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भारत सरकार
जल संसाधन मंत्रालय
केंद्रीय भूजल बोर्ड
GOVERNMENT OF INDIA
MINISTRY OF WATER RESOURCES
CENTRAL GROUND WATER BOARD

महाराष्ट्र राज्य के अंतर्गत जालना जिले की भूजल विज्ञान जानकारी
GROUND WATER INFORMATION
JALNA DISTRICT, MAHARASHTRA

By

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द्वारा

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मध्य क्षेत्र , नागपुर
CENTRAL REGION, NAGPUR
2013

JALNA DISTRICT AT A GLANCE

1. GENERAL INFORMATION

Geographical Area	:	7718 sq. km.
Administrative Divisions	:	Taluka-8; Jalna, Bhokardan, Jafrabad, Badnapur, Ambad, Ghansawangi, Partur, Mantha
Villages	:	971
Population (2001)	:	1612980
Average Annual Rainfall	:	643-825 mm

2. GEOMORPHOLOGY

Major Physiographic unit	:	Part of Western Ghats, Satmala hill range, Ajanta hill range and Godawari plain
Major Drainage	:	One; Godawari

3. LAND USE (2010-11)

Forest Area	:	101.18 sq. km.
Net Area Sown	:	6109.86 sq. km.
Cultivable Area	:	5125.44 sq. km.

4. SOIL TYPE

: Black Cotton Soil

5. PRINCIPAL CROPS (2010-11)

Cotton	:	2893.00 sq. km.
Cereals	:	2449.00 sq. km.
Pulses	:	1524.27 sq. km.
Jowar	:	1090.00 sq. km.
Wheat	:	3430.00 sq. km.

6. IRRIGATION BY DIFFERENT SOURCES (2006-07) **-**
Nos. / Potential Created (ha)/ Potential Utilized(ha)

Dugwells	:	71210/205547/199828
Shallow Tubewells/	:	841 / 1916 /1790
Deep Tubewells		: 413 /1179 /1174
Surface Water	:	3860 /10687 /10687
Net Irrigated Area	:	213479 ha

7. GROUND WATER MONITORING WELLS (As on 31/05/2011)

Dugwells	:	25
Piezometers	:	7

8. GEOLOGY

Recent	:	Alluvium
Upper Cretaceous-Lower Eocene	:	Basalt (Deccan Traps)

9. HYDROGEOLOGY

Water Bearing Formation	:	Basalt (Deccan Traps) weathered, vesicular fractured, jointed. Under phreatic and confined conditions.
Premonsoon Depth to Water Level (May-2011)	:	3.84 to 16.20 m bgl
Postmonsoon Depth to Water Level (Nov.- 2011)	:	1.05 to 14.65 m bgl
Premonsoon Water Level Trend (2001-2010)	:	Rise: 0.0922 to 1.76 m/year Fall: 0.0151 to 1.1478 m/year
Postmonsoon Water Level Trend (2001-2010)	:	Rise: 0.0342 to 0.9808 m/year Fall: 0.0087 to 0.6643 m/year

10. GROUND WATER EXPLORATION (As on 31/03/11)

Wells Drilled	:	30
Depth Range	:	145.65-200.2

	SWL	:	17.95-50.00
	Specific Capacity	:	75 to 200 lpm/m
	Transmissivity	:	30 to 80 m^2/day

11. GROUND WATER QUALITY

The quality of ground water is generally alkaline and suitable for drinking and irrigation purpose with few exceptions

	Type of Water	:	Ca-HCO_3 and Ca-Cl

12. DYNAMIC GROUND WATER RESOURCES- (As on 31/03/2009)

	Annual Replenishable GW Resources	:	95054.38
	Total Draft (Irrigation + Domestic)	:	45158.91
	Projected Demand (Domestic + Industrial)	:	1787.09
	Stage of Ground Water Development	:	47.51

13. AWARENESS AND TRAINING ACTIVITY

A	Mass Awareness Programme	:	Nil
B	Water Management Training Programme	:	Nil

14. GROUND WATER CONTROL & REGULATION

	Over-Exploited Taluka	:	Nil
	Semi-Critical Taluka	:	Nil

15. MAJOR GROUND WATER PROBLEMS AND ISSUES

Although a modest area in Jalna district is under canal command of various irrigation projects and the area is showing declining trend of ground water levels due to exploitation of ground water for irrigation and other purposes at a faster rate. There is much scope for conjunctive use in such areas. The conjunctive use of water is recommended in this area.

Ground water quality is adversely affected at many places due to high concentration of some parameters specially nitrate. Adequate sanitary protection to the wells may be provided to control the nitrate contamination.

Ground Water Information Brochure
Jalna District

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Ground Water Information Brochure

Jalna District

1.0 Introduction

Jalna district became 27th district of Maharashta from 1st May 1981. Jalna town is situated at the confluence of the Kundalika and the Sina rivers and was known as “Hirawali” till 1300 AD. The last ruler in the area was “Jalarai” and the present name is after him.

The district comprises of 8 talukas viz: Jalna, Bhokardan, Jafrabad, Badnapur, Ambad, Ghansawangi, Partur, Mantha. The district forms the eastern part of Marathwada Region of Maharashtra and is bordered by Aurangabad district in the west, Jalgaon district in the north, Buldhana and Parbhani districts in the east and Beed district in the south. It is bounded by North latitude 19° 15′ and 20° 32′ and East longitude 75° 36′ and 76° 45′. It falls in Survey of India toposheet no 46P, 47 N, 55 D and 56 A.

Ground water exploration in the district has been taken up in different phases in hard rock areas occupied by Deccan Trap Basalt. A total of 30 Exploratory Wells (EW) have been drilled by outsourcing till March 2011 as given in table 1.

Table 1: Salient Features of Ground Water Exploration, Jalna District

Taluka	Formation	Wells		Depth (mbgl)	SWL (mbgl)	Discharge (lps)
		EW	OW			
Jalna	Basalt	7	0	200.2-200.85	35.4-50.00	0.14-1.37
Bhokardan	Basalt	5	0	200.2	50	0.38
Jafrabad	Basalt	4	0	195.65-200.2	50	0.14
Badnapur	Basalt	2	0	200.2	17.95	0.78
Ambad	Basalt	2	0	200.2	-	
Ghansawangi	Basalt	3	0	200.2	50	0.85
Partur	Basalt	4	0	145.6-200.2	50	1.37
Mantha	Basalt	3	0	195.65-200.2	50	0.38
Jalna District Total=30		**30**	**00**	**145.65-200.2**	**17.95-50.00**	**0.14-1.37**

In Basalt, 30 exploratory wells were drilled through outsourcing in Jalna district and their depth ranged from 145.65 to 200.2 metres below ground level (m bgl). The discharge from these wells varied from 0.14 to 1.37 litres per second (lps). Static water levels ranged from 17.95 to 50.00 m bgl.

2.0 Climate

The district has dry and tropical climate with very hot summer and mild winter with humid SW monsoon season of moderate rainfall. The climate can be divided into three main seasons viz;

a) Hot to warm humid monsoon season from June to September.

b) Cool dry winter season from October to February and

c) Hot dry summer season from March to June.

Temperature during rainy season ranges from 21 to 30^0 C. In winter season temperature fall appreciably and range from 10 to 25^0C. In nights temperature range is 20 to 25^0C with privilege of cool breeze.

The rainfall record shows that the district has two regions on the rainfall pattern. The first comprises Bhokardan, Jafrabad and Jalna talukas with rainfall of about 700 mm favorable for Khariff cropping. The second region comprises Ambad and Partur talukas with rainfall of about 800 mm, more favorable for rabi cropping. Rainfall is not uniform in all parts of the district as assured rainfall areas are Jalna and Ambad talukas and the area of moderate rainfall of 625 to 700 mm is Bhokardan and Jafrabad talukas. The average annual rainfall in the area is 725.80mm. About 83% of the rainfall occurs during June to September and July is the rainiest month.

The air is generally high over the district except during the southwest monsoon when the relative humidity is high. The summer months are the driest when the relative humidity is generally between 20 and 25 percent in the afternoon.

Winds are generally light to moderate with increase in speed during the later half of the hot season and in monsoon season. The winds blow predominantly from directions between west and north during the hot season. They are mostly from directions between southwest and northwest during the southwest monsoon season.

3.0 Geomorphology and Soil Types

The northwestern part of the district is comprised of the eastern slopes of the Ajanta Plateau. The satmala hill ranges (943m) throws an offshoot in southesastern direction through Jafrabad taluka which forms the western edge of the Buldhana plateau. Eastern offshoot of the Ajanta or Samala hill ranges comprising flat topped hills form divides between Purna and Girija rivers and between Girja and Dudhna rivers. The south eastern offshoot of Ellora hills comprising a series of dissected flat topped hills reaching upto Ambad town. Apart from these, hilly regions occurring in northern and western parts of Jafrabad, Bhokardan and Ambad taluka , most of the southern and central parts of the district comprise undulating plains. Elevations of the hilly regions range from 600 to 900 m above (amsl) and of the plains from 450 to 600 m amsl. Generally, ground slope in the district is towards east and southeast. Plains along the banks of Godavari and Dudhna rivers in Ambad and Partur talsils range in elevation from 150 to 350 m amsl.

Drainage:

The district is well drained by river system, which are dendritic type and have matured valleys. There are two main drainage systems viz: (1) Godavari river and (2) the Purna and Dudhna rivers.

The river Godavari forms the entire southern boundary of the district in Ambad and Partur talukas. It is one of the most important river of Deccan plateau and whole district of Jalna falls in its great basin. The direct tributaries of the river are Shivbhadra, Yellohadrs, Galhati and Musa riers. All these tributaries rise from the Ajanta and Ellora plateau and flow south and eastwards to join the Godavari river. While most of the smaller streams dry up in summer, the major rivers are perennial.

The Purna river rises from near Mehun about 8 km NE of Satmala hills and at a height of about 725 m amsl. It is most major river after Godavari and drains entire area of Jafrabad, Bhokardan and Parts of Jalna district. Its tributaries are the Charna, the Khelna, the Jui, the Dhamna, the Anjan, the Girja, the Jivrakha and the Dudhna.

The Dudhna river is the largest tributary of the Purna river which is nearly as long as main river itself. It has the longest course in Jalna district and drains parts of Ambad, Jalna and Partur talukas with its tributaries such as the Baldi, the Kundilikha, the Kalyan, the Lahuki, the Sukna, etc.

Soils:

The Soils of the district are derived from the basaltic lava flows. Thickness of the soil cover is less in northern and western region where ground elevations are higher and consequently soil regur, gravels, murum are transported down to lower regions through gravity, water or winds. Soils in central, southern and eastern regions of the district near the banks of Godavari and Dudhna rivers are thicker. Here soils ranging in depth from 1 to 2 m are black and rich in plant nutrients.

Profile description and analytical data of some typical soils are as follows:

a) Light soils occur along hills, rugged regions, plateaux and elevate plains. These soils are brown to grey in colour, less fertile as plant nutrients are less and range in depth from 0-15 cm. They comprise grains of basalt, quartz and clays with calcareous nodules and gravels.

b) Medium soils occur along undulating plains, depressions in hilly regions etc. These are dark brown in colour and contain more plant nutrients. The soil ranges in thickness from 15 to 40 cms and comprises clays with some silica and lie over murum at 40 to 100 cm depth.

c) Deep soils occur along plains of lower elevation, depressions and along river banks. These are dark black cotton soils, plastic, sticky, rich in plant nutrients and are very fertile. These soils range in thickness from 50 to 200 cm and lie over murum at 2 to 4 meters depth comprising clays, loam, lime etc.

4.0 Ground Water Scenario

4.1 Hydrogeology

Groundwater occurrence and movement in the area is influenced by its rock formations. Groundwater potentially depends upon porosity and permeability (both primary and secondary) of rock formations. Jalna district is underlain by basaltic lava flows and alluvium only. Water bearing properties of these rocks are described below.

The regional Static water level in the area varies from 20 to 25 mbgl. Ground water extraction in the area is done mainly through dug wells and

bore wells. The average depth range of dug wells in the area is from 15.00 to 30.00 m. The average depth range of bore wells in the area is from 60.00 to 80.00 m.

4.1.1Deccan Trap Basalt

The basaltic lava flows belonging to the Deccan Traps occupy about 98% of the area of the district. The formation is very thick and comprises scores of lava flows of 5 to 25 meters individual thickness. Each flow comprises a lower zone of 40 to 70% hard, massive basalt which is devoid of primary porosity and permeability. The upper zone of 30 to 60% is vesicular basalt which has limited primary porosity. However, the formation generally has secondary porosity and permeability acquired due to weathering, jointing, shearing, fracturing etc. When the thickness of these zones are appreciable (30 to 60% of a flow), the flow forms an aquifer of moderate potential. The structural and composite characteristics described above are repeated in all the lava flows of an area and they thus form a multiple aquifer system which generally extends to depths of 150 to 250 meters.

Apart from the inherent properties of lava flows cited above, topography also plays an important role in groundwater potential of basaltic area. Hills and higher grounds stood out as their rocks are hard, compact and resistant to weathering. The steep gradient causes rain water to run off rapidly without much infiltration. In contrast, the valleys depressions and areas of lower elevations are formed where rocks were weaker, prone to weathering due to joints, fractures etc. In addition, rain water runoff is less and infiltration is more in such areas.

Groundwater in Deccan traps occur under water table condition in weathered, jointed, fractured and vesicular zones of the flow exposed at the surface. Groundwater occurs under confined conditions in Jointed, brecciated or fractured and vesicular zones of lower flows. The vesicular and zeolitic basalts are highly susceptible to weathering as interconnected vesicles form conduits from weathering agents. It is generally seen that “Pahoehoe” flows contains uniformly distributed vesicles and have good porosity and permeability and constitute potentials aquifers.

4.1.2 Alluvium

It occurs as small patches along banks, flood plains and meanders of main rivers. These have individual extent from 1 to 20 Km^2 and 5 to 30m thickness. It comprises beds and lenses of sands, gravels and boulders in a matrix of clays. These granular zones form aquifers in which groundwater occurs under Phreatic and semi confined conditions. The porosity of these granular zones ranges from 10 to 15 %.

4.2 Water Level Scenario

Central Ground Water Board periodically monitors National Hydrograph Network Stations (NHNS) stations in the Jalna district, four times a year i.e. in January, May (premonsoon), August and November (postmonsoon). The data on premonsoon and postmonsoon water levels along with fluctuation during 2011 is given in **Table- 2**.

Table 2: Water Level Data (2011) with Fluctuation

S. No.	Location	Premonsoon WL (m bgl)	Postmonsoon WL (m bgl)	Fluct-uation (m)
1	2	3	4	5
1	Badnapur	9.92	14.65	-4.73
2	Longaon	12.96	7.79	5.17
3	Tirthpuri	6.42	3.92	2.5
5	Samangaon	7.88	3.7	4.18
6	Shahagad	6.8	7.1	-0.3
7	Watur	9.65	7.5	2.15
8	Ranjani	9.95	7.3	2.65
9	Dungaon	8.14	8.44	-0.3
10	Dahiphal	14.5	6	8.5
11	Partur	8.65	3.6	5.05
13	Tembhurni2	9.63	4.9	4.73
14	Bhokardhan	6.5	5.25	1.25
15	Ambad	4.55	1.05	3.5
16	Jafrabad	9.82	6.55	3.27
17	Warud	6.5	6.2	0.3

4.2.1 Depth to Water Level – Premonsoon (May-2011)

The depth to water levels in the district during May 2011 ranges between 3.84 (Shreshti) and 16.20 (Kalegaon) m bgl. Shallow water levels within the range of 2 to 5 m bgl are seen at three NHNS i.e. Ambad, shreshti,and Mantha. Water level within 5 to 10 m bgl are seen almost in entire district. The NHNS located at Badnapur, Dungaon, Ner 2, Ranjani, Bhokardan, Warud, Shahgad, Sevli, Partur, Navha, Tembhurni-2, Watur, Jafrabad, Samangaon, and Tirthpuri.are showing this particular range of water level. The water levels in the range of 10 to 20 mbgl are seen in the form of patches on the entire district, the NHNS at in Silegaon, Dahiphal, Kalegaon, Longaon, are falling in this range. Deeper water levels of more than 20 m bgl are not observed in any NHNS. The Talukawise extent of Depth to water levels during premonsoon (May 2011) of the district has been depicted in **Figure-1**.

4.2.2 Depth to Water Level – Postmonsoon (Nov-2011)

The depth to water levels during postmonsoon (Nov. 2011) ranges between 1.05 (Ambad) and 14.65 (Badnapur). The NHNS at Ambad, Talni and Chikhli is showing the shallowest depth to water level i.e. less than 2 mbgl. The shallow water levels within the range of 2-5 m bgl are observed at 10 NHNS i.e. at Partur, Samangaon, Tirthpuri, Raniuchegaon, Mantha, Sevli, Wadigodri and Tembhurni-2. Water level within 5 to 10 m bgl are extended to the entire district. 13 NHNS located at Jafrabad, Lalegaon, Shahgad, Watur, Warud, Ghansawangi, Ranjni, Longaon, Dungaon, Silegaon are showing this particular range of water level. The water levels in the range of 10 to 20 mbgl are seen in the form of patches in the the district. The NHNS at Badnapur is falling in this range. The Talukawise Spatial variation of the district in Postmonsoon (November 2011) depth to water levels is shown in **Figure 2**.

4.2.3 Seasonal Water Level Fluctuation (May-Nov. 2011)

In entire district rise in water level has been observed except at Dungaon, Badnapur and Shahgad. Fall in water level in the range of 0.3 to 4.73 m is observed. The Talukawise Spatial variation of the district in Seasonal Water Level Fluctuation in May to November 2011 is shown in **Figure 3**.

Figure 1: Depth to Water Level Map (May-2011)

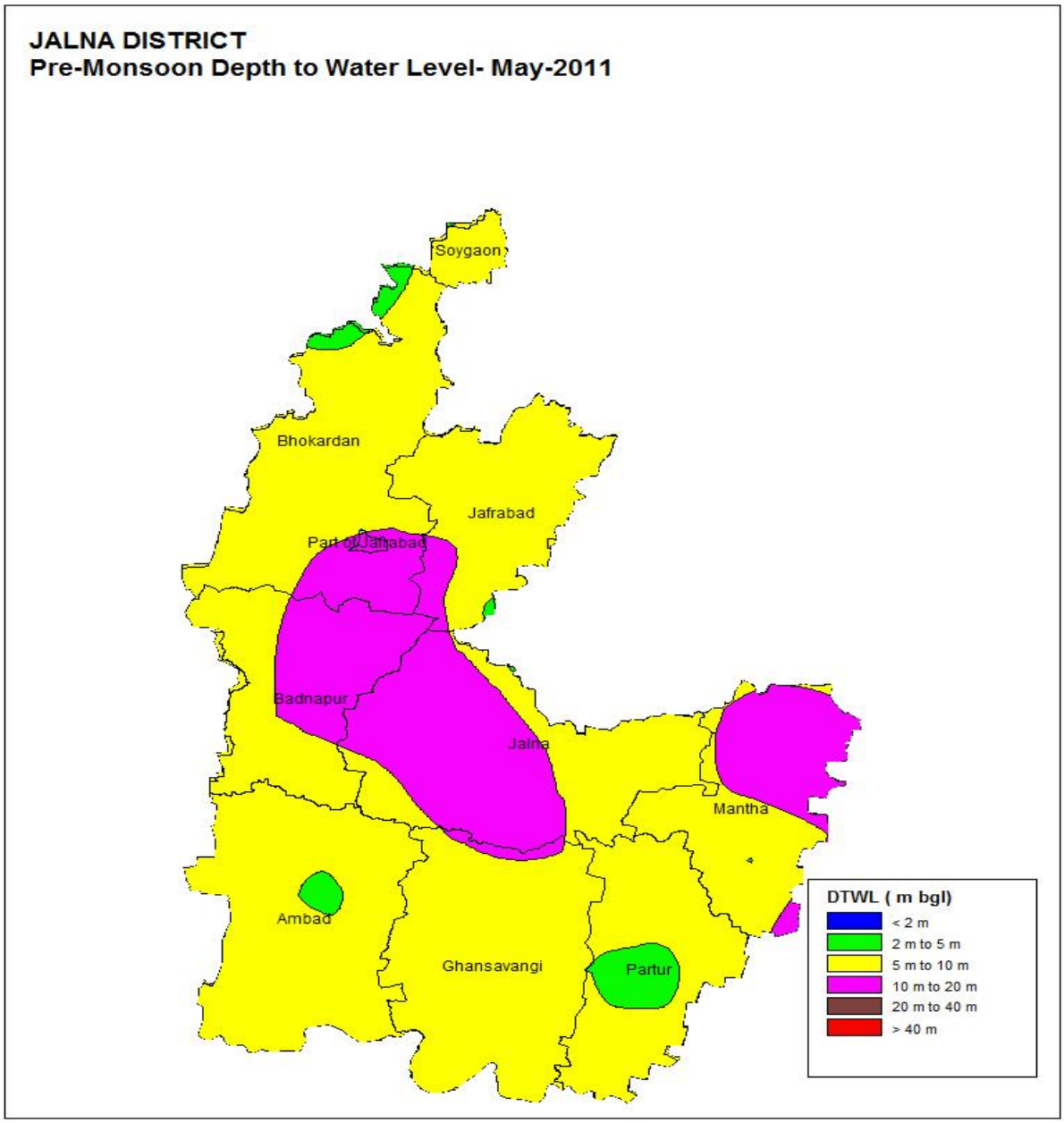


Figure 2: Depth to Water Level Map (November-2011)

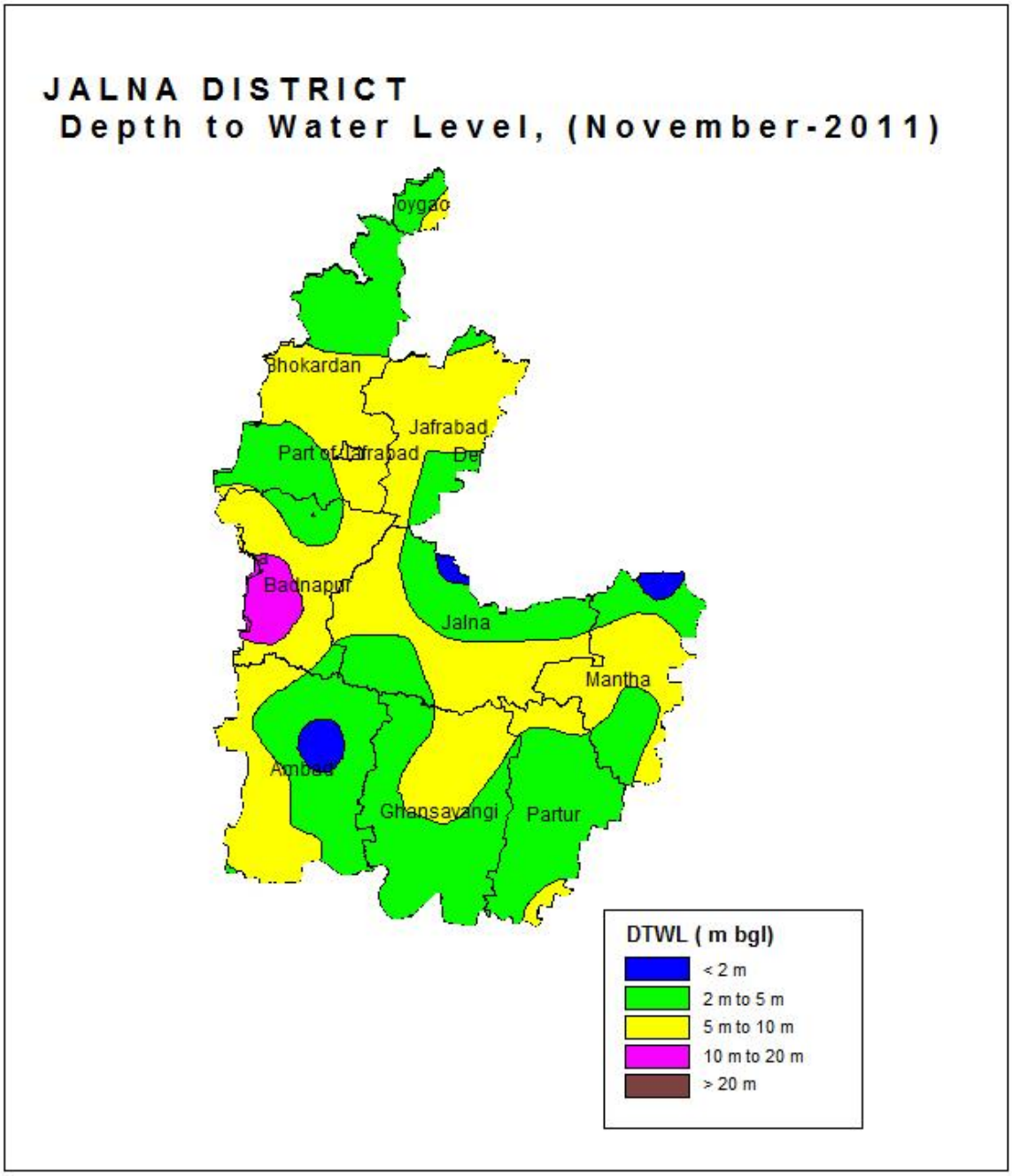
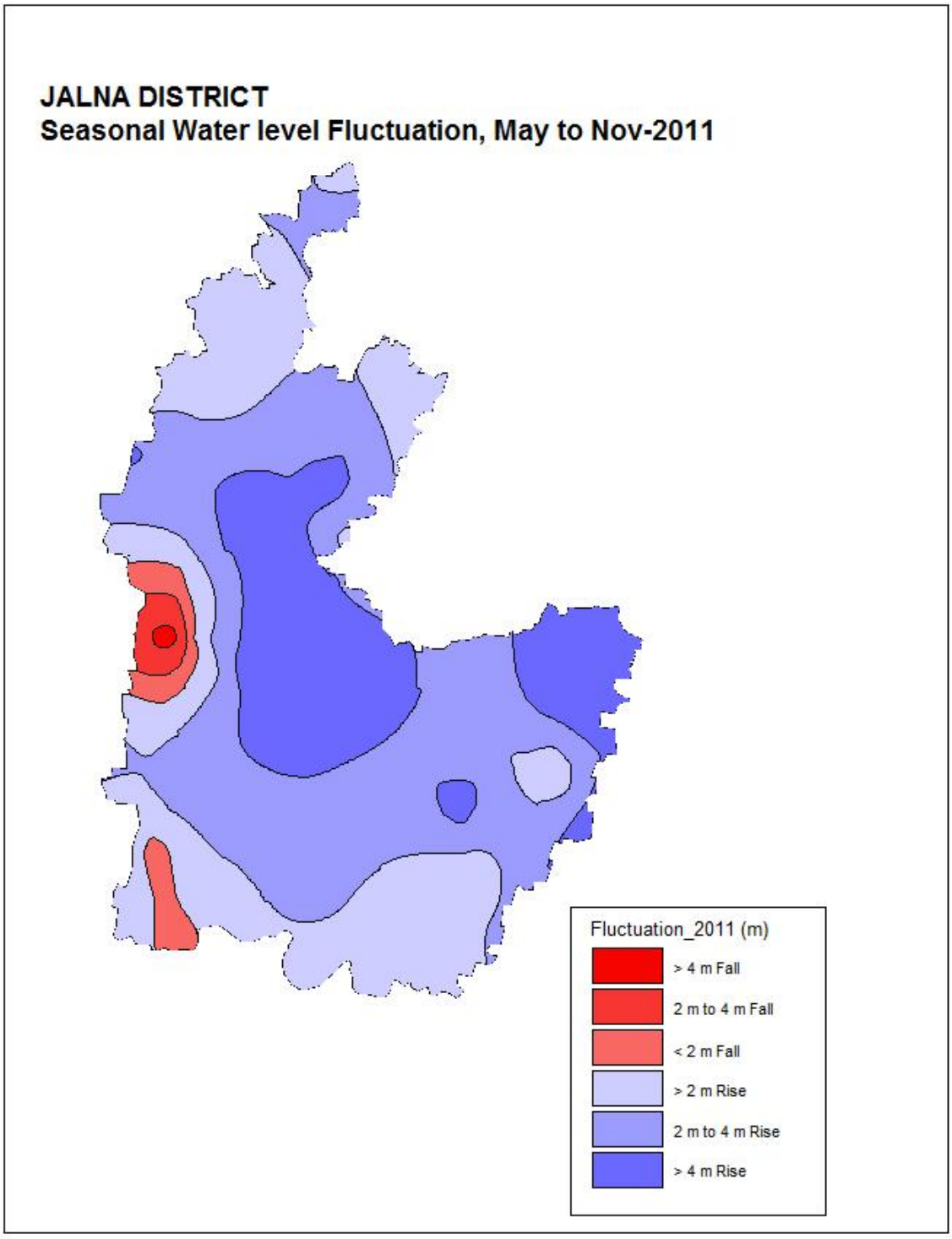


Figure 3: Seasonal Water Level Fluctuation Map (May to November-2011)



4.2.4 Water Level Trend (2001-2010)

Trend of water levels for pre-monsoon and post-monsoon periods for last ten years (2001-2011) have been computed for 35 NHNS and are given in **Table-3**.

Analysis of trend indicates that during premonsoon period, rise in water levels ranges between 0.0922 (Chikhli) and 1.7673 m/year (Wadigodri). Fall in

water levels ranges between 0.0151(Kalegaon) and 1.1468 m/year (Dungaon). During postmonsoon period, rise in water level ranges between Longaon (0.0342) to Wadigodri (0.9808), whereas at fall in water levels ranging between 0.0087 (Talni) and 0.6643 m/year (Mantha) is observed. Thus in major part of the district, declining trend has been observed during premonsoon and rising trend in postmonsoon.

Table 3: Long Term Trend Data (2001-10).

Sl No.	Location	Pre Monsoon		Post Monsoon	
		Rise (m/year)	Fall (m/year)	Rise (m/year)	Fall (m/year)
1	Hasnabad	0.2099		0.0737	
2	Jafrabad		0.0822	0.3195	
3	Bhokardhan			0.1968	
4	Warud	0.4855		0.1470	
5	Wakdi		0.0620	0.1407	
6	Kalegaon		0.0151	0.3178	
7	Dahiphal		0.4822		0.0821
8	Sevli		0.0957	0.0919	
9	Jalna	0.1007		0.3751	
10	Silegaon	0.4710		0.5220	
11	Badnapur				0.8686
12	Talni		0.1348		0.0087
13	Navha		0.0344		0.0438
14	Chikli	0.0922		0.2071	
15	Longaon		0.1053	0.0342	
16	Talegaon	0.4248		0.2210	
17	Tirthpuri	0.1814		0.4250	
18	Wadigodri	1.7673		0.9808	
19	Shreshti		0.2013		0.2053
20	Dungaon		0.1468	0.4172	
21	Gansawangi		0.0258		0.1137
22	Ambad		0.0605	0.0363	
23	Partur		1.1459		0.3177
24	Raniunchagaon		0.1388	0.1755	
25	Mantha		0.8714		0.0656
26	Ranjani		0.0687		0.0939
27	Watur		0.4421	0.0903	
28	Dambri			0.0836	

29	Jathkheda				0.1380
30	Samangaon		0.1533	0.1006	
31	Ner2			0.7724	
32	Naygaon2		0.8158	0.3297	
33	Sankhanpuri				0.2403
34	Shahagad		0.1548	0.3261	
35	Kumbhar Pimpalgaon		0.0758		0.6643

4.2.5 Aquifer Parameters

Aquifer parameters are available from data of ground water exploration carried out in the district as well as from the pumping tests. Pumping tests conducted on wells in the district show that transmissivity of shallow aquifer in basalts ranges from 30 to 80 m^2/day, specific capacity of wells ranges from 75 to 200 lpm/m. with an average of about 110 lpm/m. The specific capacity of wells and transmissivity in alluvium ranges from 130 to 2050 lpm/m and 120 to 210 m^3 / day respectively. On an average, specific yield of basalt aquifers comes to be only 2%.

4.3 Ground Water Resources

Central Ground Water Board and Ground Water Survey and Development Agency (GSDA) have jointly estimated the ground water resources of Jalna district based on GEC-97 methodology. The same are presented in **Table 4**. Ground Water Resources estimation was carried out for 8042.59 sq. km. area out of which 542.99 sq. km. is under command and 7499.60 sq. km. is non-command.

As per the estimation the total annual ground water recharge is 1886.56 MCM with the natural discharge of 103.93 MCM, thus the net annual ground water availability comes to be 1782.68 MCM. The gross draft for all uses is estimated at 451.58 MCM with irrigation sector being the major consumer having a draft of 442.65 MCM. The domestic and industrial water requirements are worked at 8.93 MCM. The net ground water availability for future irrigation is estimated at 490.01 MCM.

Stage of ground water development varies from 30.86 % (Ghansawangi) to 70.39 % (Badnapur). The overall stage of ground water development for the district is 47.51 %, which is for “Safe” category. Taluka

wise assessments indicate that no taluka falls under “Over- Exploited” , Semi critical and Critical category, all the talukas fall under “Safe” category. Watershed wise, out of 52 watersheds, 46 fall under “Safe category” and 6 watersheds are falling under “Semi critical” category. The Talukawise Ground Water resources (March 2009) are shown in **Figure 4**.

Figure 4: Ground Water Resources (March 2009)

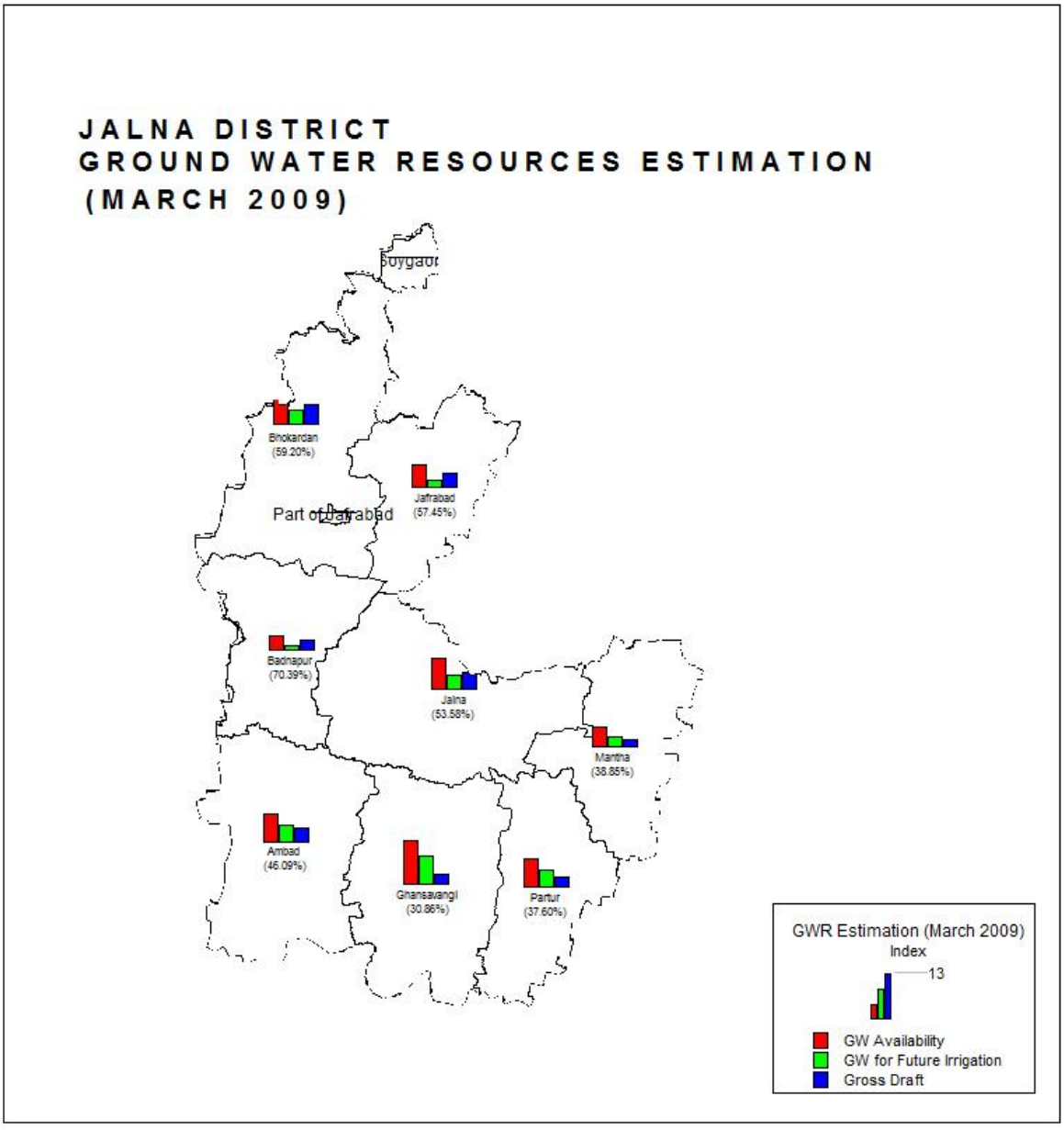


Table-4: Taluka wise Ground Water Resources (March 2009).

Sr. No.	Taluka	Area Type	Net Annual Ground water Availability (ham/yr)	Existing Gross Groundwater Draft for Irrigation (ham/yr)	Existing Gross Groundwater Draft for Domestic & Industrial water Supply (ham/yr)	Existing Gross Groundwater Draft for All uses (ham/yr)	Allocation for domestic & industrial requirement supply upto nest 25 years (ham/yr)	Net Groundwater Availability for future irrigation development (ham/yr)	Stage of Groundwater Development (%)
1	2	3	4	5	6	7	8	9	10
1	Ambad	Command	5594.05	966.26	37.94	1004.19			
		Non Command	6956.28	4693.61	86.38	4779.99			
		Total	12550.34	5659.87	124.31	5784.18	255.08	6991.71	46.09
2	Badnapur	COMMAND	918.79	494.92	14.48	509.40			
		NON COMMAND	5585.61	4020.43	48.91	4069.34			
		TOTAL	6504.40	4515.35	63.39	4578.74	127.18	1865.68	70.39
3	Bhokardan	COMMAND	930.55	288.76	11.82	300.58			
		NON COMMAND	13900.42	8306.73	172.78	8479.51			
		TOTAL	14830.97	8595.48	184.60	8780.08	372.76	5972.24	59.20
4	Ghat Sawangi	COMMAND	9115.11	1209.86	32.24	1242.11			
		NON COMMAND	8304.81	4065.84	68.65	4134.49			
		TOTAL	17419.92	5275.71	100.89	5376.60	195.33	11592.57	30.86

Sr. No.	Taluka	Area Type	Net Annual Ground water Availability (ham/yr)	Existing Gross Groundwater Draft for Irrigation (ham/yr)	Existing Gross Groundwater Draft for Domestic & Industrial water Supply (ham/yr)	Existing Gross Groundwater Draft for All uses (ham/yr)	Allocation for domestic & industrial requirement supply upto nest 25 years (ham/yr)	Net Groundwater Availability for future irrigation development (ham/yr)	Stage of Groundwater Development (%)
5	Jafrabad	COMMAND	815.86	396.22	13.40	409.62			
		NON COMMAND	9143.66	5195.94	116.60	5312.54			
		TOTAL	9959.53	5592.16	130.00	5722.16	256.04	3998.01	57.45
6	Jalna	COMMAND	1281.74	464.85	15.30	480.15			
		NON COMMAND	11884.04	6496.60	77.05	6573.64			
		TOTAL	13165.78	6961.45	92.35	7053.80	185.09	6030.31	53.58
7	Mantha	COMMAND	621.28	83.55	9.43	92.98			
		NON COMMAND	8156.08	3212.84	103.96	3316.79			
		TOTAL	8777.35	3296.38	113.39	3409.77	227.72	5255.98	38.85
8	Partur	COMMAND	3225.65	277.93	19.48	297.41			
		NON COMMAND	8620.44	4091.04	65.14	4156.18			
		TOTAL	11846.09	4368.97	84.62	4453.58	167.89	7295.43	37.60

4.4 Ground Water Quality

In the district, 15 water samples were collected during May 2010. The samples were broadly classified into four classes as given in **Table-5**.

Table- 5 Chemical Classification of Ground Water Samples.

No. of Samples	**Alkalinity**		
	<200	**200 -600**	**>600**
15	3	12	0
	Total Hardness (TH)		
	<300	**300 - 600**	**>600**
	1	11	3
	NO_3		
	<45	**>45**	
	6	**9**	
	Fluoride (F)		
	<1.0	**1.0 - 1.5**	**>1.5**
	14	0	1

4.4.1 Suitability of Ground Water for Drinking Purpose

The suitability of ground water for drinking purpose is determined keeping in view the effects of various chemical constituents in water on the biological system of human being. Though many ions are very essential for the growth of human, but when present in excess, have an adverse effect on human body. The standards proposed by the Bureau of Indian Standards (BIS) for drinking water (IS-10500-91, Revised 2003) were used to decide the suitability of ground water. The classification of ground water samples was carried out based on the desirable and maximum permissible limits for the parameters viz., TDS, TH, Ca, Mg, Cl, SO_4 and NO_3 prescribed in the standards and is given in **Table-5**.

Table-5 Classification of Ground Water Samples based on BIS Drinking Water Standards (IS-10500-91, Revised 2003)

Parameters	DL	MPL	Samples with conc. < DL	Samples with conc. in DL-MPL	Samples with conc. >MPL
TH (mg/L)	300	600	1	11	3
TA (mg/L)	200	600	11	4	1
NO_3 (mg/L)	45	No relaxation	6	-	9
F (mg/L)	1.0	1.5	14	-	1

(Here, DL- Desirable Limit, MPL- Maximum Permissible Limit)

The perusal of **Table-6** shows that concentration of TDS, TH, Ca, Mg, SO_4 NO_3 is above MPL. However, the concentration of nitrate is found more than PL at 12 locations indicating high influence of anthropogenic activity in the vicinity of the wells, causing nitrate contamination.

Therefore, it can be concluded that the ground water quality in above said areas is not suitable for drinking purpose. The ground water, in general, is potable with few exceptions.

4.4.2 Suitability of Ground Water for Irrigation Purpose

The water used for irrigation is an important factor in productivity of crop, its yield and quality of irrigated crops. The quality of irrigation water depends primarily on the presence of dissolved salts and their concentrations. Residual Sodium Carbonate (RSC) is the most important quality criteria, which influence the water quality and its suitability for irrigation.

Residual Sodium Carbonate (RSC) is considered to be superior to SAR as a measure of sodicity particularly at low salinity levels. The classification of ground water samples based on RSC values for its suitability for irrigation purpose is shown below in **Table-6**.

Table-6 Classification of Ground water for Irrigation based on RSC.

RSC	<1.25		1.25-2.50		>2.50	
Category	**Good**		**Doubtful**		**Unsuitable**	
Total Samples	No. of Samples	%	No. of Samples	%	No. of Samples	%
15	14	90	--	--	1	10

The **Table-6** shows that the RSC values of 14 out of 15 samples samples collected from the wells located in the district RSC values is less 1.25 while that of 1 sample is more than2.50.

Overall, the ground water quality in the wells monitored is good for irrigation purpose and there is a less possibility of developing sodium hazard.

4.5 Status of Ground Water Development

Ground water development depends on many factors, viz. availability, crop water requirement, socio-economic fabric and on the yield of the aquifers existing in the area.

Ground water is predominantly used for irrigation, as it is the major ground water utilising sector. As per the 4th Minor Irrigation Census data available for the year 2006-07, there are 71210 dug wells, 841 shallow tube wells and 413 deep tube wells in the district for irrigation. Irrigation potential created by ground water is 208642 ha whereas potential utilised is 202782 ha. Potential created by surface water irrigation is 10687 ha.

State Government has drilled large number of bore wells/ tube wells fitted with hand pumps for rural drinking water supply in Deccan trap area of the district. In all, GSDA, Government of Maharashtra has drilled 1500 bore wells under various schemes for water supply in Jalna district upto the end of 1987. The bore wells range in depth from 15 to 120 m bgl and their yield ranged from 0.5 to 15 lps., bout 60% borewells yield less than 2 lps. Higher yielding wells constitute only about 30% of the bore wells. The bore well tap 2 to 5 flows up to 120 mbgl.

“The War on Want” a voluntary organisation has carried out drilling and construction of borewells in Jalna town and surrounding areas for about

15 years. “The War on Want” is simply a drilling unit working on no profit and no loss basis without maintaing technical data and records. The organisation has so far drilled about 180 borewells in Jalna town and about 230 in other parts of the district.

5.0 Ground Water Management Strategy

Ground water has special significance for agricultural development in the State of Maharashtra. The ground water development in some parts of the State has reached a critical stage resulting in decline in ground water levels. There is thus a need to adopt an integrated approach of development of ground water resources dovetailed with ground water augmentation to provide sustainability to ground water development.

5.1 Ground Water Development

The present stage of ground water development in the district through dug wells for irrigation purposes is only 47.51%. Thus there is scope for ground water development in the district. However, in three talukas i.e Bhokardan, Jafrabad and Badnapur talukas of the district, the stage of ground water development is more than 55 % and requires cautious approach for future development has to be taken up judiciously tighter after considering the recharge distribution together with projected extraction for a period of 10 years.

The aquifers in the district are poor to moderately yielding having low storage capacity. Therefore, ground water development should be permitted very carefully in difficult and scarcity areas only. No watersheds falling under “Over- Exploited” category. 6 watersheds falling under “Semi-Critical” category are not recommended for any further ground water development.

5.2 Water Conservation and Artificial Recharge

CCT, nala bunding, gabion structures, vegetative bunds, terracing etc and construction of minor and medium irrigation projects with lined or pipe canals may be feasible in the Satpuda hill range. In the Basaltic area, the artificial recharge structures feasible are check Dams, gully plugs, percolation Tanks, nala bunds, etc. Existing dugwells can also be used for artificial

recharge; however, the source water should be properly filtered before being put in the wells. The artificial recharge structures suitable for Alluvial areas are percolation tanks and recharge wells/shafts. The most feasible artificial recharge structure suitable for Alluvial areas, are shallow recharge wells/shafts on the river bed of the tributaries.

These sites need to be located where the hydrogeological conditions are favourable, i.e., where sufficient thickness of de-saturated/unsaturated aquifer exists and water levels are more than 5 m deep.

Considering the hydrogeological aspects, Jalna district has feasibility of rainwater harvesting for ground water augmentation. The existing dugwells, Borewells or Tubewells may be used for recharging the ground water with proper filter media.

6.0 Ground Water Related Issues and Problems

Although a modest area in Jalna district is under canal command of various irrigation projects and the area is showing decling trend of ground water levels due to exploitation of ground water for irrigation and other purposes at a faster rate. There is much scope for conjunctive use in such areas. The conjunctive use of water is recommended in this area.

Ground water quality is adversely affected at many places due to high concentration of some parameters specially nitrate. Adequate sanitary protection to the wells may be provided to control the nitrate contamination.

7.0 M.A.P. and W.M.T.P.

Till March 2011, no Mass Awareness Programmes (MAP) have been organised in the district and the WMTP (Water Management Training Programme) is yet to be organised.

8.0 Areas Notified by CGWA/SGWA

As per ground water resource estimation the district fall under ‘safe’ category, hence till March 2011 no area has been notified either by CGWA or SGWA.

9.0 Recommendations

1. About 98 % of the area is occupied by the basaltic lava flows belonging to the Deccan traps. Each flow comprise of lower massive zone and upper vesicular zone. Weathering, joints of various types and fractures impart secondary porosity and permeability to the formation and such zones form potential aquifers. In areas where weathered jointed and fractured zones are 20 to 40 m thick, the aquifers have considerable groundwater potential. Wells located in such areas can yield about 100 to 250 M^3 / day. Thus in the area , a multi tier aquifer system is present. The deeper aquifers are tapped by bore wells up to 200m bgl. Under favourable conditions as mentioned above, bore wells can yield 2 lps to 18 lps or 7.2 to 70 m^3/ hr. Such areas are zones of weathering which facilitates weathering and denudation and hence often occur as depressions, river courses and lineaments. These features can be well studied through aerial photographs and should be demarcated for location sites for groundwater structures.
2. The area where groundwater development is less, it is recommended to locate sites for dug wells, dug cum bore wells and bore wells for further development .
3. The most feasible mode of groundwater extraction for small farmers is dug wells of 10 to 15 m depth and 5 to 8 m diameter in areas having low altitudes, 15 to 25m thick weathered, fractured and vesicular zones. For water supply and bigger farmers, bore wells may be constructed after hydrogeological Survey.