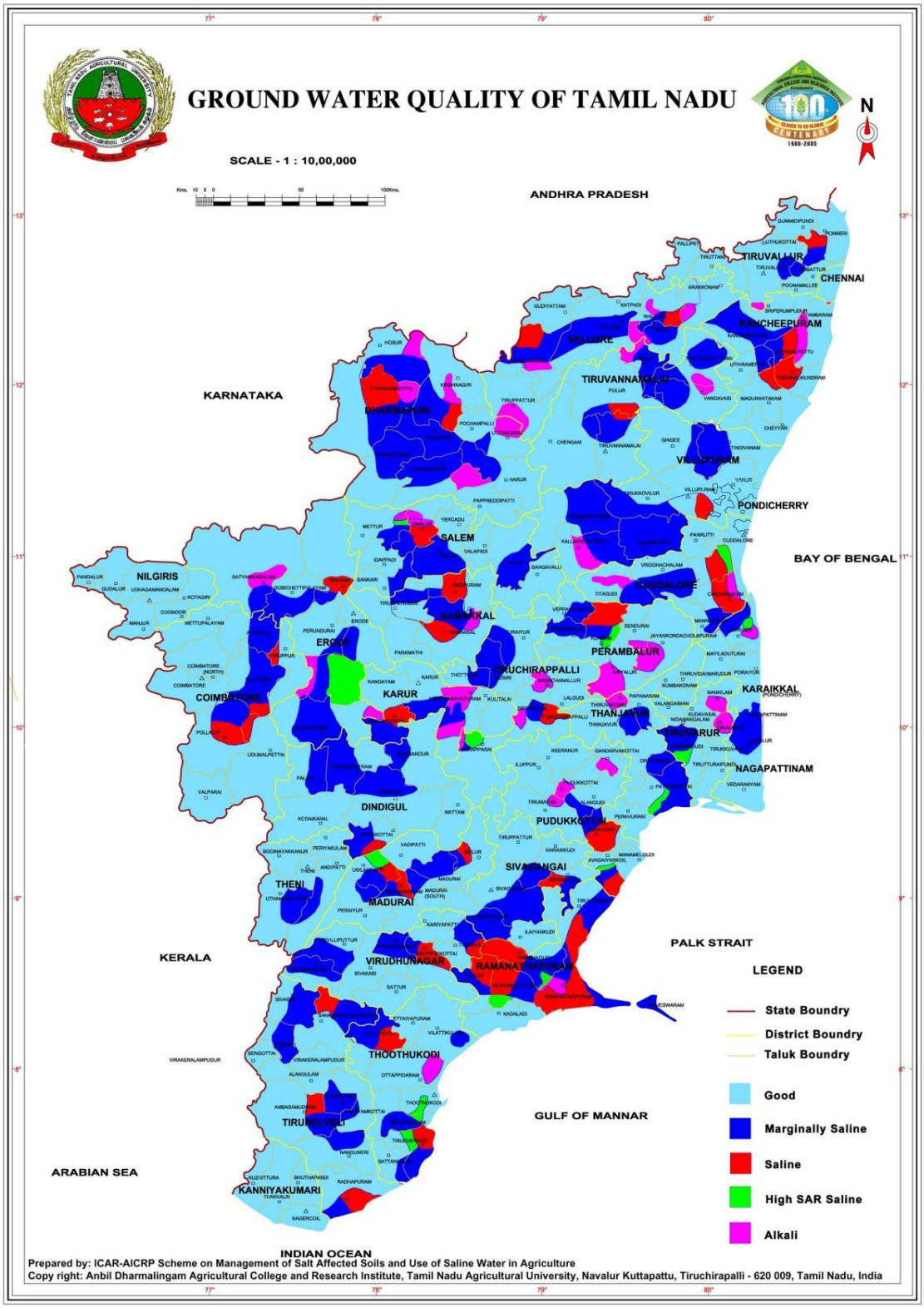
Perambalur District has four Blocks viz., Perambalur, Veppanthattai, Veppur and Alathur Block. Among the four blocks, the distribution of good quality samples were the highest in Perambalur Block (69.2%) and the lowest in Alathur (37.1 %) Block. The occurrence of marginally saline water (13.3 to 42.8 %) was prevalent in all the Blocks. The saline waters were prevalent in Alathur (8.5 %) and Veppur (2.5 %) Blocks, while the occurrence of alkali waters were reported in Veppanthattai (15 %) and Alathur (2.5 %). The marginally saline (13.3 to 42.8 %) and marginally alkali (2.5 to 25 %) waters are prevalent in almost all the blocks. High SAR saline water was reported in Alathur Block only (2.8 %). Among the total samples collected in Perambalur district, 52.4 % is coming under good quality, 26.8 is marginally saline, 10.88 % is marginally alkaline, 5.88 % is alkaline, 3.2 % is saline and 0.88 % is high SAR saline.

Ariyalur District has six Blocks viz., Ariyalur, Thirumanur, Andimadam, Jayankondam, T.Palur and Senthurai. Among the six blocks, the distribution of good quality samples were the highest in Andimadam Block (73.4 %) and the lowest in Jayankondam (56.5 %) Block. The occurrence of marginally Alkali water (8.72 to 30.4 %) was prevalent in all the Blocks.

Marginally saline water is prevalent in Ariyalur (8.72 %), Thirumanur (15.4 %), Jayankondam (8.7 %) and Senthurai (4.17 %) Blocks. The saline waters were prevalent in Ariyalur (3.49 %), Thirumanur (3.36 %) and Senthurai (5 %) blocks, while the occurrence of alkali waters were reported in Ariyalur (2.91 %), Thirumanur (3.36 %), Jayankondam (4.35), T.Palur (3.65 %) and Senthurai (8.33 %) blocks. Highly alkali water was reported only in Ariyalur Block (2.33 %). Among the total samples collected, 67.8 % is coming under good quality, 6.35 % is marginally saline, 19.9% is marginally alkaline, 3.59 % is alkaline, 2.04 % is saline and 0.48 % is highly alkaline.

The strategies to be followed based up to the efforts made in different centers of AICRP on management of salt affected soils and use of saline water in agriculture and Tamil Nadu Agricultural University such as growing tolerant crops and variety, conjunctive use of saline water with canal water in dilution/ cyclic mode, passing saline water through gypsum bed before irrigation, irrigation through pressurized systems (Drip/ sprinkler) and alternative land use (growing tree crops) are discussed.

The adverse effects of alkali waters on soil physical properties can be mitigated by applying amendments like gypsum. The quantity of gypsum for neutralization of each me L^{-1} of RSC is 90 kg ha^{-1} per irrigation @ 7.5 cm depth. The gypsum application is recommended when the RSC of irrigation water exceeds 5.0. Also by passing the alkali water through gypsum bed, RSC of irrigation water can be reduced.



Prepared by: ICAR-AICRP Scheme on Management of Salt Affected Soils and Use of Saline Water in Agriculture