जल वर्ष 2007 Water Year 2007

स्वच्छ सुरक्षित जल – सुन्दर खुशहाल कल

CONSERVE WATER - SAVE LIFE

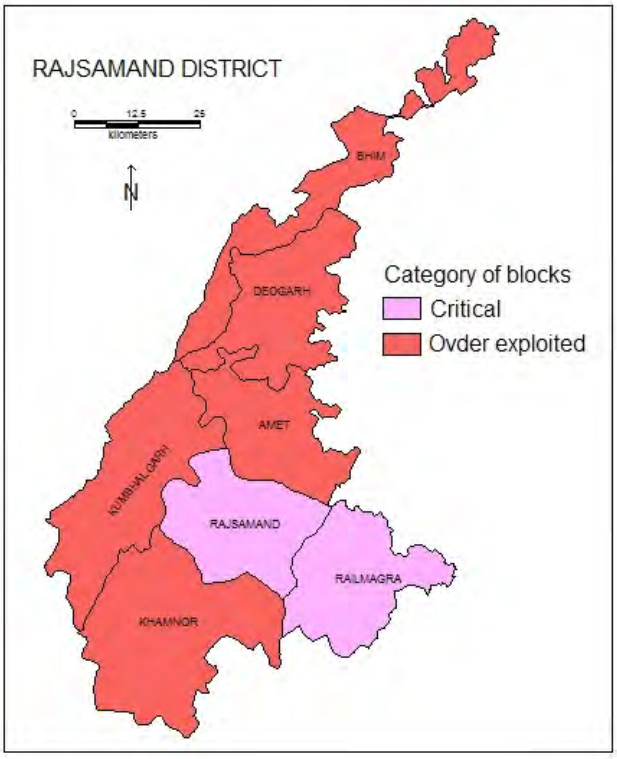
CENTRAL GROUND WATER BOARD

Ministry of Water Resources

Government of India

GROUNDWATER SCENARIO

RAJSAMAND DISTRICT, RAJASTHAN



Western Region

Jaipur

March, 2009

DISTRICT AT A GLANCE – RAJSAMAND DISTRICT, RAJASTHAN

S No	Item	Statistics	
1	**GENERAL INFORMATION**		
	(i) Geographical area (sq km)	4550.93	
	(ii) Administrative Division (As on 31.3.2007)		
	Number of Tehsils	07	
	Number of Blocks	07	
	Number of Villages	1009	
	(iii) Population (As per 2001 Census)	09,87,024	
	(iv) Average Annual Rainfall (1971-2005) in mm	553.2	
2	**GEOMORPHOLOGY**		
	Major Physiographic Units	Pediment, Buried, Intermontane Valley, Pediment, Plataeu, Sandy Plain	
	Major Drainage	Banas River	
3	**LAND USE (sq km)**		
	(a) Forest Area	246.63	
	(b) Net Sown Area	985.98	
	(c) Cultivable Area	1266.95	
4	**MAJOR SOIL TYPE**	Clay loam, Sandy Loam, Loamy clay pebbly & stony	
5	**AREA UNDER PRINCIPAL CROPS** *(As on 2004-05)*	Crops	Area in ha
		Food grains	96882
		Oil Seeds	13357
		Cotton	620
		Pulses	3917
		Sugarcane	146
		Others	11773
6	**IRRIGATION BY DIFFERENT SOURCES**		
	Source	No of structure	Gross Irrigated Area in ha
	Dug wells	58520	94991
	Tube wells/Bore wells	619	4371
	Tanks/Ponds	439	10692
	Canals	-	-
	Net Irrigated Area (ha)	30971	
	Gross Irrigated Area (ha)	-	

7	**NUMBER OF GROUND WATER MONITORING WELLS OF CGWB** (As on May 2007)	
	Number of Dug wells	28
	Number of Piezometers	02
8	**PREDOMINANT GEOLOGICAL FORMATIONS**	Rock types belonging to Bhilwara, Aravalli, Delhi Supergoup and Alluvium
9	**HYDROGEOLOGY**	
	Major Water bearing formation	Alluvium, Schist/phyllite, Gneiss, Slate, Granite, Quartzite
	Depth to water level (Pre-monsoon, 2006) (mbgl)	3.16 – 20.99
	Depth to water level (Post-monsoon, 2006) (mbgl)	1.08 – 13.31
	Long term water level trend (1997-2006) in cm/yr	< 10
10	**GROUNDWATER EXPLORATION BY CGWB** (As on 31.3.2001)	
	Number of wells drilled (EW, OW, PZ, SH, Total)	EW - 17 & OW -1
	Depth Range (m)	15 – 200
	Discharge (liter per second)	Negligible – 15
	Storativity	-
	Transmissivity (m^2/day)	985 – 7944
11	**GROUND WATER QUALITY**	
	Presence of chemical constituents more than permissible limit (EC>1500 mmhos/cm at 25^0 C, F>1.5 mg/l, As, Fe>1.0mg/l)	EC – < 200 sq km F – < 100 sq km Fe – < 20 sq km
	Type of water	Alkaline
12	**DYNAMIC GROUND WATER RESOURCES (March, 2004) in mcm**	
	Annual Replenishable Ground Water Resources	94.148905
	Net Annual Ground Water Draft	114.2965
	Projected Demand for Domestic and Industrial Uses up to 2025	36.416
	Stage of Ground Water Development	121.00%
13	**GROUND WATER CONTROL AND REGULATION**	
	Number of Over-exploited blocks	05
	Number of Critical Blocks	02
	No of Blocks Notified	Nil
14	**MAJOR GROUND WATER PROBLEMS AND ISSUES**	Water level decline Scarcity of water

DISTRICT GROUND WATER BROCHURE
RAJSAMAND, DISTRICT

1.0 INTRODUCTION

Rajsamand district is located in the southern part of Rajasthan State and extends between north latitudes 24°43'32" and 26°1'36" and east longitudes 73° 28'30" and 74°28'55". It covers an area of 4768.10 Sq. kms. It is bounded in the south and south west by Udaipur district, in the est and south east by Bhilwara and Chittorgarh district, in the north by Ajmer district and in the west by Pali district. Rajsamand district with the area of 4768 sq km covers 1.39 percent of total area of state and is divided into 7 Tehsils and 7 blocks. As per 2001 Census data the population of the district is 987024. The rural and urban population is 858301 and 128723 respectively with a density of 217 persons per sq. km.

Systematic Hydrogeological survey in the district was carried out by Central Ground Water Board from 1972 to 1985. Reappraisal hydrogeological Surveys have been carried out in the district except Deogarh block by Central Ground Water Board between F.S.P. 1986-87 and 1987-88. Under exploratory programme 17 exploratory boreholes and 1 OW have been drilled. Monitoring of water level is being carried out four times a year from 30 National Hydrograph Network Stations.

2.0 RAINFALL & CLIMATE

The district experiences arid to semi-arid type of climate. Mean annual rainfall (1971-2005) of the district is 553.2 mm whereas normal rainfall (1901-1970) is lower than average rainfall and placed at 551 mm. Almost 93% of the total annual rainfall is received during the southwest monsoon which enters the district in the third or fourth week of June and withdraws in the mid of September. The highest mean annual rainfall (673.2mm) is received at Kumbhalgarh, which lies near the south-western boundary of the district. The lowest mean annual rainfall (494.8mm) is received at Bhim, which lies in the northern part of the district. The rainfall at the remaining station does not very much. The highest monthly rainfall (18 mm) is received in the month of August and lowest (1.0mm) in the month of February. Probability of annual rainfall exceeding 700 mm is only 10%. However, there is 90% probability that the annual rainfall will be more than 250 mm. Drought analysis based on agriculture criteria indicates that the district is prone to mild and normal type of droughts. Occurrence of severe and very severe type of drought is very rare.

The winter season sets in after about the middle of November, when both day and night temperatures begin to drop steadily up to month of January. January is the coldest month with mean daily minimum temperature of 7.8ºC. The day and night temperatures rise rapidly from February to May. May is the hottest month of the year with mean daily maximum temperature of 38.6ºC.

When the South-west monsoon arrives in the district both day and night temperatures start decreasing appreciably. After the withdrawal of South-West monsoon there is a slight increase in day temperatures and a Secondary maximum is obtained in the month of October. The night temperature however continues to fall gradually. The day temperature also starts falling in November.

The relative humidity is gradually low except during South-West monsoon season. The highest relative humidity (81%) is recorded in the month of April at 17:30 hrs. The summer season is the driest part of the year. Winds are generally light with some strengthening in the later half of summer and south-west monsoon season. In the period from May to September winds blow from directions between South & West. In the post monsoon season the winds are predominantly from direction between North-West & North-East. The potential evapotranspiration is highest in the month of May and lowest in month of December. Evapotranspiration is more than rainfall in all the month except in July and August.

3.0 GEOMORPHOLOGY & DRAINAGE

Rajsamand district consists of monotonously rolling topography interacted by shallow valleys. Towards the western part of the district, Aravalli hills, a series of ridges run diagonally in the direction of NE and SW. The highest portion of Aravallis occurs south of Kailwara near Kumbhalgarh fort (25°08':73°35') with an altitude of 1293 m above msl. A typical gneissic plain bearing irregularly carved of gneisses and granites without any alluvium cover is observed to the highest altitude of above 600 m amsl. The Central and eastern part of the district is relatively plain area forming the foot hill part of Aravalli ranges. This plain gently slopes towards the east and northeast. In the higher and more rugged part towards the western side alluvium is scanty where as in the eastern flank the alluvium is more continuous and reasonably thick.

Rajsamand district is drained by Banas river and its tributaries i.e. Khari, chandrabhaga, Gomati, Kothari and Ahar etc. The river as well as tributaries are ephemeral and flow only in response to heavy precipitation. The Banas or the hope of the forest rises in Aravalli hills about 5 km. from Kumbhalgarh fort and flowing southwards meets the Gogunda plateau. Hence it burst east and cutting through the outlying ridges of Aravalli it burst into open country. Here on its right banks is situated the famous Vaishnava shrine of Nathdwara. It flows through Rajsamand and Railmagea tehsils and then crosses into Chittaurgarh and Bhilwara district. Chandrabhage originates from northern and the Gomti from the north-west part of the areas. The Chandra Bhaga and Gomti river trend NNW-SSE to NW-SE. The predominant drainage pattern in the western hill ranges is rectangular to sub-rectangular and it is dendritic to sub-dendritic in rest of the area. Drainage pattern in the western hill region is controlled by fractures & joints and in rest of the area by subsurface liniments.

4.0 SOIL, LAND USE & IRRIGATION PRACTICES

The soils of the district vary from sandy loam in Bhim, Deogarh & Amet blocks to heavy clay in Kumbhalgerh block. The types of soil occurriag in the district are classifified as follows:

Type of Soil	Name of block
Sandy loam	Bhim, Deogarh, Amet
Clay loam	Rajsamand,Relmagra, Khamner
Heavy clay	Kumbhalgarh.

The loam soil can support almost all crops. Clay loam is suitable for cultivation of wheat, Barley, Maize, Cotton, Suger cane, Jawar etc. crops like Bajra, Moong, Moth, Guar, Ground nut, til etc. can be grown on Sandy loam soils. Wheat, sugarcane and rice are the main crops of clay soils. Broadly, the northern, southern and eastern part of the district possesses loam, foot hill soils and black cotton soil with moderate run off, where as in the western part of the district lithosols and regosols of hills and rocky outcrops having very high run off are prevalent. Soil infiltration rate varied from 0.6 cm/hr to 4.2 cm. hr while the average infiltration rate was found to be 2.35 cm/hr. The cumulative depth to which vertical infiltration took place varied from 3.6 to 16.2 cm by which time, constant infiltration rate was also achieved.

LAND-USE PATTERN:

The sociocultural and economic factors have significant influence over land use, both in rural and urban areas. Land forms, slope, soils and natural resources are some of the important factors which control the land use pattern of the district. Out of the total area of 469336 hectares, approximately 100263 hectares land was cultivated during the year 2006-07. The land use pattern is as given below

LAND USE PATTERN (2006-2007)	
Classification	**Area (Hectares)**
Total Reporting Area	455093
Areas under forest	24663
Area under non agriculture use	127697
Fellow Land	202470
Dupaj Land	47055
Total Cultivated Area	147318
Total Irrigated Area	30971
Actual Cultivated Area	100263

Relmagra and Nathdwara tehsils have the maximum cultivated area of 24542 hectares & 21486 hectares respectively. Kumbhalgarh has the minimum cultivated area of 11834 hectares. Relmager and Nathdwera tehsils also top the list in the double cropped area. Net irrigated area in the district is 30971 hectares. Nathdwara & Relmagra tehsils have the maximum irrigated area.

CROPS:

Agriculture in the district is by and large confined to traditional kharif cultivation depending on monsoon rainfall. Rabi cultivation is prevalent to areas where irrigation facilities are available. The major crops grown are:

Main crops	:	Maize, Wheat and Jowar
Pulses	:	Kharif Pulses and Gram
Oily material	:	Groundnut, Til and Mustard
Others	:	Sugercane and Chilly

The area under principal crops is given in table. Since the agriculture is the principal occupation of the population, it is imperative that if the irrigation facilities are extended over large area, it will be possible to change the agriculture scenario of the district to a greater extent.

Agriculture Area sown and Production (2005-2006)

Crops	Total area Sown(Hectors)	Total Production (Metric Tons)
Food Gains	96173	80730
Pulses	5798	3262
Oil Seed	13090	9508
Cotton	620	18
Sugarcane	146	1
Others	10868	8085
Total	126695	101604

IRRIGATION:

The principal means of irrigation in the district are wells though the small area is irrigated by tank also. Ground water plays an important role for irrigation and is utilized through dug wells, dug cum bored wells and tube wells.

The details of the wells, tanks, pumping sets, tube wells etc and gross irrigated area by different sources have been given below.

Number of Sources		Net area irrigated (hectares)	
Source	Number	Sources	Net area irrigated
Diesel pump sets	5706	Wells/ Tube wells	26240
Electric pump sets	7683	Tanks	2136
Total wells	59066	Other sources	2595
Tube wells	619	Total	30971

Since most of the irrigation in the district is done through wells so the ground water development activity in the district is in advanced and accelerated stage.

It is imperative that the optimum utilization of water resources both surface and ground water is vital for the integrator and intensive agricultural development of the district. For the agro-economic development of district there should be proper management and the gap between irrigation potential aerated and those actually utilized has to be narrowed down.

5.0 GROUND WATER SCENARIO

The hydrogeological framework of the district is essentially controlled by geological setting, distribution of rainfall; circulation and movement of water through interconnected primary and secondary porosities of the geological formations constitution the aquifers.

5.1 Geological Framework

The oldest formation exposed in the area belongs to Bhilwara super group of Archean age. The northern, central and western part of the district are occupied by the younger formations of Aravalli super group and Delhi super group of Proterozoic age. Quaternary and recent alluvium overlies most of the formations in isolated pockets, along river courses and in shallow depressions.

Archeans: Archaeans are represented in the district buy formation of Bhilwara Super Group comprising younger Rajpura Dariba group over lying the older Mangalwar complex and Sandmata complex. The formations of Bhilwara Super Group are intruded by mafic and ultramafic bodies and synorogenic granites. Mangalwara and Sandmata complexes are exposed in the eastern part of the district and occupy fairly good area where as formation belonging to Rajpura Dariba Group occurs in isolated pockets. Mangelwar Complex comprises mainly migmatite, gneisses, mica schist, quartzites, impure marble where as Sandmata Complex Comprises gneisses, biotite schist, marble and quartzites, Rajpura Dariba group comprises mainly dolomitic marble, micaschist and quartzites.

Proterozoics: Proterozoics are represented in the district by formations of older Aravalli Super Group and younger Delhi Super Group. Aravalli Super Group Comprises Bari lake group, Kankroli group, Jharol group, Devda group. Aravalli

Super Group in the district is located in the southern part in the form of an inverted cone roughly separated in the east by Bhilwara Super Group along Delwara lineament and from the Western Delhi Super Group by Kali Guman lineament. The younger Bari lake Kankroli, Jharol, Devda and Nathdwara groups are located in the southern part of district, north of Udaipur. Kankroli Group represents garnetiferous schist, marble and quartzites. Jharol group which is exposed along a north-south treading belt consist of chlorite, phyllite, quartzites and micaschists. Devda group located west and north of Kankroli comprises quartzites, dolomitic marble, horn-blende, mica schists and gneisses. Nathdwara group located around Nathdwara comprises dolomitic marble, quartzites, phyllites and schists.

The entire western belt of Rajsamand district extending from the north eastern tip the South-Western edges are occupied by rocks belonging to Delhi Super Group. The younger Gogunda group consists of quartzites, biotite schists and calc silicates rocks. These formations extend from west of Khamnor to west of Devgarh formatting a continuous elongated belt trending north east south west. Western extremity of the district is occupied by formations belonging to Kumbhalgarh group which are mainly calc schist – calc gneisses, quartzites and marbles.

The alluvial deposit of recent origin occurs in narrow discontinuous bends along the channel of Banas, Khari, and other rivers in the form of valley fills. They are composed of unconsolidated stream laid sand and gravel and occasionally silt clay and kankars. Their lateral extent is very limited, maximum being about 1 km. from river bank while vertically they do not extend beyond 15 metres depth. Besides, blown sands occur in localised patches.

Recent alluvium in the form of valley fills is found along the Banas river near Relmagra in the district. Be sides there are minor valley fills. The alluvium occupies the buried river channel of Banas river and stream laid unconsolidated deposits are found along the other rivers. This is main valley fill which occurs in the district.

5.2 Hydrogeology

The occurrence of ground water in the district is mainly controlled by the topographic and structural features present in the geological formations. The principal source of ground water is precipitation. Out of the total rainfall received, a major part of it is lost as run off and by evapotranspiration through soil and vegetation. Only a small part of rainfall infiltrates down to reach ground water body. Groundwater occurs mainly under water table conditions in all formations. The important water bearing formation besides alluvium is the gneisses granites, schists, limestone and phyllites. In the hard rocks the occurrence and movement of ground water is controlled through the foliation/bedding planes, fissures, joints,

solution cavities and other structural weak planes. The weathered mantle of the hard rocks yields good discharge of water. In alluvium ground water occurs in the interstices of unconsolidated sand and gravel, locally semi confined conditions are encountered both in hard rock and alluvium.

Consolidated formation

Bhilwara Super Group: The eastern part of the district is underlain by rocks belonging to Bhilwara Super Group. In most part of this area the formations encountered are schist, gneisses and migmatites with intrusive granites. Ground water in these rocks occurs under-water table conditions in the zone of weathering fracturing, joints and foliation planes. When schists are intermixed with gneisses then the sequence become softer and crumpling with the result that it forms a etter aquifer. At places granites and gneisses form fairly good aquifers where the thickness of weathering zone persists along secondary quartz veins. Intrusive contacts are found to be good channals for ground water circulation. The depth to water level varies from 5 to 15 below ground level and yield of wells varies from 10m to 150m3/day. The rate of recuperation in wells is slow in gneisses and schists where it is comparatively faster in granites.

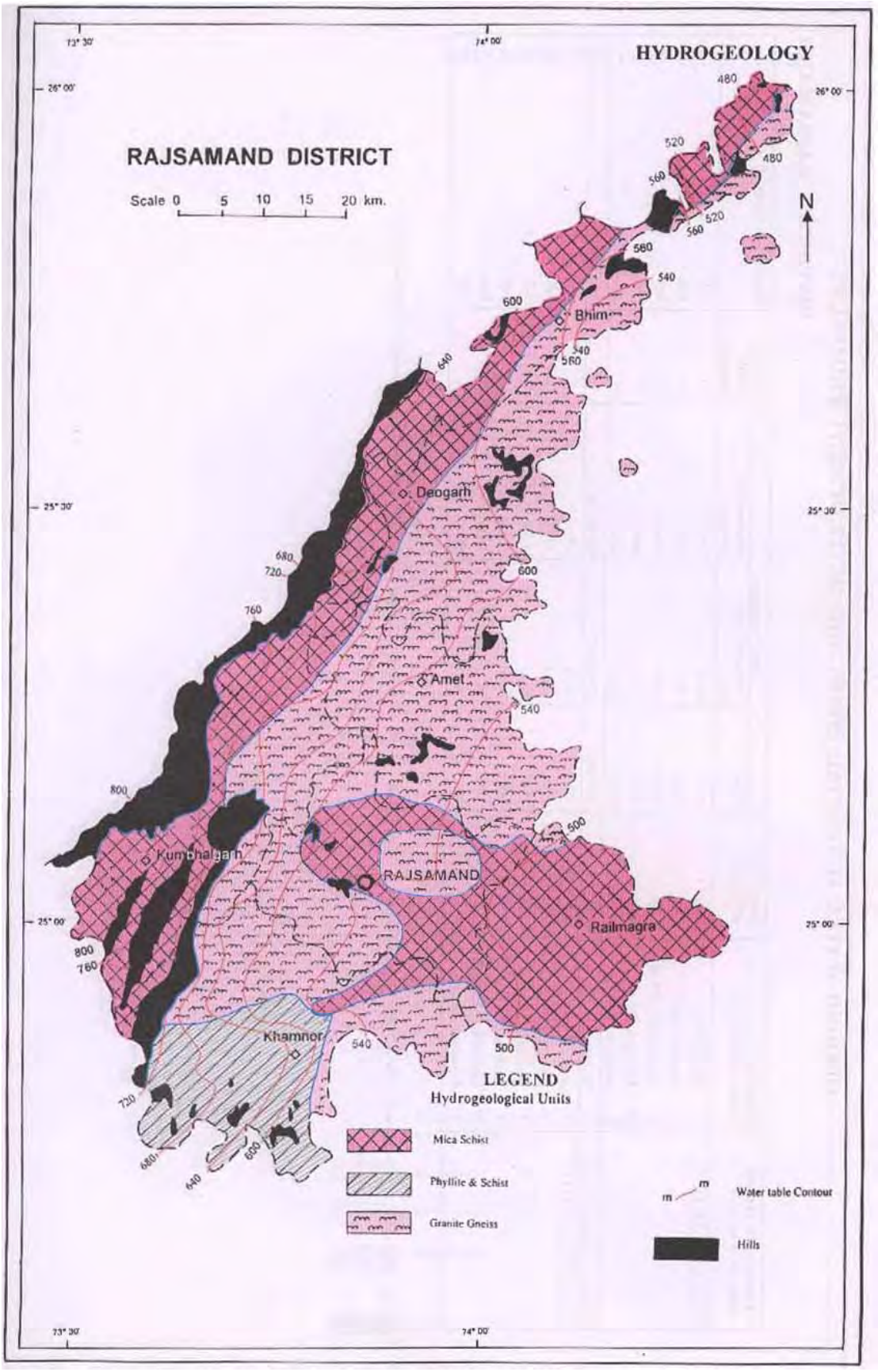
Aravalli Super Group: Rocks belonging to Aravalli Super Group are located in south Central part of the district and comprise mainly phyllites, schists, quartzites, conglomerate, dolomite, marble etc. Phyllites, quartzites and dolomites belonging to the Aravalli Super Group form important aquifer. Ground water in these rocks occurs and circulates mainly through the weathered zones and weak planes like joints, fissures, schistosity, badding etc. Quartzites generally occur intercalated with phyllites and slates well jointed. Ground water occurs along the formational contacts and in the joints. Ground water in phyllite and schists occurs mainly in slaty and fractured cleavages. The depth to water level varies form 5 to 30 metres below ground level and the total depth of the well varies from 8 to 30 metres. The yield of the well varies from 15 to 150 m3/day. However the average yield is around 40 m3/day. In dolomite & limestones the yield of well varies from 20 to 200 m3/day averaging to about 92 m3/day.

Delhi Super Group: The formations belonging to Gogunda and Kumbhalgarh groups of Delhi Super Group are exposed in the western part of the district along a north east south west trending. Lower- Gogunda group constitutes mainly quartzite and schists and the upper Kumbhalgarh group consists of mainly schists, gneisses marble and quartzites. Ground water in quartzites occurs in the joints and fractures and in the near granitic intrusive. Depth to water level generally is shallow. The yield of the wells ranges between 16 and 96 m3/d roughly averaging to 50 m3/day. Groundwater in biotite schist and hornblende schist occurs in joints and fractures. The depth to water level range from 5 to 15 mbgl and the yield of the well varies from 12 m3/day to 250 m3/day. In calc schist and calc gneiss the yield of dug well varies from 10 to 100 m3/day averaging to

60 m3/day. The yield is high when the lenticular cavities along calc bends are saturated and are interconnected.

Unconsolidated formation

Relmagra valley fill: Ground water occurs in boulder, gravel bad under confined conditions. The saturated thickness encountered in the exploratory borehole ranged between 3 and 12 metre. The static water level in these boreholes varies from 5.08 to 10.98 mbgl. Most of the wells situated in the alluvium along or in the vicinity of Banas river during monsoon of 1969 recorded a rise of 1.0 to 2.0 metres. The wells which recorded a rise of 0.2 to 1 metre are located away from Banas river. Wells existing close to river stream course and tapping biotite schist recorded a rise of more than 5 metres.


HYDROGEOLOGY
RAJSAMAND DISTRICT
Scale 0 5 10 15 20 km.
N
Bhim
Deogarh
Amet
Kumbhalgarh
RAJSAMAND
Railmagra
Khamnor
LEGEND
Hydrogeological Units
Mica Schist
Phyllite & Schist
Granite Gneiss
Water table Contour
Hills

Depth to water level

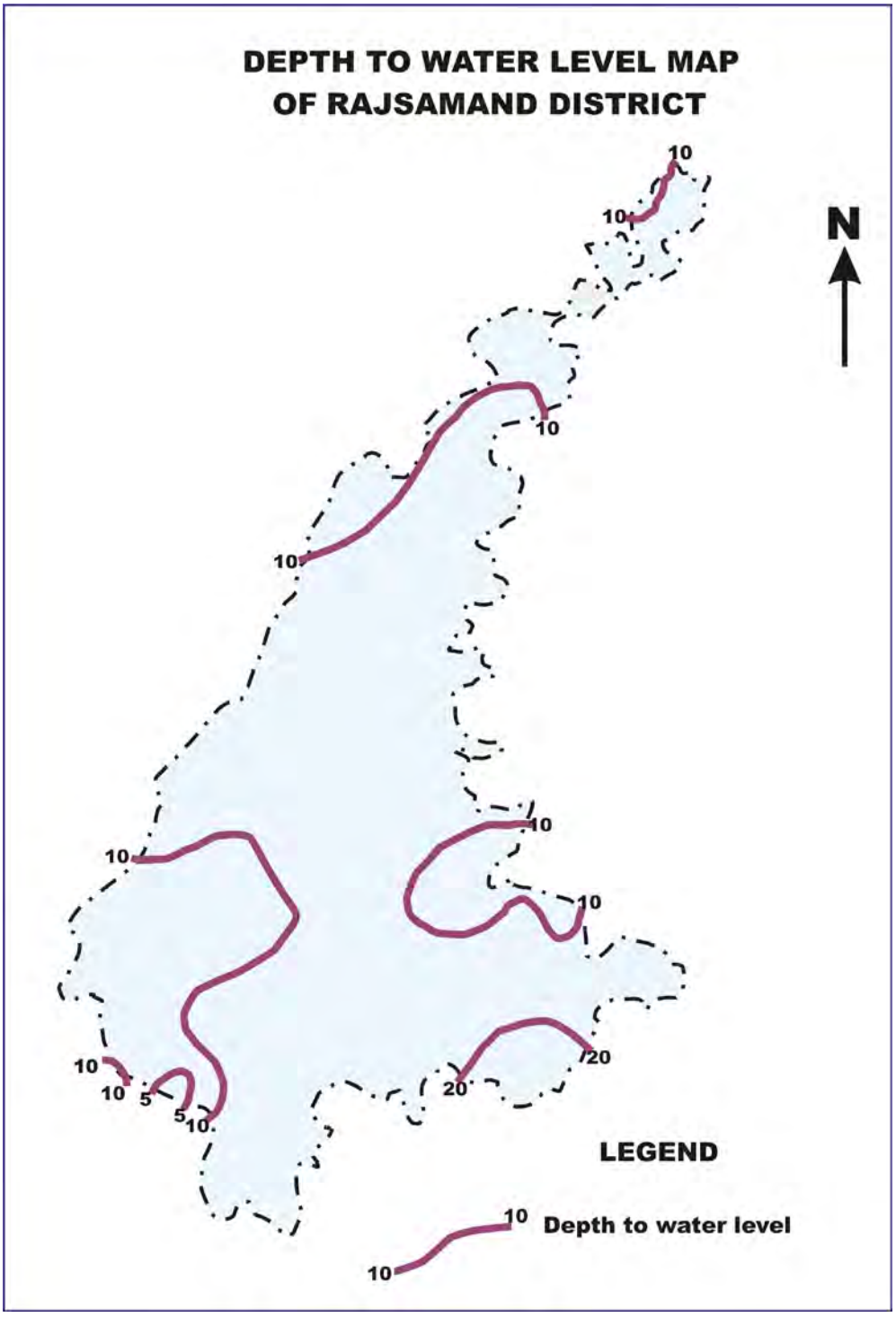
Depth to water level (2006) in the district, monitored on 30 stations, ranges from 3.16 to 20.99 meter below ground level (mbgl) and -0.30 to 13.31 m during pre monsoon and post monsoon, 2006, respectively. Block-wise depth to water level is as follows

Block	Pre-monsoon water level in m		Post-monsoon water level in m		Water level fluctuation in m (Pre– Post)			
					Rise		Fall	
	Min	Max	Min	Max	Min	Max	Min	Max
Amet	17.23	20.99	6.57	9.37	7.86	12.41	-	-
Bhim	7.14	17.90	2.34	8.14	2.51	13.60	-	-
Deogarh	13.17	13.17	3.23	3.23	9.94	9.94	-	-
Khamnor	3.65	15.48	1.69	6.87	4.38	8.80	-	-
Kumbhalgarh	4.40	20.75	-0.30	10.39	2.38	12.45	-	-
Railmagra	3.16	12.88	1.08	7.92	2.08	5.68	-	-
Rajsamand	6.49	18.20	4.22	13.31	2.27	4.89	-	-
District	**7.89**	**17.05**	**2.69**	**8.46**	**4.49**	**9.68**		

During pre monsoon, shallow (<10 m) water level exists Bhim, Khamnor, Kumbhalgarh, Railmagra and Rajsamand blocks. In the remaining area water level was between 10 & 21 m.

Post monsoon data shows depth to water level below 1 m in the Kumbalgarh block, 1 to 8m in Railmagra, Bhim, Deogarh, and Khamnor blocks. Rest of the area falls under 5 to 15m category.

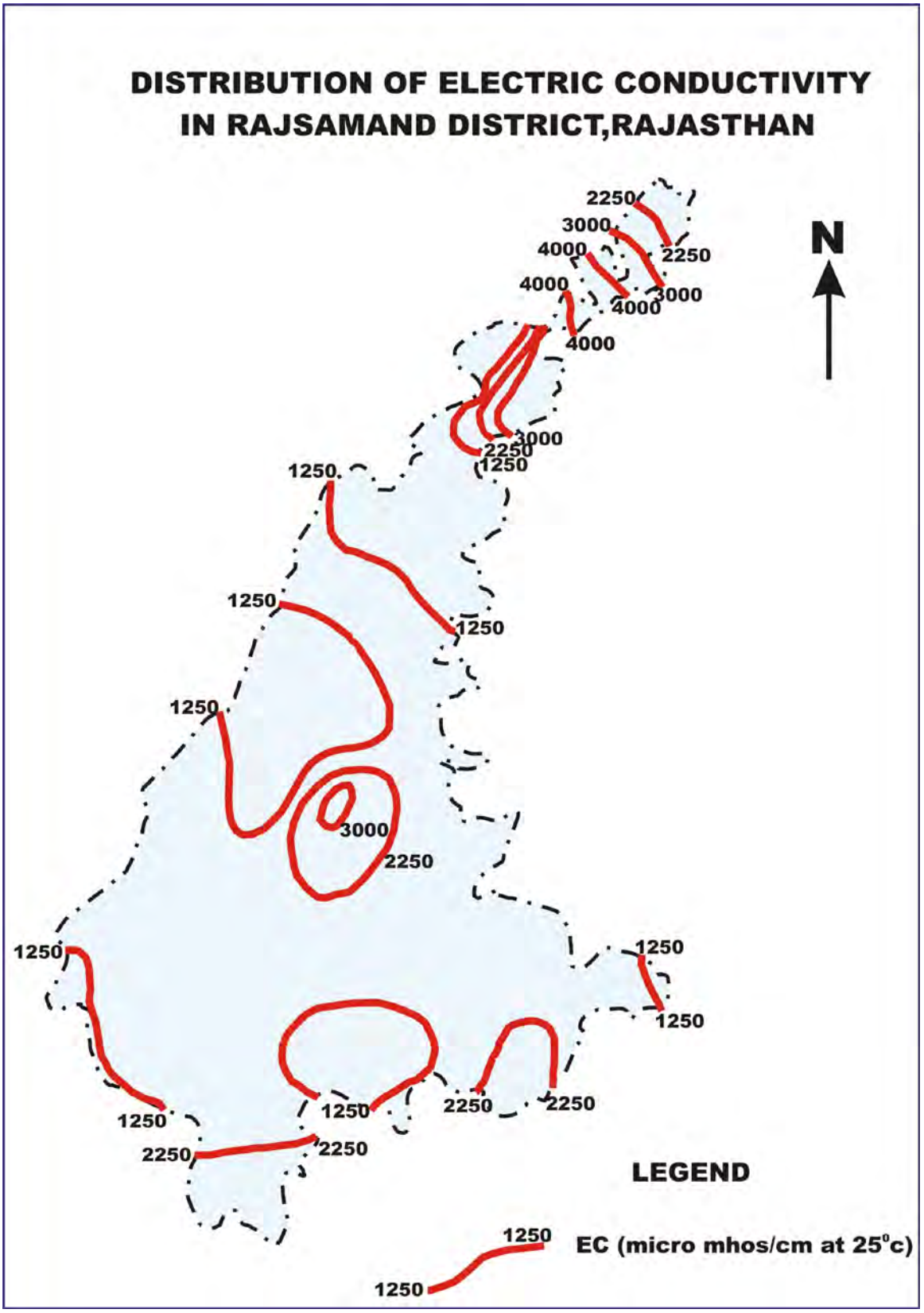
DEPTH TO WATER LEVEL MAP OF RAJSAMAND DISTRICT



5.3 Ground Water Quality

General chemical quality of ground water is very good except for few small pockets. The pH value of ground water in major part of the district varies from 7.47 to 8.90 indicating alkaline nature of ground water. The specific conductance in the district varies from 430 to 4100 micromhos/cm. at 25°C. The variation in specific conductance in greater part of the area ranges form 750 micromhos/cm to 2000 micromhos/cm. In small area around Nadiawala in Amet block the specific conductance is between 2000 to 3000 micromhos/cm. and in small pockets around Ghato in Bhim block and around chattarpur in Amet block the EC is more then 3000 micromhos/cm at 25°C.

The chloride content in the area varies from 14 ppm. to 937 ppm. The chloride concentration in the ground water is generally with in 250 ppm in a major part of the district. The chloride content more than 250 ppm. But less than 500 ppm has been observed at Amet in Amet block, in north eastern and east central part of the district. The fluoride in ground water generally falls with in 2.0 mg/litre. However high fluoride in ground water has been observed at Dhana, Khandel and Ghato where the concentration of fluoride varies between 2.5 & 7.2 mg/litre.


DISTRIBUTION OF ELECTRIC CONDUCTIVITY
IN RAJSAMAND DISTRICT,RAJASTHAN
N
2250
3000
4000
4000
4000
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3000
4000
4000
3000
2250
1250
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1250
1250
1250
3000
2250
1250
1250
1250
1250
2250
2250
2250
2250
LEGEND
1250
1250
EC (micro mhos/cm at 25°c)

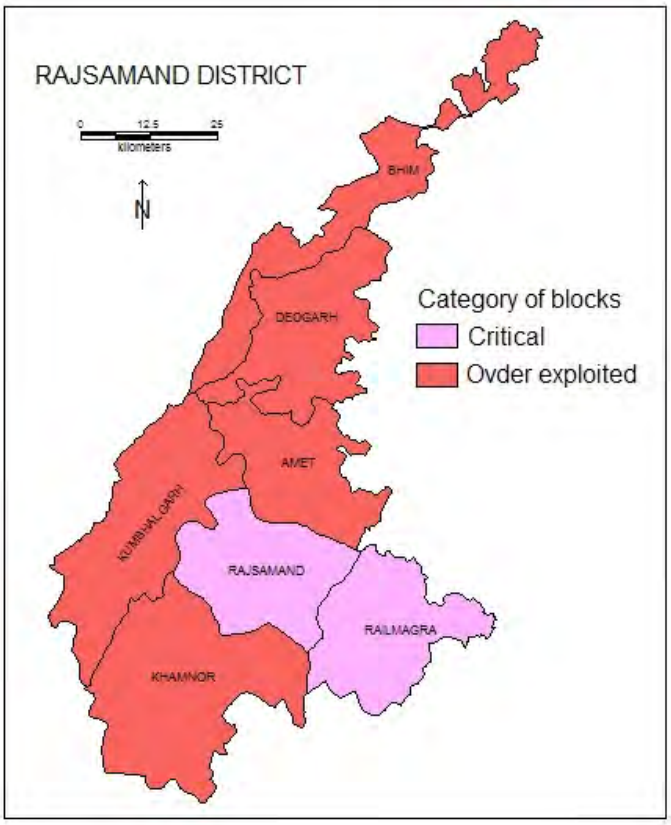
5.4 Ground Water Resources

Ground water resources have been reassessed as on 31.3.2004 based on Ground Water Estimation Committee (1997) are given below:

GROUND WATER POTENTIAL OF RAJSAMAND DISTRICT AS ON 31.3.2004

Block	Area of Block	Type of Area	Potential zone area	Net Annual Ground Water Availability	Existing Gross Ground Water Draft for Irrigation	Existing Gross G.W. Draft for Dom. & Ind. Use	Existing Gross Ground Water Draft for all uses.	State of G.W. Develop-ment	Category
	(Sq.m.)		(Sq.m)	(mcm)	(mcm)	(mcm)	(mcm)	(%)	
1	2	3	5	6	7	8	9	12	15
Amet	523.56	NC	465.19	11.4126	10.7856	1.6849	12.4705	109.27	O.E.
Bhim	687.39	NC	337.16	12.2709	18.7638	0.9263	19.6901	160.46	O.E.
Deogarh	617.01	NC	390.76	10.2077	10.1526	0.6169	10.7695	105.50	O.E.
Khamnor	791.68	NC	675.86	20.3453	26.8002	1.7183	28.5185	140.17	O.E.
Kumbhalgarh	788.35	NC	536.56	19.7096	22.6032	0.8144	23.4176	118.81	O.E.
Railmagra	608.14	NC	600.18	11.8328	10.0968	1.2309	11.3277	95.73	CRITICAL
Rajsamand	619.33	NC	534.38	8.3700	6.2594	1.8432	8.1026	96.81	CRITICAL
Total of District			**3540.09**	**94.1489**	**105.4616**	**8.8349**	**114.2965**	**121.40**	

CATAGORY OF BLOCKS, RAJSAMAND DISTRICT
(As on 31.3.2004)



5.4 Ground Water Development

The ground water development in the district is being done by dug wells, bore wells and dug cum bore wells. Dug wells with horizontal boring are very common. Diameter of dug well varies from 1 m to 6 m with depth ranging from 5 m to 40 m. the present stage of ground water development in the district is 121.04%, which indicate that the scope of ground water development is already exhausted. Out of 07 blocks, 5 fall under “Over-exploited” category and 2 blocks under “Critical” category.

Gneiss, schist, phyllite, slate, Granite, Quartzite and alluvium form the aquifer in different parts of the district. Alluvium area is restricted to riverbeds. Ground water occurs under unconfined to semi-confined condition. Depth and diameter of the dug well and bore well depends on formation and geomorphology. However, general depth of dug well and bore well ranges from 10 to 40m and 200m respectively except in alluvial aquifer where depth of dug well ranges from 15 to 30 m. Details of groundwater structures is as follows:

Formation	Yield of Dug well (m^3/day)	Discharge of Bore well (lpm)	Depth (m)		Diameter		Type of pump/Water lifting devices
			Dug well	Bore well	Dug well (m)	Bore well (mm)	
Alluvium	45-55	250-1500	20-25	15-20	4-5	200	Submersible /Centrifugal pump/ Bullock
Granite Gneiss	30-40	60-100	40-55	150-175	4-5	200	
Phyllite/ Schist	30-45	20-450	15-50	150	4-5	200	
Quartzite	15-25	20-600	10-30	150	4-5	200	

6.0 Ground Water Development Strategy

6.1 Ground Water Development

Stage of ground water development in the district is 121.04%, which indicate that the scope of ground water development is already exhausted in 5 blocks where groundwater development has already exceeded 100% and categorized as “Over-exploited”. Only 2 blocks falls under “Critical” category where ground water development is approaching 100%. There is no scope for further development in the district for irrigation or industrial use. However, exploratory drilling can be taken up in unexplored area for estimation of aquifer parameters.

6.2 Water Conservation and Artificial Recharge

Due to over development further exploitation of precious resources must be checked. For sustainable development of ground water artificial recharge measure to be employed to augment ground water and surface water resources.

Since the stage of ground water development has already crossed 100%, artificial recharge is the only solution to augment ground water through construction of bunds, anicuts, and rooftop harvesting structures. The area has undergone polyphase deformation in geological past, which has resulted in a complex structure (folded, faulted and jointed) that may not be conducive for such structures. Therefore, site of these structures should be selected carefully.

Watershed Development & Soil Conservation Department has constructed permanent (masonry) check dams under Irrigated Watershed Development Project to harvest rainwater, reduce soil erosion, check runoff velocity and Erosion from nalah bank minimizes. Cropping pattern and cropping intensity changed. Harvested water provides supplementary irrigation during long dry spell. In view of the above, such artificial recharge Programmes may be taken up in the district for further development of surface water and ground water resources to enhance agricultural production.

7.0 GROUND WATER RELATED ISSUES & PROBLEMS

Almost entire district is facing problem of ground water scarcity. Over the greater part of the district is occupied by hard formation the well yields are very poor. As such the depth of weathered zone generally is restricted up to 30m, which control the occurrence and movement of groundwater. Deep-seated fracture below 100m is very rare. This causes depletion of well yield drastically during the summers creating acute water shortage of domestic water supply. However, in selected area located on structural weak planes connected to some recharge source continue to yield moderate quantity of water. Deeper levels are either devoid of water or quality of water brackish to saline. Alluvium occurs at limited places close to the major drainage/ valley fill but has very shallow thickness. The well yield varies drastically year to year in different parts of the district and over the season. Thus the availability of surface as well as ground water is very scarce in low rainfall years.

8.0 Recommendations

1. Stage of ground water development in the district has reached 121.4% due to indiscriminate use. It has to be controlled by preventing further development.

2. Revival of traditional ground water storage system i.e. *Baori*, open wells, *Tanka* etc for rainwater conservation for use in day to day life will reduce ground water draft.

3. There are so many marble processing units located in Rajsamand District. These industries consume huge quantity of water resulting in drinking water problem. Affluent is left untreated and allowed to mingle with ground water. Regular monitoring and check on untreated disposal of waste can prevent ground water to get pollute.

4. Awareness programme and training on rainwater harvesting will be beneficial to check decline in water level and justified use.

5. Taking advantage of uneven topography of the area, small check dams or earthen dams, upstream of irrigation commands, at suitable sites, may be constructed to store rainwater. This will increase recharge to ground water which ultimately result in increase of yield of wells.
6. An area of 246.63 sq km is occupied by forest. To protect the area from environmental degradation, extensive programme of aforestation and soil conservation measures may be taken up.

7. Modern agricultural management techniques have to be adopted for effective and optimum utilization of the water resources. This can be achieved by maintaining irrigation through minimum pumping hours as per minimum requirement of water by the crop and also selecting most suitable cost effective crop pattern.

8. Alluvial tracts along river channels of Banas, Khari and chandrabhaga, Gomati and Kothari, Ahar are most feasible locations where shallow wells can be constructed to harness the shallow water table aquifers being potentially recharged by the flash flood and surface runoff. These wells can be used for water supply, wherever feasible.

9. Surface runoff can be harnessed by constructing tanks at feasible sites in the area occupied by the hard rock terrain for supplementing irrigation potential to increase the agricultural production.

10. High water requirement crops to be discouraged. Proper agriculture extension services should be provided to the farmers so that they can go for alternate low water requirement economical crops.

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