



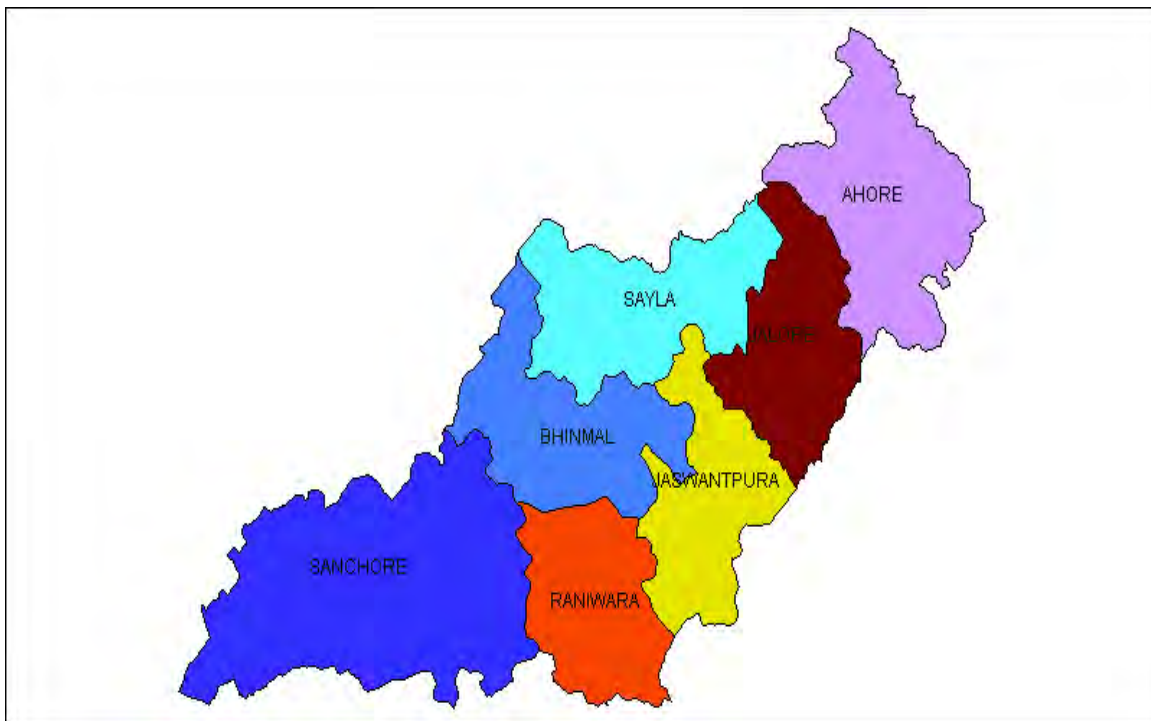
स्वच्छ सुरक्षित जल - सुन्दर खुशहाल कल

CONSERVE WATER - SAVE LIFE

CENTRAL GROUND WATER BOARD
Ministry of Water Resources
Government of India

GROUNDWATER SCENARIO

JALORE DISTRICT, RAJASTHAN



Western Region
Jaipur
January, 2008

DISTRICT AT A GLANCE – JALORE, RAJASTHAN

S No	Item	Statistics	
1	GENERAL INFORMATION		
	(i) Geographical area (sq km)	10640	
	(ii) Administrative Division (As on 31.3.2007)		
	Number of Tehsils	07	
	Number of Blocks	07	
	Number of Villages	701	
	(iii) Population (As per 2001 Census)	1448486	
(iv) Average Annual Rainfall (1977-2006) in mm	385.8		
2	GEOMORPHOLOGY		
	Major Physiographic Units	Alluvial plain, Flood plain, Buried pediment, pediment, sandy plain, Eolian plain.	
	Major Drainage	Luni, Jawai, Sukri, Khari, Bandi & sagi.	
3	LAND USE (sq km)		
	(a) Forest Area	195.60	
	(b) Net Sown Area	6221.21	
	(c) Cultivable Area	7408.78	
4	MAJOR SOIL TYPE	Sand to sandy loam, Loamy alluvium	
5	AREA UNDER PRINCIPAL CROPS (As on 2005)	Crops	Area (hectare)
		Bajra	342774
		Wheat	34339
		Jawar	3118
		Barley	530
		Maize	142
		Pulses	81077
		Oilseeds	85317
6	IRRIGATION BY DIFFERENT SOURCES		
	Source	No of structure	Area in ha
	Dug wells	41955	202153
	Tube wells/Bore wells	1034	
	Tanks/Ponds	-	-
	Canals	-	33
	Other Sources	-	-
	Net Irrigated Area (ha)	179447	
	Gross Irrigated Area (ha)	202153	

7	NUMBER OF GROUND WATER MONITORING WELLS OF CGWB (As on May 2007)	
	Number of Dug wells	10
	Number of Piezometers	11
8	PREDOMINANT GEOLOGICAL FORMATIONS	Older alluvium, Younger alluvium, Jalore Granite, Siwana Granite Malani Rhyolite (Volcanics) Idar Granite, Erinpura Granites
9	HYDROGEOLOGY	
	Major Water bearing formation	Older and Younger alluvium, Granite, Rhyolite.
	Depth to water level (Pre-monsoon, 2006) (mbgl)	5 to 78
	Depth to water level (Post-monsoon, 2006) (mbgl)	1 to 78
	Long term decline water level trend (1997-2006) in m/yr	Upto 0.1775
10	GROUNDWATER EXPLORATION BY CGWB (As on 31.3.2007)	
	Number of wells drilled (EW, OW, Total)	EW-16, OW-17 SH-21, PZ-13 Total-67
	Depth Range (m)	50 to 363
	Discharge (liter per minute)	Meager to 3500
	Transmissivity (m ² /day)	34 to 370
11	GROUND WATER QUALITY	
	Presence of chemical constituents more than permissible limit (EC>1500 mmhos/cm at 25 ^o C, F>1.5 mg/l, Nitrate>45.0mg/l)	EC - 4163 sq km F - 9256 sq km Nitrate- 7721 sq km
	Type of water	
12	DYNAMIC GROUND WATER RESOURCES (March, 2004) in mcm	
	Annual Replenishable Ground Water Resources	432.3349
	Net Annual Ground Water Draft	782.1150
	Projected Demand for Domestic and Industrial Uses up to 2025	74.3410
	Stage of Ground Water Development	180.90%
13	Awareness and training Activity	Date: 11.03.2005 (Mass Awareness programme) Place: Bagora
14	Groundwater control and Regulation	No. of OE blocks: 07 No. of block notified: 03
15	MAJOR GROUND WATER PROBLEMS AND ISSUES	Declining water level, Low Yield of Wells, Quality hazard.

GROUND WATER SCENARIO DISTRICT - JALORE, RAJASTHAN

1.0 Introduction

The district derives its name from the town of Jalore, which is the headquarters of the district administration. District is located between latitudes 24° 37' 00" to 25° 49' 00" and longitudes 71° 11'00" to 73° 05'00" with an area of 10,640 Sq. kms (3.11% of the State). The district is part of Jodhpur Division. The district is composed of five sub-divisions viz. Jalore, Ahore, Bhinmal, Sanchore, Raniwara which covers seven tehsils viz: Jalore, Ahore, Bhinmal, Sanchore, Raniwara, Sayala, Bagora and seven blocks viz: Jalore, Ahore, Bhinmal, Sanchore, Raniwara, Sayala & Jaswantpura. Total number of villages in the district is 701 and it also has 3 urban towns. Rural and Urban population of the district is 13.38 lakh and 1.10 lakhs respectively. Central Ground Water Board carried out detailed groundwater investigations during 1967-69 under United Nations Development Program (Phase-I) Project. Purpose of this project was to investigate and evaluate groundwater potentialities and to make appraisals of technical and economic feasibility of ground water development. A key area of 6750 Sq. Km. was selected covering mainly Jawai-Sukri River basin in this district. Reappraisal study was done by Central Ground Water Board in 1979-80 covering the entire district. In 1997-98 Jawai sub basin of the Luni River catchment of the district was covered under reappraisal hydrogeological studies. The Central Ground Water Board has also taken up the exploratory drilling program in the district in 1986-87, 1991-92, 1998-99 and Piezometer construction in 1994-95.

2.0 Rainfall & Climate

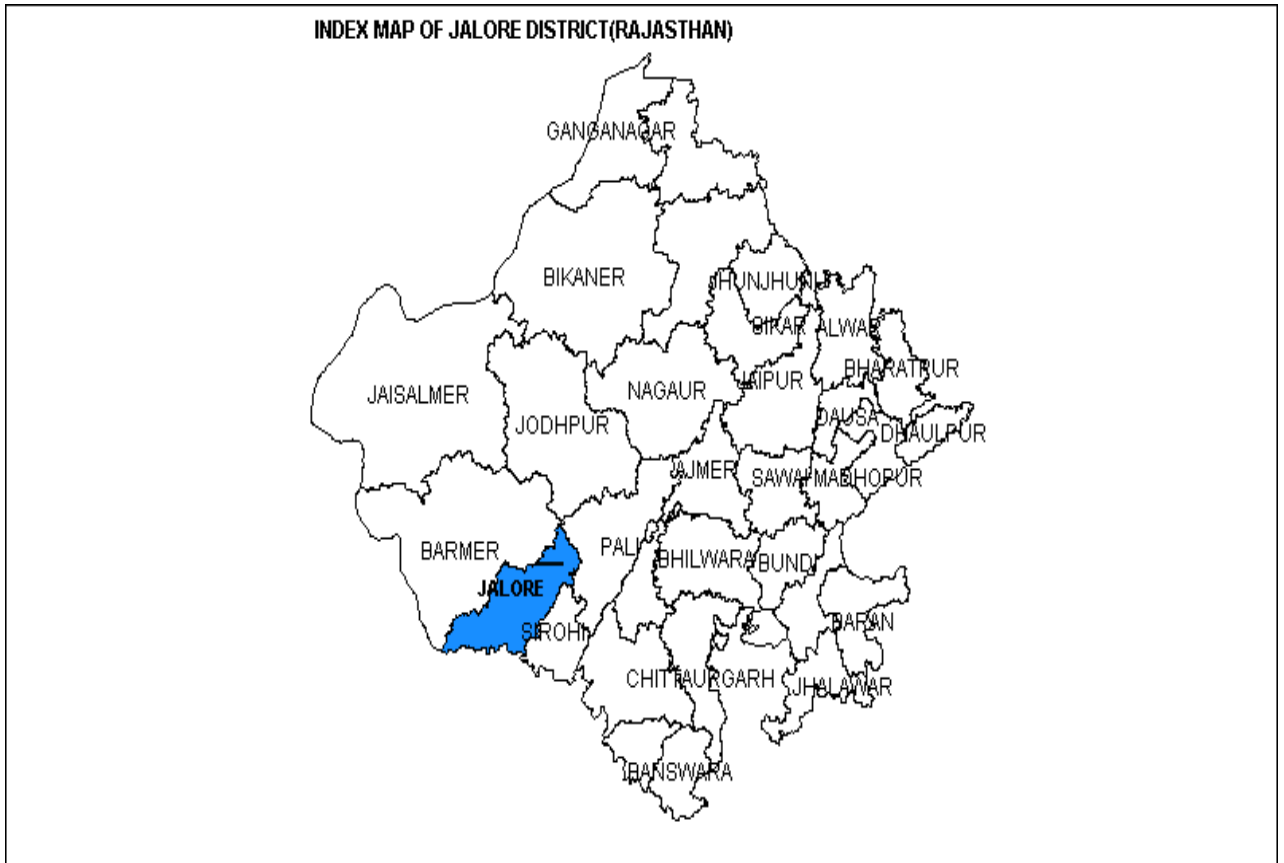
Average annual rainfall (1977-06) of the district is 422.7 mm. However normal rainfall for the period 1901 to 1970 is 400.6 mm. The annual rainfall gradually decreases from southeastern part to northwestern part. The maximum average rainfall is 469.6 mm at Jaswantpura and minimum average rainfall is 388.7 mm at Ahore.

The district experiences either mild or normal drought once in two years. Severe type of drought has been recorded at Ahore block. Most severe type of drought has been recorded at Bhinmal (1980,87), Sanchore (1987,2002) & Jaswantpura (1987) block in the district.

3.0 Geomorphology , Drainage & soil type

The district is characterized by landscape of alluvial plains of hill ranges, and isolated hillocks. Jalore district has almost an even topography in its western section, the lowest point being around 17.0 meter above mean sea level and is marked by sand dunes. The sand dunes trend NE-SW, indicating prevalent wind direction in the area. The eastern section is dominantly hilly, forming the flank of Mount Abu range and the highest point is 991 m. above mean sea level. The elevation of the area ranges from more than 600m above MSL in the east to 75m above MSL in the west at the confluence of the Luni and Jawai-Sukri Rivers. Generally the terrain slopes westward. The valley floor has an area elevation ranging from 60m above MSL to 215m above MSL. The hilltops are normally

shaped by weathering phenomena. In the mid eastern and western parts, sand dunes are a common topographic feature. The Jalore district is often called “Delta of West Rajasthan” and all the principal rivers of western Rajasthan flow through this district



Drainage:

Jalore district falls in parts of Luni (82.8%), Other Nallahas (16.9%) and Outside Basin(0.3%) basins. Tehsil wise distribution of basin area is given below

Sl.No	Name of Tehsil	Area in Sq. Km.		
		Luni	Other Nallahas	Out side Basin
1	Ahore	1536.4	-	-
2	Bhinmal	2653.6	-	4.1
3	Jalore	2277.2	-	-
4	Raniwara	494.9	-	513.8
5	Sanchore	1857.9	33.9	1286.8

The Jalore district forms a part of the Central Luni Basin and is drained by the Luni drainage system, which passes only through the southwestern tip of the district near Sanchore before shedding its load into Runn of Kutch, originating from the Aravalli hill ranges. The main rivers in the district are Jawai, Sukri, Khari, Bandi and Sagi which are the tributaries to the Luni River and forms a trellis pattern of drainage flowing due northwest. All rivers are ephemeral with graded and meandering courses and wide flood plains. Additionally, there are innumerable old channels buried under wind blown sand.

Soils & Irrigation Practices

Soils are shallow with deep gravel encrusted with CaCO₃. The texture of the soils in general varies from sandy to sandy loam but in deltaic areas of the Luni River south to southwest of Sanchore, the soils are loamy alluvium. The pH value ranges from 7.0 to 9.0 and in general, the soils have a higher pH. The nature of the soils can be broadly described fine-sorted sand on the dunes and coarse to medium textured soils on the plains with a tendency for increase in fine particles. The soils in the eastern parts of the district are shallow, covering partly weathered rocks and calcareous gravelly material. Soils along the hill slopes are mostly shallow consisting of weathered rock and calcareous gravelly materials. The fertility status of the soils in general is low and the proportion of organic matter varies from 0.2 to 1.0 per cent. The soils of the district can be broadly divided into three types.

Irrigation:

The principal means of irrigation in the district are wells/tube wells, though some areas are irrigated by canals. Groundwater is the main source of irrigation and is utilized through dug wells, DCB's, and tube wells. Canal irrigates only a small area. Important irrigation projects are Narmada canal project, Bandhi Sandhara irrigation project, Bhetala irrigation project, Dantwara irrigation project, Dhumada mata bund, Gudanal II irrigation project.

Details of the gross irrigated area by different sources and numbers of structures have been given below:

(Area in Ha)

Sl. No	Tehsil	Total Irrigated Area	Irrigated Area				Number of structures		
			Tube wells / wells	Ponds / Tanks	Canals	Others	Dug Well	Tube Well	Pond
1	Jalore	24314	24314	-	-	-	4456	105	-
2	Ahore	11682	11649	-	33	-	2272	197	-
3	Bhinmal	17488	17488	-	-	-	5185	141	-
4	Raniwara	18889	18889	-	-	-	6716	45	-
5	Sanchore	62988	62988	-	-	-	12692	182	-
6	Soyala	35550	35550	-	-	-	5495	57	-
7	Bagora	31241	31241	-	-	-	5139	307	-

4.0 GROUNDWATER SCENARIO

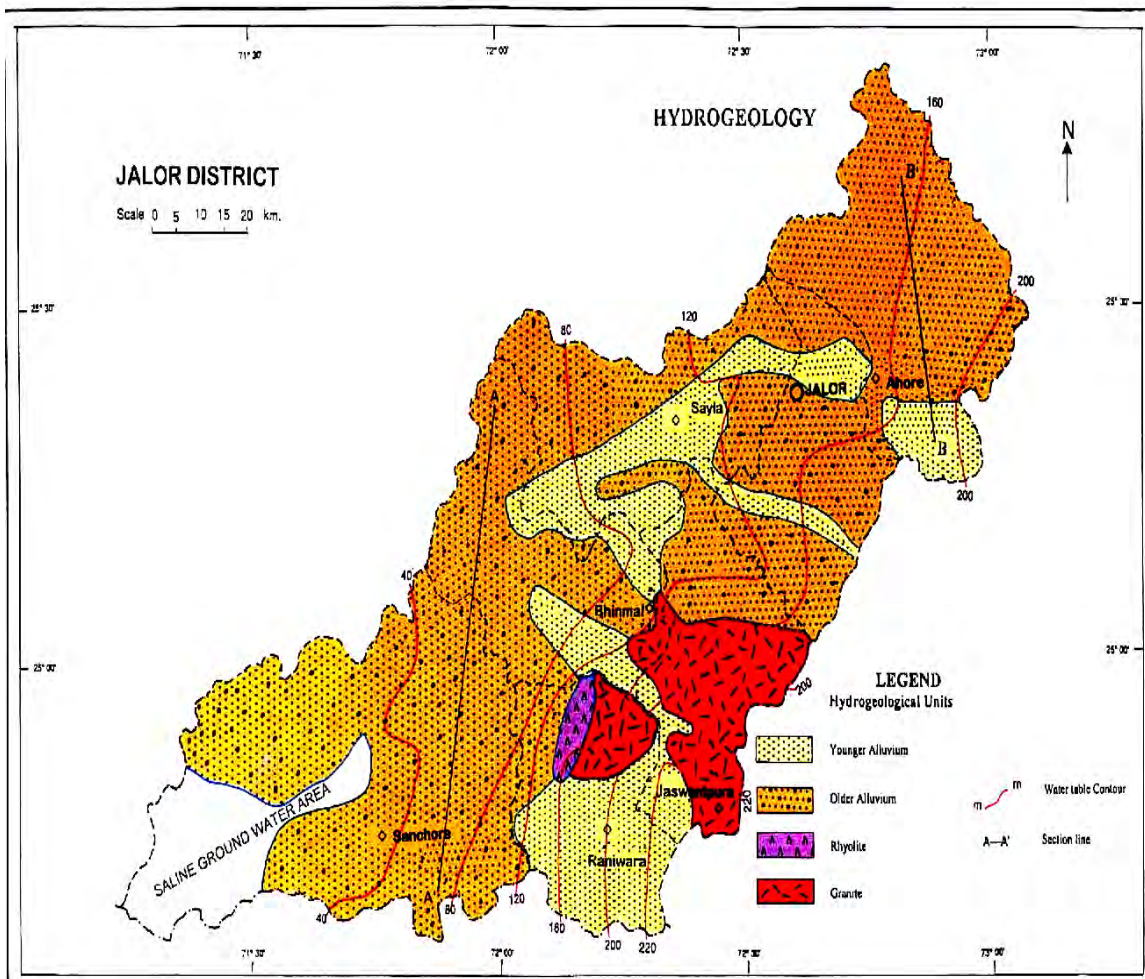
Geological Framework

Quarternary Alluvium, various igneous and meta-sedimentary rocks, represents the geological set-up of the district. Quarternary Alluvium and wind blown sand cover vast area. Southeastern part of the district around Jaswantpura is occupied by Delhi super group rocks-phyllite, schists and Erinpura granite and Gneisses are exposed. Erinpura granite and Gneisses are also exposed near Jalore town. Younger Alluvium mainly occurs along river courses and stream channels.

4.1 Hydrogeology:

Groundwater occurs under unconfined condition in saturated zone of rock formation. Its occurrence is controlled by topography, physiography and structural features of the geological formations. The movement of the groundwater in hard rock areas is governed by size, openness, interconnection and continuity of structural weak planes while in unconsolidated rocks.

HYDROGEOLOGICAL MAP OF JALORE DISTRICT



ground water movement takes places through pore space between grains. Water bearing properties of different aquifers are described below

Groundwater in Delhi Super Group

- **Granite:** These aquifers occur predominantly in Jaswanpura tehsil. Few intrusives are also found which have low permeability. Groundwater is retained in weathered zones, fractures joints etc.

Depth in open wells tapping these aquifer ranges from 20 to 50m. Yield of wells varies from 20m³/day to 188m³/day. The depth to water level in the area tapping this aquifer ranges from 11m to 31m.

- **Phyllite :** These aquifer occur predominantly towards Jaswanpura tehsil. Groundwater occurs under water table condition and is mostly tapped by dug wells. Depth of wells ranges from 20m to 30m. The depth to water level ranges from 11m to 18m,bgl. Yield of wells is generally very poor ranges from 30 to 80m³/day.

Groundwater in Unconsolidated Sediments

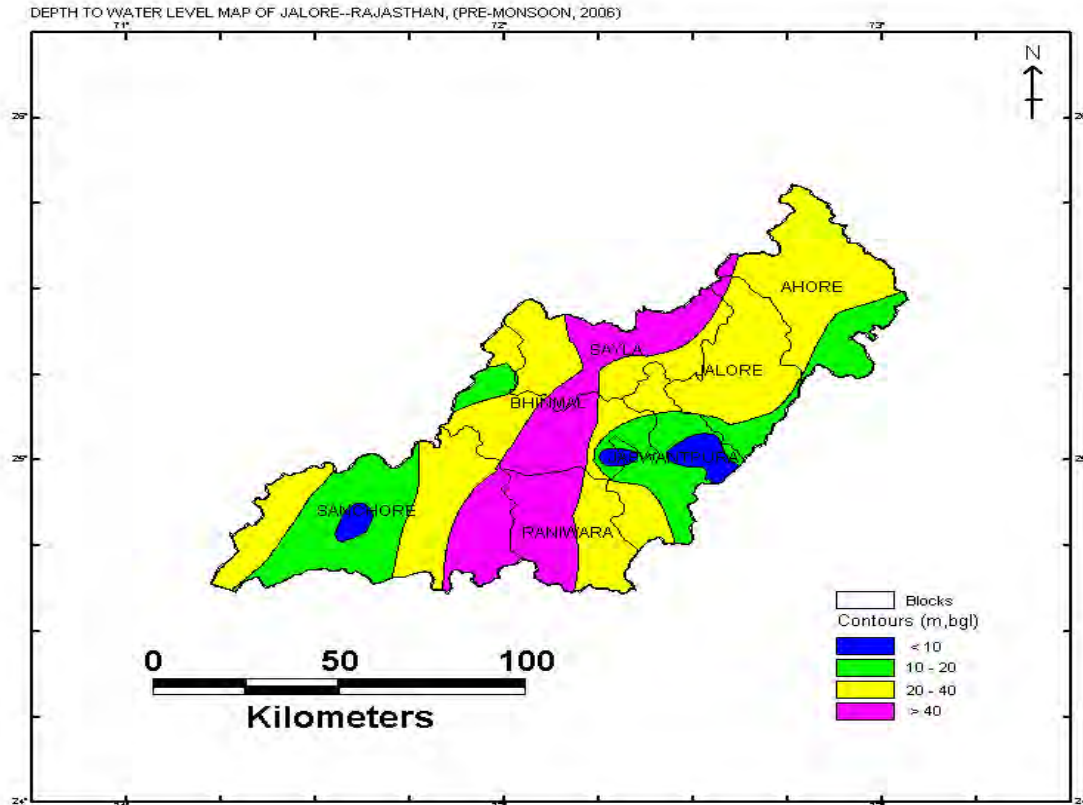
- **Younger Alluvium:** Alluvium covers major part of the district. It is confined to riverbeds and riverbanks. The depth to water level is less than 10m,bgl near river courses but exceeds 40m in other areas.Yield ranges for dug well are 60-150m³/day and for tubewells 80-560m³/day

Deep Aquifer System:

Exploratory drilling in the district reveals that depth of Alluvium upto 362m at Jhab.Yield of tube wells ranges from 10-40m³/day with a drawdown of 1.28-16.28m.Transmissivity varies from 370-5696m²/day

Depth to Water Level (Pre Monsoon 2006) The depth to water level varies widely depending upon topography, drainage, bedrock geology etc. Depth to water varies from less than 6m to more than 50m bgl. Water level is shallower in hard roks aquifer part (Bhinmal) of the district. In general DTW varies from 10 to 40m in greater part of the district. In the easternand western part DTW varies from 10m to 40m,bgl. Deep water levels (>50m) are observed in parts of Bhinmal,Raniwara,Soyala and east of Sanchore blocks.

DEPTH OF WATER LEVEL MAP OF JALORE-(Pre-monsoon,2006)

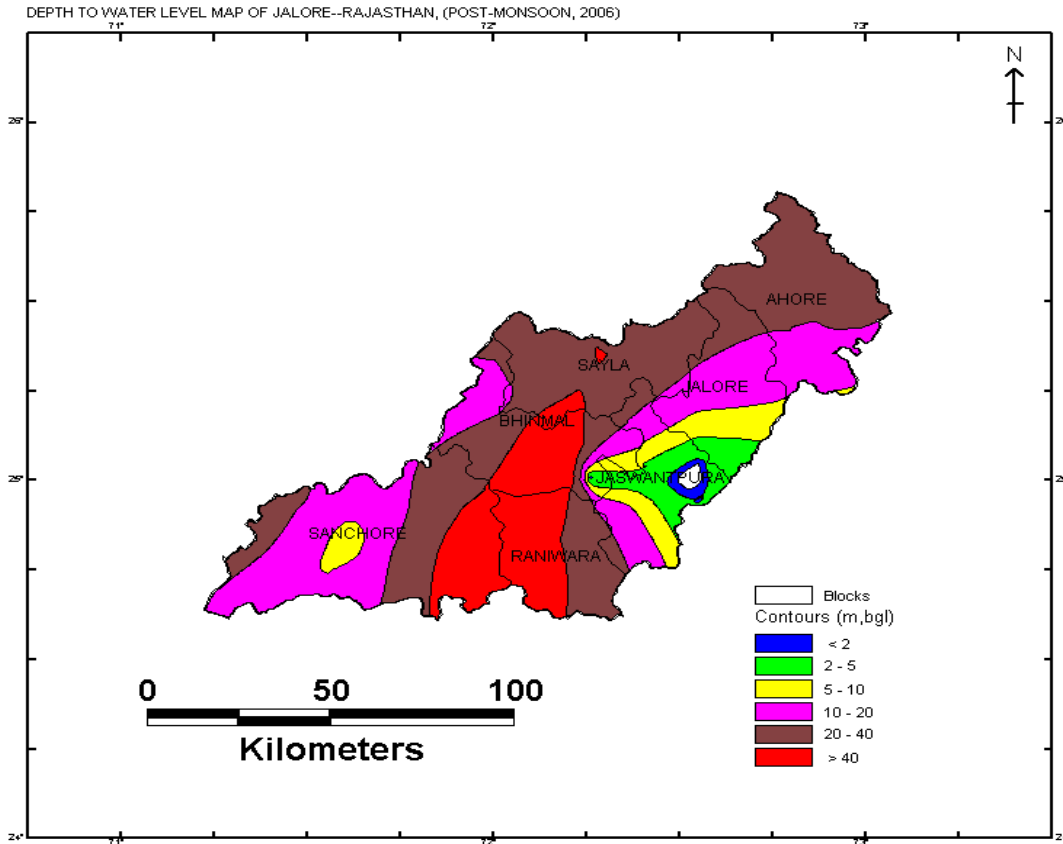


Depth to Water Level (Post Monsoon 2006)

During Nov.06 water level ranges widely from less than 2m to more than 50m,bgl. Water level is shallower in eastern part of the district. In general DTW varies from 2m to 10m in Jaswantpura and south of jalore tehsils., between 10m to more than 40m in rest of the tehsils.

Block	Pre Monsoon		Post Monsoon	
	Min	Max	Min	Max
Jalore	9.50	31.53	7.70	19
Ahore	18.20	29.38	14.14	25.90
Bhinmal	5.95	77.70	1.60	77.30
Raniwara	28.13	53.70	20.35	54.90
Sanchore	7.57	25.88	7.25	23.08
Soyala	26.90	51.73	23.10	46.51
Jaswantpura	7.15	9.39	1.56	2.44

DEPTH OF WATER LEVEL MAP OF JALORE-(Post-monsoon,2006)



Water Level Fluctuation

Seasonal fluctuation in water level based on Pre and Post-monsoon 06' indicate that there has been rise in water level in major part of the district. Perusal of the fluctuation data indicate that major part of the district has recorded rise in water level of more than 10m and decline in water has been observed at Bhinmal block upto 3m..

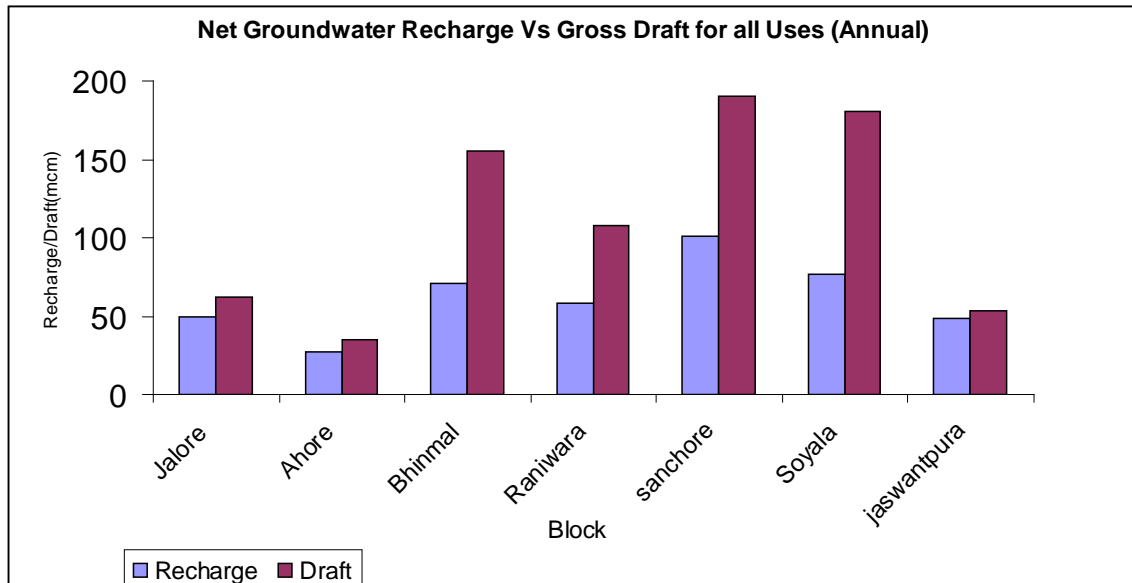
Block	Water level fluctuation (Pre- Post)			
	Rise		Fall	
	Min	Max	Min	Max
Jalore	0.40	11.55	0.80	-
Ahore	0.90	13.00	0.70	1.40
Bhinmal	0.4	4.53	0.35	2.70
Raniwara	0.10	9.00	0.15	1.70
Sanchoore	0.25	1.70	0.10	1.20
Soyala	0.25	3.80	0.90	-
Jaswantpura	0.30	13.80	0.90	-

Decadal (1997-06) water level trend has been worked out for Pre and Post Monsoon and has been given in the table. On comparing water level data majority of monitoring stations show declining trend ranging from upto 0.1994m/yr during pre-monsoon. Rise in water level is observed in small pockets in Bhinmal and Ahore tehsils. During post-monsoon decadal trend show rise and decline of 0.021 and 0.8685m/yr respectively.

Block	Pre Monsoon Trend (m/yr)		Post Monsoon Trend (m/yr)	
	Rise	Fall	Rise	Fall
Jalore	-	0.085	-	0.0648
Ahore	0.0005	0.1125	-	0.8685
Bhinmal	0.0018	0.046	0.0262	0.052
Raniwara	-	0.1994	-	0.2098
Sanchoore	-	0.0546	-	0.3389
Soyala	-	0.1628	-	0.1939
Jaswantpura	-	0.0051	0.0219	-

4.2 Groundwater Resources

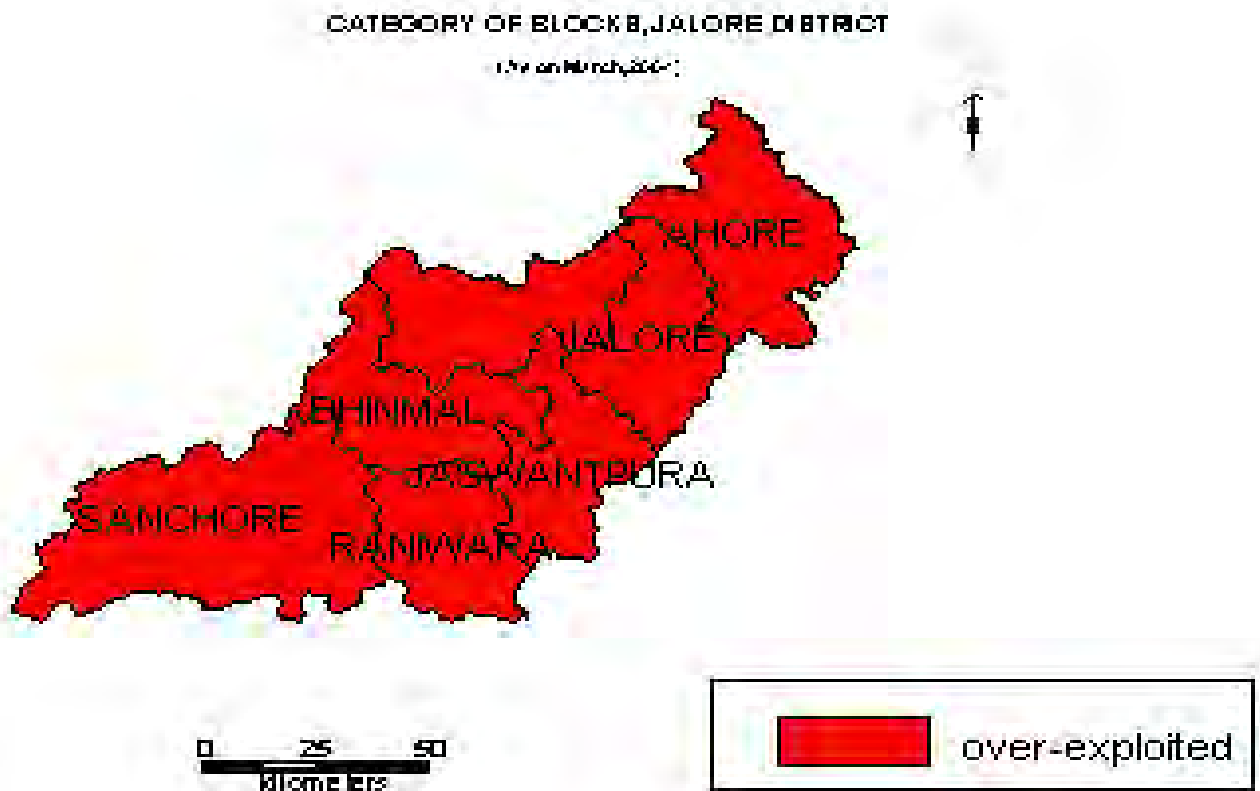
Groundwater resources have been estimated as per the norms recommended by GEC 97. While assessing the ground water resources saline and hilly areas have not been considered. Total groundwater resources based on water level fluctuation method is estimated to be 432.3283mcm. Draft for all use is 783.7411mcm and over all stage of development is 180.90%. Summarized block wise estimate of dynamic groundwater resources is given below:



Summerised block wise estimate of dynamic groundwater resources is given below:-

Sl. No.	Assessment Unit	Net Annual Ground Water Availability (mcm)	Gross Ground Water Draft for All uses (mcm)	Stage of Ground Water Development (%)	Category
1	Jalore	49.3725	62.3175	126.22	OE
2	Ahore	26.9516	34.9067	129.52	OE
3	Bhinmal	70.5403	155.6022	220.59	OE
4	Raniwara	58.0040	107.7222	185.72	OE
5	Sanchore	101.4181	189.8693	187.21	OE
6	Soyala	77.0821	180.1386	233.70	OE
7	Jaswantpura	48.9662	51.5585	105.29	OE
DISTRICT TOTAL		432.3283	783.7411	180.90	OE

**CATEGORY OF BLOCKS, JALORE DISTRICT
(Ason31.03.2004)**



4.3 Groundwater Quality

Water Quality in shallow Aquifer

The range of chemical constituents of groundwater in Jalore district.

S.No.	Chemical constituent	Range
1	PH	7.2 to 9.0
2	Chloride	07 to 5230 ppm
3	Specific conductivity at 25°C	340 to 14030 micro mhos/cm
4	Total hardness as CaCO ₃	60 to 1750 ppm
5	Calcium	8 to 368 ppm
6	Magnesium	2 to 387 ppm
7	Carbonate	Nil to 244 ppm
8	Bicarbonate	18 to 1732 ppm
9	No ₃	2 to 384 ppm
10	F	0.21 to 14.9 mg/lit

Changes in the quality of groundwater

It has been observed that the following important changes have taken place in the contents of chemical constituents since the completion of UNDP project in 1969.

1. That there has been a decrease in Chloride content in the central section of Jalore district at Jalore, Madri and Dedwa. While the southern section around Raniwara and Sanchore, Sarnau and Kura indicate a substantial increase of chloride contents.
2. There has been a increase in the alkalinity of groundwater around Sarnau, Bhinmal, Dedwa, Jalore as dovedent from pH. Nimla and Saila record a downward trend while there is no appreciable change at other places.
3. Electrical conductivity shows an upward trend around Raniwara, Sanchore, Bhinmal and Kura which are in the southern part of the district while Jalore and Madri stations indicate a downward trend since 1975.

4. The hardness of groundwater has also gone up around Raniwara, Sanchore and Kura where as Jalore and Madri station record a decline in CaCo₃ content.

Quality of water from deeper aquifer

The ground water exploration data indicates that the quality of ground water in the district is generally brackish to saline with very limited and small pockets having fresh ground water. The lowest electrical conductivity values of 578m mhos / cm. at 25⁰C at Ahore, whereas at Dangra electrical conductivity values goes upto 22719 mmhos / cm at 25⁰C. The depth wise quality deterioration has been observed at Ahore, Dangra, and Posana. The quality deteriorates with depth. Fluoride concentration in the ground water in general is from 1.00- 4.0 mg/l. whereas it ranges for minimum value of 0.3 mg/l. to maximum value 8.0 mg/l.

4.4 Status of Groundwater Development

Alluvium, Granite and Rhyolite form the aquifer in different parts of the district.. Ground water occurs under unconfined to semi-confined condition. Depth and diameter of the dug well and bore well depends on formation and geomorphology..

Details of groundwater structures is as follows:

Block	Formation	Avg. Yield m ³ /day	
		Dug well+DCB	TW
Ahore	Younger Alluvium	120	150
	Older Alluvium	140	170
Bhinmal	Younger Alluvium	150	140
	Older Alluvium	150	150
Jalore	Younger Alluvium	135	150
	Older Alluvium	135	150
Jaswantpura	Younger Alluvium	90	150
	Older Alluvium	90	135
	Granite	90	120
Raniwara	Younger Alluvium	100	135
	Older Alluvium	120	150
	Granite	120	120
	Rhyolite	90	-
Sanchore	Older Alluvium	135	150
Sayala	Younger Alluvium	120	150
	Older Alluvium	135	150

As the stage of GW development in district in 180.90% thus there in no scope for further ground water development.

5.0 Ground Water Management Strategy

5.1 Ground Water Development

Stage of ground water development in the district is 180.90%, which indicate that the scope of ground water development is already exhausted in all blocks where groundwater development has already exceeded 100% and categorized as "Over-exploited". There is no scope for further development in the district . However, exploratory drilling can be taken up in unexplored area for estimation of aquifer parameters.

5.2 Water Conservation and Artificial Recharge

As the entire district come under the category of 'Over-exploited' hence ground water should be used judiciously taking into account modern agriculture water management techniques by cultivating crops needing less watering and Use of sprinkler system & drip irrigation should be encouraged.

The small-scale farmers in the area should be encouraged for the use of common ground water structures for optimum use of ground water resources for irrigation purposes because the area comes under the category of "Over-exploited". The suitable artificial recharge structures like subsurface barriers across the river bed should be constructed so the ground water run off may be arrested and impounded in the subsurface reservoir for meeting various sectoral needs.

Ground Water resources of the district have been updated in accordance with GEC guidelines (1997) and it has been observed that all blocks have been categorised as "Over-exploited" This reflects excessive withdrawal of ground water in comparison to recharge, resulting in depletion of ground water levels, deterioration in chemical quality of ground water and reduction in yield of wells and tube wells. If this situation continues for some more years, aquifers in the district may be damaged causing acute problem of availability of ground water even for drinking water supply; therefore, early implementation of regulation on ground water use in the area is necessary. Suitable techniques are required to be adopted to recharge ground water reservoir. Cultivators should also be made aware and encouraged to adopt suitable cropping pattern using modern techniques by extension services for getting maximum agriculture production through minimum withdrawal.

Jalore district is covered by extensively alluvial plains with some scattered rocky terrain. Topographically all the rivers flowing in the district originate in Sirohi & Pali district. Hydrogeologically, alluvial formation has good water storage and transmission capacity in comparison to hard rocks. Alluvium being the major aquifer in the district, so different techniques of artificial augmentation of ground water resources can be adopted such as :-

- 1) Rain Water Harvesting and Construction of subsurface barriers / check dam / percolation tanks etc. in the district may increase recharge of ground water reservoirs.

2) Existing dams situated in Sirohi and Pali district should be release some water in down stream and so that alluvial aquifers of the district may be recharged.

3) Mass awareness programmes should be taken up in almost all the areas of the district to educate public in adopting water saving practices & conservation of water.

In view of the above the district should be notified for ground water control the regulation in the district & all the ground water abstraction ground structures should be registered.

A provision for surplus water of Narmada Canal project for artificially recharge in the district may also be taken into consideration. Maximum stress should be given for preparation of regional water supply scheme from Narmada canal water & maximum irrigation facilitated by surface water available through Narmada Canal project so the stress on ground water resources can be reduced. Ground water legislation must be implemented so that control on ground water draft can be ascertained. Wells to be put down for potable supplies should be limited to the unconfined aquifer containing water with less TDS 2000 PPM.

6.0 GROUND WATER RELATED ISSUES & PROBLEMS

Almost entire district is facing problem of ground water scarcity. However, there are large areas vulnerable for quality and depleted water table. Major issues in the district are as follows:

Groundwater Depletion Hazard

Comparison of pre monsoon water level between 1997 & 2006 shows that 90% of wells (total wells 33) registered decline in water level. In the decade, decline ranges from 0.021 and 0.8685m/yr observed in max. wells. The long term depleting nature of water level causes reduction in storage, which leads to water scarcity.

Water Quality Hazard

High fluoride:The main problem of the district is high fluoride in the ground water. The central and eastern part of the district has high fluoride values exceeding permissible limit of 1.5 mg/lit. The fluoride value ranges in district for 0.21 mg/lit.(Choudhariyo Ki Dhani) to 9.07 mg/lit. at Bagora.

Salinity:In the extreme south west and in the western parts of the district where bandi and Sukri stream discharge their load in the Luni river,the groundwater is found to be saline to highly saline as around Sanchore having total dissolved salts ranging from 3000 to 7000ppm.

Vertical groundwater quality zonation: Vertical groundwater quality zonation has been noticed at depth in Jawai-Sukri valley at Ahore,Dangra,Posana and Dhadhal locations.Non-judicious pumping of wells may cause ingress of saline formation.Geophysical logging of boreholes in the area has clearly indicated the vertical groundwater quality zonation and later ascertained by exploratory drilling.

Occurrence of Drought The rainfall variation during last decade has been a critical water sector hazard. During 1997–06 the rainfall deficit years were 91,98,99,00,01 and 02 and are classified as serious drought years. The constant

rise in population, urbanization, industrialization and agricultural growth has caused decrease in per capita availability of water.

7.0 Awareness & Training Activity:

Mass awareness programme organized;

Date; 11.03.2005

Place; Bagora

Block; Jalore

8.0 Area notified by CGWA/SGWA

Number of OE Blocks:seven(07)

Number of Blocks Notified by CGWA;Three(03) Jalore,Raniwara and Bhinmal

9.0 Recommendations

1. As the stage of ground water development in the district as a whole is 180.90% & therefore practically no scope is left for the construction of new ground water structures for irrigation purposes, except for domestic drinking water supply.
2. As the entire district come under the category of 'Over-exploited' hence ground water should be used judiciously taking into account modern agriculture water management techniques by cultivating crops needing less watering such as wheat(Raj 911), barley (RD 2508), Makka- Mahi kanchan, Jowar (CSH 1,6&14) Bajara (HHB 67260), Moong (K 581), Soyabean (Pusa 16), Til (RT 46) Ground nuts (RG 141), Mustard (Pus Bold) and use of sprinkler system & drip irrigation should be encouraged.
3. The small-scale farmers in the area should be encouraged for the use of common ground water structures for optimum use of ground water resources for irrigation purposes.
4. Cultivators should also be made aware and encouraged to adopt suitable cropping pattern using modern techniques by extension services for getting maximum agriculture production through minimum withdrawal.
5. The suitable artificial recharge structures like subsurface barriers across the river bed should be constructed so the ground water run off may be arrested and impounded in the subsurface reservoir for meeting various sectoral needs.
6. Over all stage of ground water development in the district is 180.90% and district is categorised as "Over exploited". This reflects excessive withdrawal of ground water in comparison to recharge, resulting in depletion of ground water levels, deterioration in chemical quality of ground water and reduction in yield of wells and tube wells. If this situation continues for some more years, aquifers in the district may be damaged causing acute problem of availability of ground water even for drinking water supply; therefore, early implementation of regulation on ground water use in the area is necessary.
7. Jalore district is covered by extensively alluvial plains with some scattered rocky terrain. Topographically all the rivers flowing in the

district originate in Sirohi & Pali district. Hydrogeologically, alluvial formation has good water storage and transmission capacity in comparison to hard rocks. Alluvium being the major aquifer in the district, so different techniques of artificial augmentation of ground water resources can be adopted such as Rain Water Harvesting and Construction of subsurface barriers / check dams / percolation tanks etc. in the district may increase recharge of ground water reservoirs.

8. Existing dams situated in Sirohi and Pali district should be release some water in down stream and so the alluvial aquifers of the district may be recharged.
9. Mass awareness programmes should be taken up in almost all the areas of the district to educate public in adopting water saving practices & conservation of water.
10. The district should be notified for ground water control the regulation in the district & all the ground water abstraction ground structures should be registered.
11. A provision for surplus water of Narmada Canal project for artificially recharge in the district may also be taken into consideration. Maximum stress should be given for preparation of regional water supply scheme from Narmada canal water & maximum irrigation facilitated by surface water available through Narmada Canal project so the stress on ground water resources can be reduced.
12. Reappraisal hydrogeological survey after every 3 years to study the groundwater regime with special reference to the depth to water table, base flow, quality of groundwater and well densities and draft of groundwater in the fresh water tracts with shallow ground water table and the adjoining saline water tracts, and in areas with high density of wells.
13. Establishment of additional observation wells under the national network observation well programme to monitor periodical water levels and quality at frequent intervals in areas with shallow water table and adjoining saline water tracts and high well density areas.
14. Geophysical survey of fresh water areas to determine depth and configuration of fresh water / saline water interface in the aquifers.
15. Awareness about the consequences in the near future caused by the impact of sharply declining water level trend need to be brought about among the users and planners of ground water structures.
16. Implementation of ground water development programme in stages and under competent technical supervision to avoid well failures and saline water ingress because haphazard and ill planned ground water development is likely to cause ingress of salinity into fresh water aquifers and loss of usable ground water resources.

