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Availability and Possibilities of Underground Water in Churu District

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Abstract

The rapid expansion in development of ground water resources for various usage has contributed in expansion of irrigated agriculture, overall economic development and in improving the quality of life in India. Last three decades have seen an exponential growth in number of ground water structures and more than 17 million wells all over the country are providing irrigation water to more than 50 percent of irrigated area. The substantial proportion of agricultural output is from ground water irrigation due to higher yields in ground water irrigated areas.

Keywords: Exponential, substantial, Economic, Utilization, Awareness, Thermal-power, Navigation, Recreation etc.

Introduction

The rapid expansion in development of ground water resources for various usage has contributed in expansion of irrigated agriculture, overall economic development and in improving the quality of life in India. Last three decades have seen an exponential growth in number of ground water structures and more than 17 million wells all over the country are providing irrigation water to more than 50 percent of irrigated area. The substantial proportion of agricultural output is from ground water irrigation due to higher yields in ground water irrigated areas. This resource has become an important source of drinking water and food security for teeming millions of the country. It provides 80 percent of water for domestic use in rural areas and about 50 percent of water for urban and industrial areas. The significant contribution made for Green Revolution and also as primary reliable source of irrigation during drought years has further strengthened the people's faith in utilization of ground water as dependable source.

Water is a prime natural resource, a basic human need and a precious national asset. Planning, development and management of water resources need to be

governed by national perspectives. As per the latest assessment, out of the total precipitation, including snowfall, of around 4000 billion cubic meter in the country, the availability from surface water and replenish able ground water is put at 1869 billion cubic meter. Because of topographical and other constraints, about 60% of this i.e. 690 billion cubic meter from surface water and 432 billion cubic meter from ground water, can be put to beneficial use. Availability of water is highly uneven in both space and time. Precipitation is confined to only about three or four months in a year and varies from 100 mm in the western parts of Rajasthan to over 10000 mm at Cherrapunji in Meghalaya. Rivers and underground aquifers often cut across state boundaries. Water, as a resource is one and indivisible: rainfall, river waters, surface ponds and lakes and ground water are all part of one system.

Water is part of a larger ecological system. Realizing the importance and scarcity attached to the fresh water, it has to be treated as an essential environment for sustaining all life forms. Water is a scarce and precious national resource to be planned, developed, conserved and managed as such, and on an integrated and environmentally sound basis, keeping in view the

socio-economic aspects and needs of the States. It is one of the most crucial elements in developmental planning. As the country has entered the 21st century, efforts to develop, conserve, utilize and manage this important resource in a sustainable manner, have to be guided by the national perspective. Floods and droughts affect vast areas of the country, transcending state boundaries. One-sixth area of the country is drought-prone. Out of 40 million hectare of the flood prone area in the country, on an average, floods affect an area of around 7.5 million hectare per year. Growth process and the expansion of economic activities inevitably lead to increasing demands for water for diverse purposes, domestic, industrial, agricultural, hydro-power, thermal-power, navigation, recreation, etc. So far, the major consumptive use of water has been for irrigation. While the gross irrigation potential is estimated to have increased from 19.5 million hectare at the time of independence to about 95 million hectare by the end of the Year 1999-2000, further development of a substantial order is necessary if the food and fiber needs of our growing population are to be met with. The country's population which is over 1027 million (2001 AD) at present is expected to reach a level of around 1390 million by 2025 AD.

Physiographic Regions of Churu

To make a study more comprehensive and analytical, it is imperative to divide the study area into micro divisions having physical homogeneity. As Dickinson states, "A region is an area which is homogeneous in respect of particular set of associated' conditions like land, people, resources etc". The region thus represents a geographical area with a considerable measures of unity. The physical regions facilitate the appreciation of the complex relations between the human and natural environment. Thus the-physiographic divisions arrived at after considerations of various geographical factors such as relief, geology, slop, drainage, soil, forest, rainfall etc. are of much use for geographical study. The methodology for delineation of physical regions is on the basis of topography. District Churu is a part of the Arid Rajasthan Plain known as Rajasthan Bagar Area. It is a sandy desert area with dunes which are of shifting nature. The district has been sub-divided into six sub-micro regional divisions.

Physiographic Regions of Churu District

Name of Regions	Administrative Divisions (Tehsil)	Soils	Geology
1. Western Churu Sand Dunes Zone	1. Sarsarshahar (Partly)	Alluvium and blown sand	Orthids psamments
2. Sardarshahar Sandy	1. Taranagar (Partly) 2. Sarsarshahar	Alluvium and blown sand	Orthids psamments

Plain Zone	(Partly) 3. Churu (Partly)		
3. Eastern Churu Shifting Sand Dunes Zone	1. Taranagar (Partly) 2. Rajgarh (Whole) 3. Churu (Partly)	Alluvium and blown sand	Orthids psamments
4. Central Churu Sand Dunes Zone	1. Ratangarh (Partly) 2. Sarsarshahar (Partly) 3. Churu (Partly)	Alluvium and blown sand	Orthids psamments
5. Ratangarh-Bigga Sandy Upland Zone	1. Ratangarh (Partly) 2. Sujangarh (Partly) 3. Churu (Partly)	Alluvium and blown sand	Orthids psamments
6. Sujangarh Upland Zone	1. Sujangarh (Partly)	Alluvium and blown sand	Orthids psamments

1. Western Churu Sand Dunes Zone

The entire region has sand dunes of latitudinal slope. This region is a sandy desert and spreads over the tehsil of Sardarshahar covering an area of 1,466.40 sq. km. The distribution of population is sparse in the whole region. The state highway no. 7 passes through the region linking Sardarshahr to Hanumangarh district which is the major source of transport and communication. The region is situated at the north-western border of the district.

2. Sardarshahar Sandy Plain Zone

The region is a plain having sandy soil and small sand dunes scattered throughout the region. It covers some parts of the tehsils, viz. Sardarshahar, Taranagar and Churu. Sardarshahar and Taranagar are the two main urban centres of this region linked with state highway no. 6. The region has 164 villages in all with an area of 2,756.91 sq. km. Sahwa is an important village of the region which ranks second in terms of population after towns.

3. Eastern Churu Shifting Sand Dunes Zone

The region comprises of sand dunes which are of shifting nature and their existence remains uncertain. The region covers entire Rajgarh tehsil and some parts of Taranagar and Churu tehsils. The northern part of the region has

dunes while the southern parts contain sandy plain. Kantli is the only river of importance in rainy season flows the southern parts of Rajgarh tehsil where it dries up 18 km. South of Rajgarh town. It has an area of 3,085.11 sq. km. with improved means of transport and communication within the region. Rajgarh is an important town of this region and is linked with various places viz., Bhadra (Hanumangarh district), Hissar (Haryana State), Pilani (Jhunjhunu district) and Churu by train. The state highway no. 6 and 13 are town important state highways of this region. Shankhoo is an important village of the region having largest population next to Rajgarh town.

4. Central Churu Sand Dunes Zone

The proportion of population is larger in the eastern part and has a declining trend towards the west which has larger number of sand dunes. It includes desert and semi-desert area with sand dunes scattered throughout the region. The region is situated in the central part of the district connecting three district boundaries, i.e., Bikaner, Jhunjhunu and Sikar. It has 163 villages covering 4,363.55 sq. km. area It has two urban centres, namely, Churu and Ratangarh. This region is linked with railway lines, viz., Bikaner, Hissar, Rewari, Delhi, Jodhpur and Jaipur etc. The national highway no. 11 and 65 and state highway no. 6, 7 and 20 pass through the region. Momasar being the chief village of the region stands next to the towns in terms of population.

5. Ratangarh-Bigga Sandy Upland Zone

The region has high elevation with sandy soil and covers the western northern and eastern parts of the district including the tehsils of Ratangarh and Sujangarh. Sandy upland is the major characteristic of the region. The population is evenly distributed throughout the region. It contains 220 villages and two towns, namely, Ratangarh and Rajaldesar. It has an area of 3,809.91 sq. km. Bigga and Parihara are important villages.

6. Sujangarh Upland Zone

The region has sandy soils with undulating sand hills and also possesses a small forest area under Chhaper town. The region is densely populated with an exception of the north-eastern parts. This is the upper part of the district and is situated on the western border of the district containing 65 villages with 1,255.21 sq. km. area. It has three urban centres, namely, Bidasar, Chhaper and Sujangarh town on the eastern side of the region. The National Highway No. 65 and state highway no. 20 and other roads are there in the region which serve and communication. Sandwa is the main village of the region as per the size of population and is situated on the state highway no. 20.

Fluctuation of Water-Table

An initial net-work of key-wells and piezometers was established in the district for periodic monitoring of

water-table fluctuation behaviour. However, its shape and size has been changing every year either with the construction of new piezometers or with the drying-up/silting of existing key-wells/piezometers. Existing monitoring net-work includes 137 key-wells and 21 piezometers. These hydro-stations are being monitored regularly during pre-and post-monsoon surveys every year.

Field observations have revealed that water-table fluctuation shows a very wide range in its magnitude. Range of fluctuation of water-table is more in hard-rock formations while it is considerably less in alluvial and loose formations with very few exceptions.

Depth to water during pre-monsoon & post-monsoon periods and fluctuation of water-table during last five years have been computed in Formation wise and block wise fluctuation of water table, and the trend of average water-table in various ground water potential zones have been given.

Range of Water Table Fluctuation in Various Blocks (Formation Wise)

(Pre-monsoon 2005 to Post-monsoon 2018)

Block			1	Churu	Ra jga rh	Rat ang arh	Sar dar sha har	Suj ang arh	Tar ana gar
Water Table Fluctuation (MTS)	You nge r Allu viu m	Pos itiv e (+)	2	-	-	-	(+) 2.7 0	-	-
		Ne gati ve (-)	3	-	-	-	(-) 1.8 3	-	-
	Old er Allu viu m	Pos itiv e (+)	4	(+) 0.86	(+) 1.0 8	(+) 1.8 0	(+) 1.8 6	(+) 1.2 6	(+) 1.7 6
		Ne gati ve (-)	5	(-) 0.68	(-) 1.1 7	(-) 1.4 0	(-) 2.5 5	(-) 1.0 3	(-) 0.8 3
	Tert iary For mati ons + Nag aur For mati ons	Pos itiv e (+)	6	-	-	(+) 0.1 1	(+) 3.0 8	(+) 2.5 7	-
		Ne gati ve (-)	7	-	-	(-) 0.9 1	(-) 5.3 3	(-) 1.8 4	-
	Bila ra For mati ons	Pos itiv e (+)	8	-	-	-	-	(+) 2.1 2	-
		Ne gati ve (-)	9	-	-	-	-	(-) 2.6 3	-
	Jod hpu r For mati ons	Pos itiv e (+)	10	-	-	(+) 7.0 2	(+) 7.1 6	(+) 0.5 4	-
		Ne gati ve (-)	11	-	-	(-) 8.3 5	(-) 4.4 2	(-) 1.5 3	-
	Gne isse s/S chis ts	Pos itiv e (+)	12	-	-	-	-	(+) 4.5 7	-
		Ne gati ve (-)	13	-	-	-	-	(-) 6.6 2	-

Range of Water-Table Fluctuation in Various Water Bearing Formations

(Pre-monsoon 2009 to Post-monsoon 2018)

Water Bearing Fuuctuation In Mt	Water Table	
	Positive{+}	Negative {-}
1	2	3
Younger Alluvium	{-} 1.83	{+} 2.70
Older Alluvium	{-} 2.55	{+} 1.86

Tertiary Formations	}	5.33	{+}	3.06
+ {-}				
Nagaur formations				
Bilara Formations	{-}	2.63	{+}	2.12
Jodhpur Formations	{-}	8.35	{+}	7.16
Gnesisses/Schists	{-}	6.62	{+}	4.57

Description of Ground Water in Churu District

Study of ground water potential zone/saline zone map, given as Plate-II, reveals that about 5191.74 sq kms (34.37%) area of the district falls under ground water potential zones about 8601.21 sq kms (62.36%) area falls under ground water saline zones. A brief block wise description of ground water potential zones/saline including area, water bearing formations, range of depth to water, range of average discharge, chemical quality of ground water is given in subsequent pages.

Block Churu:

It covers an area of 1606.87 sq km. Only one ground water potential zone and one saline zone have been demarcated in the block. About 30.14% area of the block is covered by ground water potential zone while 69.86% area is covered by saline zones. The block has 88.80% stage of ground water development and is put under "SAFE" category. Out of 104 villages, 40 (38.46%) have been covered under ground water potential-zones and 64 (61.54%) have been covered under saline zones.

(A) Ground Water Potential Zones-

Potential zone "A₀₃" :- It covers an area of 484.38 sq km towards extreme south of the block. Older alluvial units, such as sand, sandy-clay, clayey-sand, clay, kankar, etc, are the main water bearing formations. Depth to water ranges between 30.22 to 47.89 mts below ground-level. Quality of ground water is potable to semi-saline with electric conductivity ranging between 2000 to 6000 micro-siemens/cm. Average discharge of dug-cum-bored wells/tube wells constructed in the zone ranges between 2000 to 3000 gallons per hour. The zone has 88.80% stage of ground water development.

(B) Ground water saline zones-

Saline zone "A₀(S)" : It covers an area of 1122.49 Sq km. Depth to water ranges between 24.07 to 44.87 mts below ground-level. Quality of ground water is saline to extremely saline with electric conductivity ranging between 6000 to 10900 micro-siemens/cm. However, ground water having electric conductivity below 6000 micro-siemens/cm has also been observed at some places but thickness of such zone is very less.

Block Rajgarh

It covers an area of about 2224.92 sq km towards north-eastern part of the district. Only one ground water potential zone and one saline zone have

been demarcated in the block. About 14.57 percent area of the block is covered under ground water potential-zone while 85.43 percent area is covered under saline-zone. The block has 437.17 percent stage of ground water development and is put under "OVER-EXPLOITED" category. Out of 209 villages, 38 (18.18 percent) have been covered under ground water potential-zone while 171 (81.82 percent) have been covered under saline-zones.

Ground Water Potential Zones

potential zone "Ao₃" :- It covered an area of 324.25 sq km towards extreme southern part of the block. Older alluvial units, such as sand, sandy-clay, clayey-sand, clay, kankar, etc are the main water-bearing formations. Depth to water ranges between 36.65 to 54.45 mts below ground-level. However, exceptionally deep depth to water upto 64 mts magnitude has also been observed at village Thirpali Bari. Quality of ground water is fresh to semi-saline with electric conductivity ranging between 2500 to 6800 micro siemens/cm. Average discharge of dug-cum-bored wells/tube-wells constructed in the zone ranges between 2500 to 3500 gallons per hour. The zone has 437.17 percent stage of ground water development.

Ground Water Saline Zones

Saline zone "Ao(s)" :- It covers an area of 1900.67 sq km. Depth to water ranges between 13.67 to 51.85 mts below ground-level. Quality of ground water is saline to extremely saline with electric conductivity ranging between 2500 to 23500 micro siemens/cm.

Block Ratangarh

It covers an area of about 1622.41 sq km. Three ground water potential zones and one saline zone have been demarcated in the block. About 64.43 percent area of the block is covered under ground water potential-zone while 35.57 percent area is covered under saline-zone. The block has 59.48 percent stage of ground water development and is put under "SAFE" category. Out of 100 villages, 56 (56.00percent) have been covered under ground water potential-zones while 44 (44.00 percent) have been covered under saline-zones.

Ground Water Potential Zones

Potential zone "Ao₂" :- It covers an area of 507.81sq km which is about 31.30 percent of the area of the block. Older alluvial units, such as sand, sandy-clay, clayey-sand, clay, kankar, etc are the main water-bearing formations. Depth to water ranges between 34.95 to 46.92 mts below ground-level. Quality of ground water is fresh to slightly saline with electric conductivity ranging between 1500 to 5800 micro siemens/cm. Average discharge of dug-cum-bored wells/tube-wells constructed in the zone ranges between 2500 to 3500 gallons per hour. The zone has 73.34 percent stage of ground water development. The zone includes 33 villages.

Potential zone "Ss(N)" :- It covers an area of 192.18 sq km towards extreme western periphery of the block and constitutes about 11.85 percent of the area of the block. Nagaur sandstones and shales are the main water-bearing formations. Depth to water ranges between 77.39 to 79.65 mts below ground-level. Quality of ground water is more or less fresh with electric

conductivity ranging upto 3000 micro siemens/cm. Average discharge of dug-cum-bored wells/tube-wells constructed in the zone ranges between 1500 to 2000 gallons per hour. It has 39.75 percent stage of ground water development. The zone includes only 04 villages.

Potential zone "Ss(J)" :- It covers an area of 345.31 sq km which is about 21.28 percent of the area of the block. Jodhpur sandstones are the main water-bearing formations. Depth to water ranges between 49.32 to 92.27mts below ground-level. Quality of ground water is fresh to semi-saline with electric conductivity ranging between 2500 to 5000 micro siemens/cm. Average discharge of dug-cum-bored wells/tube-wells constructed in the zone ranges between 2000 to 2500 gallons per hour. The zone has 47.75 percent stage of ground water development. The zone includes 19 villages.

Ground Water Saline Zone

Saline zone "Ao(S)" :- It covers an area of 577.11 sq km. Older alluvium is the main water bearing formation. Depth to water ranges between 22.88 to 44.24 mts below ground-level. Ground water is saline to highly saline with electric conductivity ranging between 6000 to 11300 micro siemens/cm. It includes 44 villages.

Block Sardar Shahar

The block covers an area of 3860.80 sq km towards north western part of the district. Five ground water potential zones and three saline zones have been demarcated in the block. About 55.0 percent area of the block is covered under ground water potential-zones while 45.0 percent area is covered under saline-zones. The block has 28.28 percent stage of ground water development and is put under "SAFE" category. Out of 185 villages 103 (56.68 percent) have been covered under ground water potential-zones while 82 (44.32 percent) have been covered under saline-zones.

Ground Water Potential Zones

Potential zone "A3" :- It covers an area of 1421.87 sq km towards north-western part of the block and constitutes about 36.83 percent of the area of the block. Younger alluvial units, such as sand, sandy-clay, clayey-sand, clay, kankar, etc, are the main water bearing formations. Depth to water ranges between 40.74 to 69.95 mts below ground-level. Quality of ground water is fresh to semi-saline with electric conductivity ranging between 1500 to 5500 micro siemens/cm. Average discharge of dug-cum-bored wells/tube-wells constructed in the zone ranges between 2000 to 2500 gallons per hour. The zone has 16.92 percent stage of ground water development. It includes 58 villages.

Potential zone "Ao2" :- It covers an area of 278.13 sq km which is about 7.20 percent of the block. Older alluvial units, such as sand sandy-clay, clayey-sand, clay, kankar, etc, are the main water-bearing formations. Depth to water ranges between 37.02 to 48.41 mts below ground-level. Quality of ground water is almost fresh with electric conductivity ranging between 2500 to 3500 micro siemens/cm. Average discharge of dug-cum-bored wells/tube-wells constructed in the zone ranges between 4000 to 4500 gallons per hour. The potential zone has 97.48 percent stage of ground water development. It includes 18 villages.

Potential zone “Ao3” :- It covers an area of 132.81 sq km towards south-eastern part of the block and constitutes about 3.44 percent of the area of the block. Older alluvial units, such as sand, sandy-clay, clayey-sand, clay, kankar, etc, are the main water bearing formations. Depth to water ranges between 33.30 to 42.00 mts below ground-level. Quality of ground water is acceptable to semi-saline with electric conductivity ranging between 4000 to 6000 micro siemens/cm. Average discharge of dug-cum-bored wells/tube-wells constructed in the zone has 68.43 percent stage of ground water development. It includes only 9 villages.

Potential zone “Ss(N)”:- It is a very small zone and covers an area of 101.89 sq km towards extreme south of the block and constitutes about 2.64 percent of the area of the block. Tertiary and Nagaur sandstones are the main water bearing formations. Depth to water ranges between 75.95 to 91.05 mts below ground-level. Quality of ground water is fresh to semi-saline with electric conductivity ranging between 1500 to 4000 micro siemens/cm. Average discharge of dug-cum-bored wells/tube-wells constructed in the zone ranges between 2250 to 3000 gallons per hour. The zone has 25.56 percent stage of ground water development. It includes only 6 villages.

Potential zone “Ss(J)” :- It is also small zone and covers an area of 189.06 sq km towards extreme south of the block and constitutes about 4.89 percent of the area of the block. Jodhpur sandstones are the main water-bearing formations. Depth to water ranges between 49.55 to 67.65 mts below ground-level. Quality of ground water is almost fresh to semi-saline with electric conductivity ranging between 2500 to 4500 micro siemens/ms. Average discharge of dug-cum-bored wells/tube-wells constructed in the zone ranges between 1500 to 2000 gallons per hour. The potential zone has 16.65 percent stage of ground water development. It includes 12 villages.

Ground Water Saline Zones

Saline zone “A(S)”:- It covers an area of about 627.13 sq km. Younger alluvial units are the main water-bearing formations. Depth to water ranges between 49.05 to 59.55 mts below ground-level. Quality of ground water is saline to highly saline with electric conductivity ranging between 6000 to 9200 micro siemens/cm. It includes 13 villages.

Saline zone “Ao(S)” :- It covers an area of 307.65 sq km towards extreme south-eastern part of the block and constitutes about 7.97 percent of the block. Older alluvial units are the main water-bearing formations. Depth to water ranges between 25.82 to 38.17 mts below ground-level. Quality of ground water is saline to extremely saline with electric conductivity ranging between 6500 to 24000 micro siemens/cm. It includes 25 villages.

Saline zone “SSJ(S)” :- It covers an area of 802.26 sq km towards north-eastern part of the block and constitutes about 20.78 percent of the area of the block. Jodhpur sandstones are the main water-bearing formations. Depth to water ranges between 24.83 to 53.75 mts below ground-level. Chemical quality of ground water is saline to highly saline with electric ranging between 6000 to 10100 micro siemens/cm. It includes 44 villages.

Block Sujangarh

The block covers an area of 2667.55 sq km towards extreme southern half of the district. Four ground water potential zones and two saline zones have been demarcated in the block. Actually there are two separate zones having Jodhpur sandstone as main water bearing formation but due to their very small area and more or less similar chemical quality of ground water, both the zones have been considered as a single potential zone. About 45.51 percent area of the block is covered under ground water potential-zones and about 54.49 percent is covered under saline-zones. The block has 97.35 percent stage of ground water development and put under “CRITICAL” category. Out of 158 villages 62 (39.24 percent) have been covered under ground water potential zones while 96 (60.76 percent) have been covered under saline-zones.

Ground Water Potential Zones

Potential zone “Ls1” :- It covers a small area of 59.37 sq km towards extreme north eastern part of the block and constitutes about 2.22 percent of the area of the block. Bilara limestones and shales are the main water-bearing formations. Depth to water ranges between 67.32 to 73.40 mts below ground-level. Quality of ground water is fresh with electric conductivity ranging between 1000 to 3000 micro siemens/cm. Average discharge of dug-cum-bored wells/tube-wells constructed in the zone ranges between 3000 to 4000 gallons per hour. The zone has 93.62 percent stage of ground water development. It includes only 04 villages.

Potential zone “Ls3” :- It is located towards south-western part of the block and covers an area of 628.12 sq km which is about 23.55 percent of the area of the block. Bilara limestones/sandstones/shales are the main water-bearing formations. Depth to water ranges between 40.88 to 67.10 mts below ground-level. Quality of ground water is fresh to semi-saline with electric conductivity ranging between 1500 to 6000 micro siemens/cm. Average discharge of dug-cum-bored wells/tube-wells constructed in the zone ranges between 2250 to 3000 gallons per hour. The potential zone has 97.97 percent stage of ground water development. It includes 28 villages.

Potential zone “Ss(N)” :- It covers an area of 412.50 sq km towards south-western periphery of the block and constitutes about 15.46 percent of the area of the block. Nagaur sandstones and shales are the main water-bearing formations. Depth to water ranges between 24.04 to 87.80 mts below ground-level. Quality of ground water is fresh to semi-saline with electric conductivity ranging between 2000 to 4500 micro siemens/cm. Average discharge of dug-cum-bored wells/tube-wells constructed in the zone ranges between 1500 to 2000 gallons per. The potential zone has 95.55 percent stage of ground water development. It includes 23 villages.

Potential zone “Ss(J)” :- It covers an area of 114.06 sq km which is about 4.28 percent of the area of the block. Jodhpur sandstones are the main water bearing formations. depth to water ranges between 44.28 to 84.45 mts below ground-level. Quality of ground water fresh to semi-saline with electric conductivity ranging between 1300 to 6000 micro siemens/cm. Average discharge of dug-cum-bored wells/tube-wells constructed in the zone ranges between 1500 to 2250

gallons per hour. It has 103.19 percent stage of ground water development. It includes only 07 villages.

Ground water Saline Zones-

Saline zone "Ao(S)" :- It covers an area of 392.28 sq km towards north-eastren periphery of the block and constitutes about 14.71 percent of the area of the block. Older alluvium is the main water bearing formation. Depth to water ranges between 28.05 to 36.76 mts below ground-level. Quality of ground water is saline to highly saline with electric conductivity ranging upto 10300 micro siemens/cm. It includes 33 villages.

Saline zone "Sc/Ph(S)" :- It covers an area of 1060.22 sq km which is about 39.78 percent of the area of the block. Schists/gneisses/phyllites are the main water-bearing formations. Depth to water ranges between 6.67 to 37.75 mts below ground-level. Quality of ground water is saline to highly saline. It includes 63 villages.

Block Tarangar

It covers an area of 1810.40 sq km towards north, north-eastern part of the block. As the native ground water is saline in the entire district, no ground water potential zones have been demarcated. The entire block has been delineated as one saline zone Ao(S).

Saline zone "Ao(S)" :- It covers the entire area of the block. Older alluvial units are the main water-bearing formation. Depth to water ranges between 10.59 to 28.65 mts below ground-level. Quality of ground water is saline to highly saline with electric conductivity ranging upto 13000 micro siemens/cm. It includes 123 villages.

Conclusion

Interpretation of various field data collected during periodic follow-up survey, results of chemical analysis of water-samples, fluctuation behavior of water-tables in various ground water potential zones, and present assessment of existing ground water resources has alarmingly indicated that the district, particularly the areas having fresh to acceptable quality of ground water, can be put under the category where the existing resources of ground water are being exhausted day by day with a consistent pace, quality of ground water is deteriorating resulting in increased salinity, and the water yielding capacity of aquifers is being reduced considerable.

1. Rain-water should be stored in each and every house so that it can be used for domestic purpose reducing consumption of ground water.
2. Aquifers should be recharged by preventing flowing rainwater by constructing appropriate recharge structures.
3. Each and every member of the society should be taught about the conservative use and to stop the wastage of water in their routine activities.
4. it is a general tendency of human psychology that he is governed/controlled by the fear of law or of society. It is, therefore, essential that ground water legislation is imposed in the states where the conditions are not favorable for ground water extraction.

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