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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 परभणी जिले की भूजल विज्ञान जानकारी

GROUND WATER INFORMATION
PARBHANI DISTRICT, MAHARASHTRA

By

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द्वारा

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CENTRAL REGION, NAGPUR
2013

PARBHANI DISTRICT AT A GLANCE

1. GENERAL INFORMATION

Geographical Area	:	6511 sq. km.
Administrative Divisions	:	Taluka-9; Parbhani, Jintur, Gangakhed, Pathri, Purna,Palam, Selu, Sonpeth and Manwat
Villages	:	841
Population (2001)	:	1527715
Average Annual Rainfall	:	850-980 mm

2. GEOMORPHOLOGY

Major Physiographic unit		Part of Western Ghat, Ajanta Hill Ranges
Major Drainage	:	One; Godavari

3. LAND USE (2010-11)

Forest Area	:	278.08 sq. km.
Net Area Sown	:	4859.53 sq. km.
Cultivable Area	:	3610.62 sq. km.

4. SOIL TYPE

: Black Cotton Soil

5. PRINCIPAL CROPS (2010-11)

Cotton	:	2023.00 sq. km.
Cereals	:	2896.00 sq. km.
Pulses	:	2177.00 sq. km.
Jowar	:	2245.00 sq. km.
Wheat	:	517.00 sq. km.

6. IRRIGATION BY DIFFERENT SOURCES (2006-07) –

Nos. / Potential Created (ha)/ Potential Utilized(ha)

Dugwells	:	31324/77021/76953
Shallow Tubewells/	:	2915 / 4918 /4903
Deep Tubewells		: 174 /474 /474
Surface Water	:	2772 /16435 /16435
Net Irrigated Area	:	98765 ha

7. GROUND WATER MONITORING WELLS (As on 31/05/2012)

Dugwells	:	33
Piezometers	:	4

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)	:	3.55 to 13.51 m bgl
Postmonsoon Depth to Water Level (Nov.-2011)	:	1.30 to 14.85 m bgl
Premonsoon Water Level Trend (2001-2011)	:	Rise: 0.0101 to 0.3686 m/year Fall: 0.0085 to 1.3737 m/year
Postmonsoon Water Level Trend (2001-2011)	:	Rise: 0.0043 to 0.2508 m/year Fall: 0.0090 to 0.6477 m/year

10. GROUND WATER EXPLORATION (As on 31/03/12)

Wells Drilled	:	51
Depth Range (mbgl)	:	EW:123-204.75
Weathered thickness (mbgl)	:	5.00-19.00
SWL (mbgl)	:	EW: 1.68-188.70
Fracture Zone (mbgl)	:	15 to 27
Discharge (lps)	:	Trace to 27.08

11. GROUND WATER QUALITY

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

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

Annual Replenishable GW Resources	:	88267.16
Total Draft (Irrigation + Domestic)	:	29390.19
Projected Demand (Domestic + Industrial)	:	2672.66
Stage of Ground Water Development	:	33.30 %

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 Parbhani 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. 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
Parbhani District

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Ground Water Information Brochure
Parbhani District

1.0 Introduction

Parbhani district was known as “Prabhavati” in ancient times. It is located towards east of Maharashtra and it is one of the eight districts of Marathwada division. Parbhani district lies in 18° 45' and 20° 01' N latitude and between 76° 13 and 77° 26' E longitude. With an area of 6155 sq km. and a population of 15.27 lakhs, it ranks 8th in the Maharashtra State. It has nine talukas and two sub-divisions which together have 841 villages and 9 towns. Out of Its total population, 68.24% is rural population. The occupation is predominantly agriculture, industry, commerce and transport claiming only a small share of it.

Ground water exploration in the district has been taken up in different phases in hard rock areas occupied by Deccan Trap Basalt. Salient features of the exploratory wells drilled in Parbhani district are as given Table 1.

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

Sl. No.	Taluka	Formation	Wells			Depth (mbgl)	SWL (mbgl)	Discharge (lps)
			EW	OW	PZ			
1	Gangakhed	Basalt	5	0	-	126-204.75	5.28-188.70	0.07-27.08
2	Jintur	Basalt	1	1	-	-	-	-
3	Manwat	Basalt	2	-	-	-	-	-
4	Palam	Basalt	2	0	-	200.0-204.75	49.7-55.15	0.07-0.14
5	Parbhani	Basalt	3	2	2	100-200	6.9-22.00	Trace-1.37
6	Purna	Basalt	3	3	1	37.1-200	0.84 -20.55	0.14-9.84
7	Sonpeth	Basalt	6	2	-	186.55-204.75	1.30-150.1	0.38-7.76

In Basalt 22 wells were drilled through outsourcing in Parbhani district and the perusal of Table 1 indicates that their depth ranged from 37.10 to 204.75 metres below ground level (m bgl). The discharge from these wells varied from Traces to 27.08 litres per second (lps). Static water levels ranged from 8.84magl to 150.1 m bgl.

2.0 Climate

The climate of the district is generally dry except during the south-west monsoon season. The year may be divided into four seasons. The cold season from December to February, followed by the hot season from March to May, the south-west monsoon season from June to September and the post-monsoon season from October to November.

The average annual rainfall in the district is 888.5 mm. Considering the general pattern of rainfall in the surrounding districts, the rainfall increases from the west to the east.

The only meteorological observatory in the district is located at Parbhani. The temperature and other meteorological data at this station may be taken as representative of the conditions over the district as a whole. The cold weather commences towards the end of November when the temperatures begin to fall. December is the coldest month with the mean daily minimum temperature at 12.6° C and the mean daily maximum temperature at 29.3° C.

The relative humidity is high during the south-west monsoon season ranging between 60 and 80 percent. After September, the humidities decrease gradually and in the cold season and summer the air is generally dry. In the summer which is the driest part of the year the relative humidity, especially in the afternoons, is less than 30 per cent.

3.0 Geomorphology and Soil Types

As a part of the Deccan Plateau, the land of the district has a general elevation of about 457.50 metres above the sea level, its highest and lowest levels being 579.73 metres in the Jintur range, about 12.87 km. north of Charthana. and 366.0 metres above sea level on the Godavari bank near the point where the river crosses over the district boundary. Pathri, Partur (except its northern part), Gangakhed and Parbhani talukas have plain topographically. So also are the talukas lying to the south. But Jintur, Hingoli, Kalamnuri and the northern and eastern parts of Partur and Basmath talukas are hilly and mountainous in nature.

The district as a whole belongs to the Godavari peninsular drainage, but the area of the district mainly belongs to two river systems, one in the north and north-east : the Penganga, and the other the Marathwada Purna and other immediate tributaries of the Godavari flowing in this district.

The prevailing tone of the landscape in Parbhani is that of plateau forms having eroded scarps and detached remnants. In places, the plateau ranges succeed one another to attain higher elevations. Where ever the plateau is wide, it assumes the appearance of an undulating remnant plain, with its scarp face overlooking broad river basins. These scarp lands present a much eroded appearance and so intense is the erosive action of streams that their deeply entrenched valley courses are flanked by broken and bare scrub-lands as in the region north and east of Kalamnuri.

The Jintur range is the more prominent portion in the heights of the district. It is a remnant plateau with a general trend from west north-west to south south-east and forms a part of the Ajantha ranges emanating from the Sahyadris. The crest line consists of flat tops at an average elevation of 533.75 metres above sea level but here and there rounded peaks record heights up to 549 metres and 579.50 metres above sea level. In its several parts, flat tops, as in Sawarkheda and Lohra Khurd, are agriculturally useful, but other areas, especially the marginal belts overlooking the scarp sides, are bare. Thus the landscape of Parbhani district has two contrasting features: the undulating agricultural plains and the residual plateau features with deeply eroded sides covered with scrub and occasional stony wastes. The scarp-lands lying to the north of the Purna area are counterparts of the Jintur hills, but they are more continuous and have an undulating plateau extension towards the north.

Soil:

The types of Soils are seen in the district are:

- Light and medium soil is seen in the northern part wherein the soil horizon is shallow. The soil is also seen in southern part of the Gangakhed taluka.
- Heavy black soil exists in the central part of the district viz in parts of Pathr, Parbhani talukas. The soil horizon is thick. This soil is called Regur which is rich in various plant nutrients. The soil horizon is very thick in valley portions.

Due to rolling and undulating topography, soil of varying thickness has developed. The soil varies from clayey to clayey loamy in valleys and sandy loamy on hills and slopes.

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. Parbhani district is underlain by basaltic lava flows and alluvium only.

The regional Static water level in the area varies from 20 mbgl to 25mbgl. 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 15.00m to 30.00 m. The average depth range of bore wells in the area is 60.00to 80.00 m.

Deccan Trap Basalt

The entire district is underlain by a series of Deccan lava flows that came out as effusive flows through openings during the period from Upper Carboniferous to Cretaceous period. An overall study of the district, based on the field surveys has recorded maximum 10 flows. The flows were demarcated on the basis of contact zones marked by red bole beds and in their absence the chilled fine grained basalt containing amygdules resting on structurally different basalt say zeolitic or vesicular basalt . The red boles are as thick as few centimetres to 2 metres. The flows are either horizontal or generallty dipping towards west. They are weathered, jointed, fratured vesicular basalt and the vesicles are filled with green earth. The columnar joints are predominant in basalts. Each flow mainly consists of upper vesicular basalt and a lower massive unit below which bole beds occur.

Intertrappean Beds: Intertrappean beds are also occurring in the district and they are limited to a few meters thickness. They are generally clayey or calcareous when met within the wells. They form good aquifers.

Alluvium: Alluvium is extremely limited in the district and is present along the Godavari, the Purna, the Dudhna, the Galati, the Dhond and Karpara rivers. They are more than 10 meters in width and yield appreciable quantities of ground water. However they are broader and of mappable size at places along the banks of rivers and 1 to 2 kms broad south of Chikhalthana and western boundary of the district towards Beed.

4.2 Water Level Scenario

Central Ground Water Board periodically monitors National Hydrograph Network Stations (NHNS) stations in the 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**.

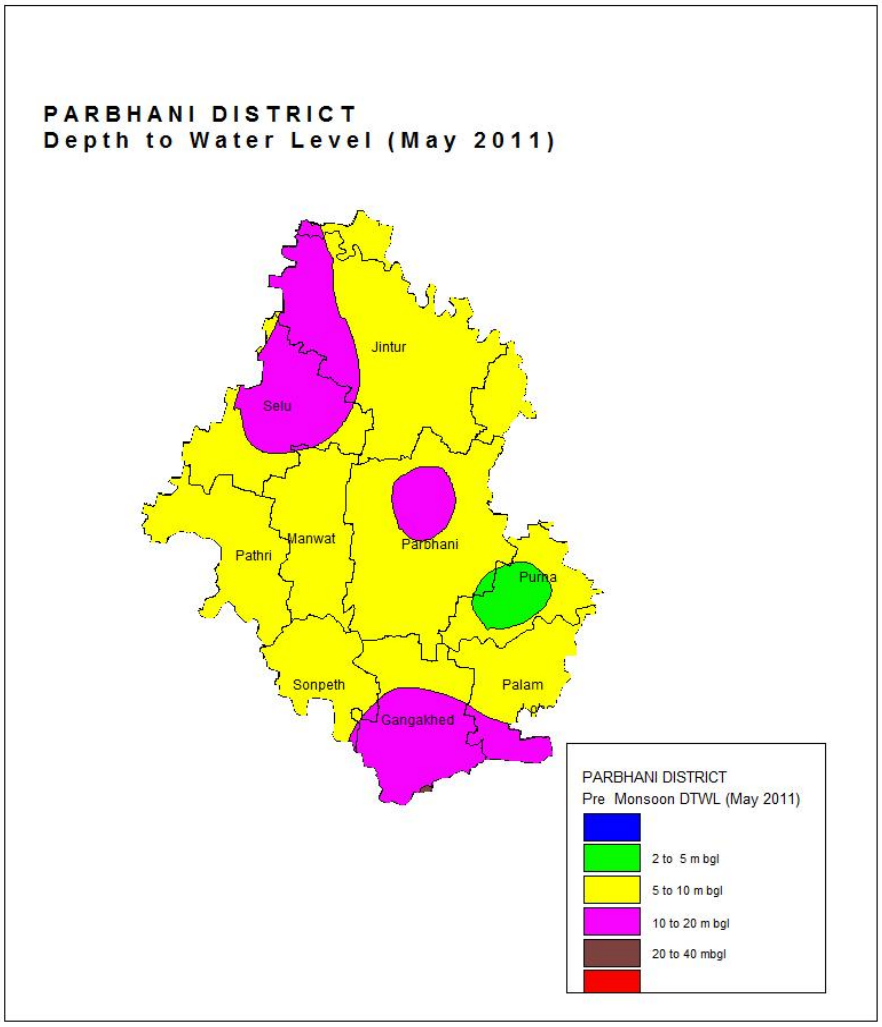
Table 2: Water Level Data (2011).

S. No.	Location	Premonsoon WL (m bgl)	Postmonsoon WL (m bgl)	Fluct-uation (m)
1	2	3	4	5
1	Chikhalthana	13.51	6.85	6.66
2	Manwat	8.01	5.9	2.11
3	Gojegaon	6.53	1.6	4.93
4	Singanapur	6.54	5.25	1.29
5	Kerwadi	8.68	4.4	4.28
6	Mankeswar	8.85	5.4	3.45
7	Todkalas	3.55	1.3	2.25
8	Selu	8.49	4.17	4.32
9	Hadgaon (PZ)	7.96	6.05	1.91
10	Pedgaon2	6.62	4.55	2.07
11	Narwadi	6.82	4.2	2.62
12	Kausdi	8.61	6.65	1.96
13	Dharmapuri2	13.01	14.85	-1.84

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

The depth to water levels in the district during May 2011 ranges between 3.55 (Tadkalas) and 13.51 (Chikhalthana) m bgl. Shallow water levels within the range of 2 to 5 m bgl are seen at one NHNS i.e. Tadkalas. Water level within 5 to 10 m bgl are seen almost in entire district. The NHNS located at Gojegaon, Singnapur,Pedgaon, Narwadi, Hadgaon, Manwat, Selu, Kausdi, Kerwadi, Mankeshwar .are showing this particular range of water level. The water levels in the range of 10 to 15 mbgl are seen in the form of patches on the district, the NHNS at in Dhrmapuri2 and Chikhalthana are falling in this range. The Taluka wise extent of depth to water levels during premonsoon (May 2011) of the district has been depicted in **Figure-1**.

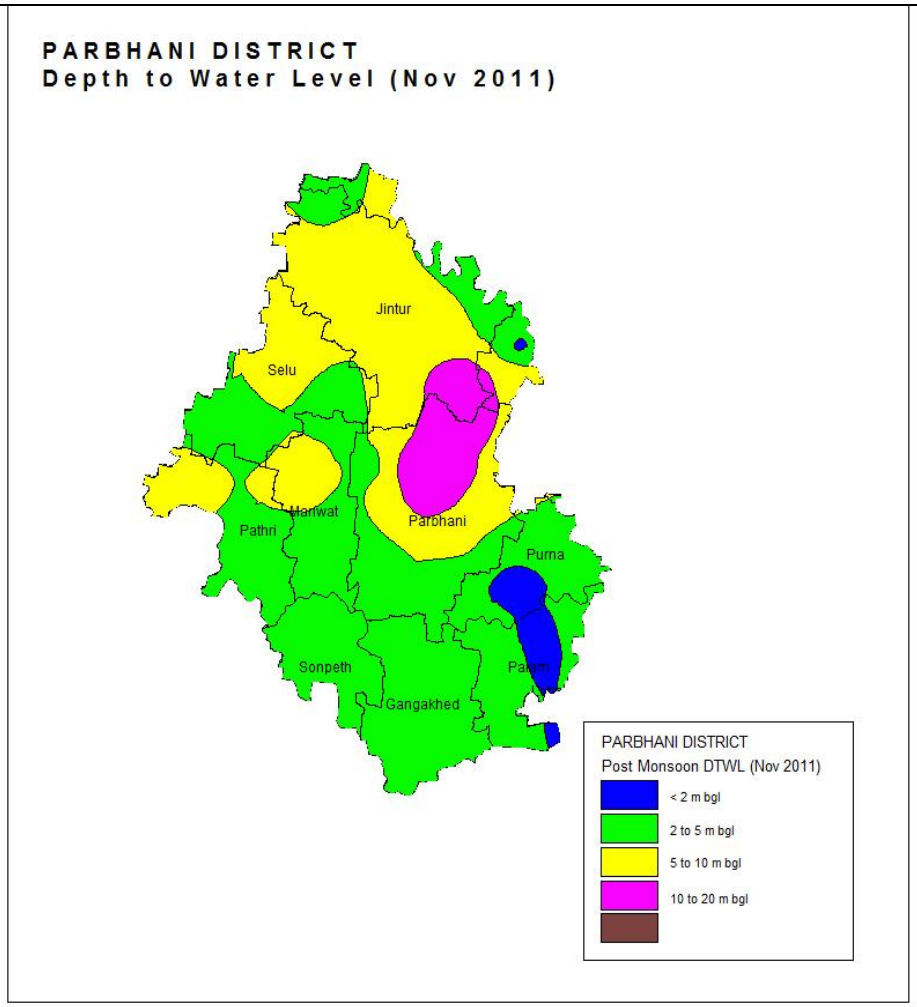
Figure 1: Depth to Water Level Map (May-2011)



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

The depth to water levels during postmonsoon (Nov. 2011) ranges between 1.30 (Tadkalas) and 14.85 (Dhrmapuri 2). The NHNS at Tadkalas, Anjanwadi, Gojegaon 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 7 NHNS i.e. at Kotamwadi, Babhulgaon, selu, Narwadi, Kerwadi, Pedgaon, Walur. Water level within 5 to 10 m bgl are observed in the major part of the district. 7 NHNS located at Shingnapur, Mankeshwar, Jintur, Manwat, Hadgaon, Kausdi, Chikhalthana 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 patch in the central part of the district. The NHNS at Asegaon and Dharmapuri are falling in this range. The Talukawise spatial variation of the water level in the district in Postmonsoon (November 2011) period is shown in **Figure 2**.

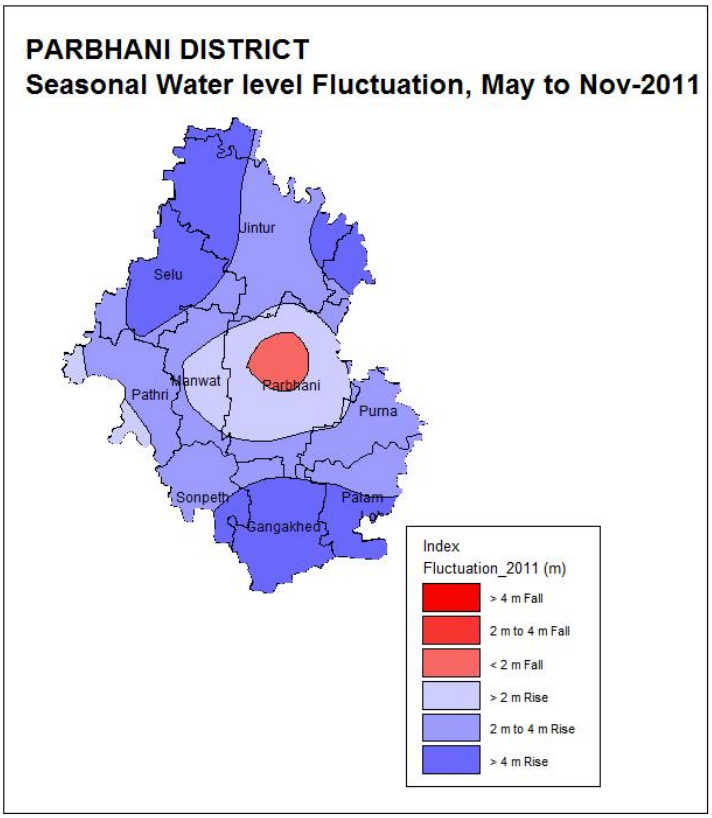
Figure 2: Depth to Water Level Map (November-2011)



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

Fall of water level of 1.84 m is observed in only one location at Dhar mapuri2. In entire district, rise in water level ranges from 1.29 to 6.66 m. Fall in water level is observed as abnormally in one location of Dharmapuri as exception. The Talukawise Spatial variation of the district in Seasonal Water Level Fluctuation in May to November 2011 is shown in Figure 3.

Figure 3: Water Level Fluctuation Map



4.6 Water Level Trend (2001-2011)

Trend of water levels for pre-monsoon and post-monsoon periods for last ten years (2001-2011) have been computed for 25 NHNS and are discussed below.

Analysis of trend indicates that during premonsoon period, rise in water levels has been recorded at 02 stations and it ranges between 0.0101 (Tadkalas) and 0.3686 m/year (Shingnapur). Fall in water levels has been observed at 23 stations and ranges between 0.0085 (Asegaon) and 1.3737 m/year (Kausdi). During postmonsoon period, rise in water level has been recorded at ranging between 0.0043 (Gojegaon) and 0.2508m/year (Shingnapur), whereas fall in water levels is ranging between 0.0090 (Hasnabad) and 0.6477 m/year (Selu). Thus, in major part of the district, both during pre and post monsoon periods declining trends have been observed.

4.7 Aquifer Parameters

The Pumping tests conducted on wells have revealed that specific capacity varies from 14.49 to 144.96 lpm per metre of drawdown. There are

rare cases of wells with specific capacity of more than 200 lpm/m of drawdown. Weathered basalts have wells of high specific capacity. Wells in jointed massive basalts have lower specific capacity as compared to weathered basalt. Wells in massive basalt have lower specific capacity of up to 30 lpm/ m of drawdown. In winter specific capacity is 30 to 50% lesser than summer.

Lineaments play a very significant role from point of view of yield from ground water structures. Those wells located on or close to lineament yield more as compared to those away from lineaments.

5.0 Ground Water Resources

Central Ground Water Board and Ground Water Survey and Development Agency (GSDA) have jointly estimated the ground water resources of Parbhani district based on GEC-97 methodology. The same are presented in **Table 3**. Ground Water Resources estimation was carried out for command and non-command area separately.

As per the estimation the total annual ground water recharge is 930.39 MCM with the natural discharge of 47.72 MCM, thus the net annual ground water availability comes to be 882.67 MCM. The gross draft for all uses is estimated at 293.90 MCM with irrigation sector being the major consumer having a draft of 280.44 MCM. The domestic and industrial water requirements are worked at 13.45 MCM. The net ground water availability for future irrigation is estimated at 575.50 MCM.

Stage of ground water development varies from 21.02 % (Sonpeth) to 47.32 % (Pathri). The overall stage of ground water development for the district is 33.30 %, 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 all the 33 watersheds fall under “Safe category”. The Talukawise Ground Water resources (March 2009) are shown in **Figure 4**.

Figure 4: Ground Water Resources (March 2009)

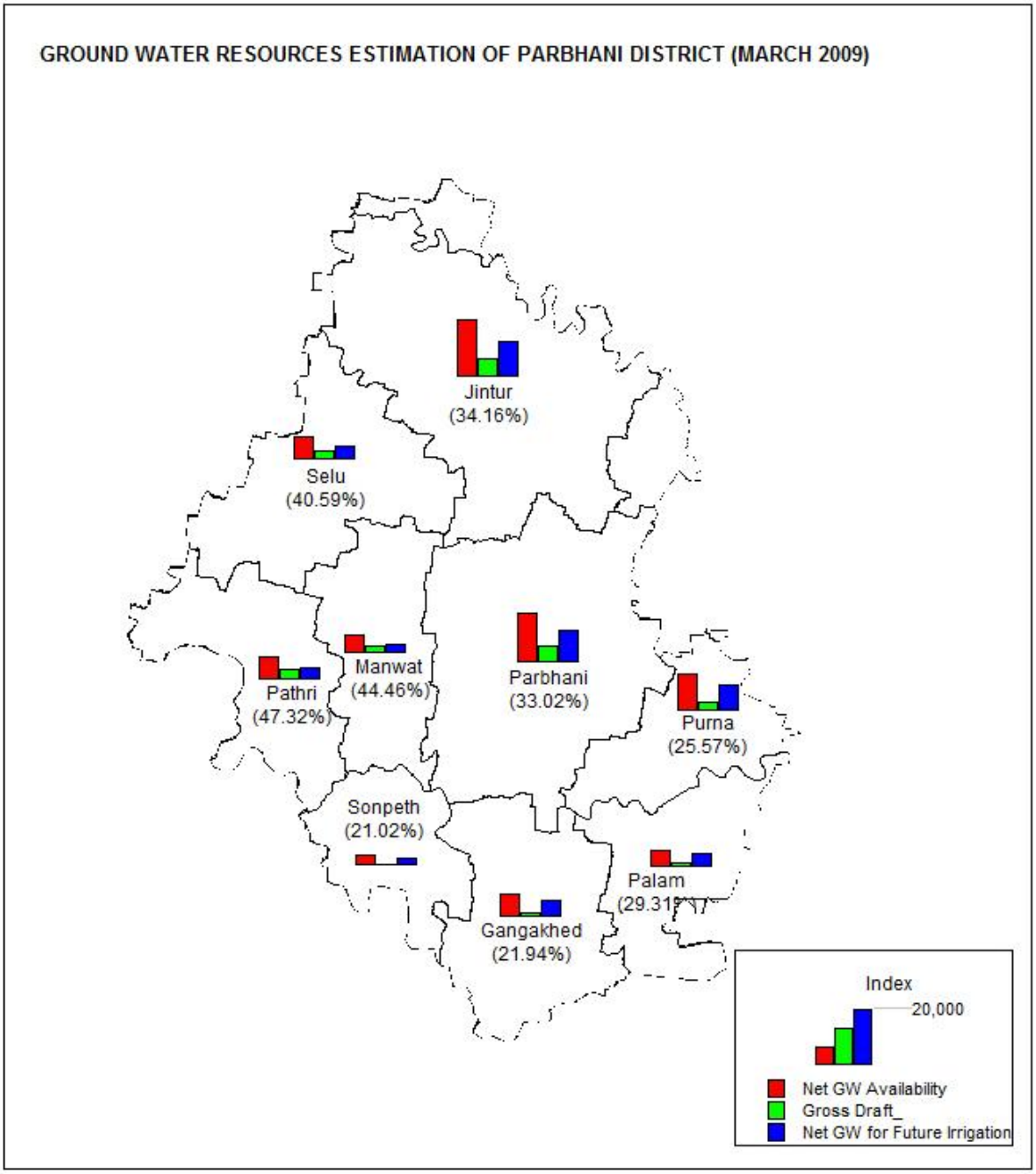


Table-3: Taluka wise Ground Water Resources (March 2009).

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	Gangakhed	Command	4623.38	415.99	55.79	471.79			
	Gangakhed	Non Command	3358.24	1185.14	94.38	1279.52			
	Gangakhed	Total	7981.62	1601.14	150.17	1751.31	312.62	5780.09	21.94
2	Jintur	Command	8003.40	1938.71	55.38	1994.09			
	Jintur	Non Command	11082.94	4368.68	157.53	4526.21			
	Jintur	Total	19086.35	6307.39	212.91	6520.30	399.12	12114.51	34.16
3	Manwat	Command	2892.06	1403.78	49.61	1453.39			
	Manwat	Non Command	3356.66	1293.25	50.51	1343.76			
	Manwat	Total	6248.72	2697.03	100.11	2797.15	198.42	3161.48	44.76
4	Palam	Command	767.93	125.55	7.45	133.00			
	Palam	Non Command	4973.57	1468.34	81.27	1549.61			
	Palam	Total	5741.50	1593.89	88.72	1682.61	182.01	4518.72	29.31
5	Parbhani	Command	11065.12	3060.89	151.69	3212.58			
	Parbhani	Non Command	5835.93	2254.18	114.53	2368.71			
	Parbhani	Total	16901.05	5315.07	266.22	5581.29	521.39	11257.80	33.02
6	Pathari	Command	6973.41	3281.79	144.79	3426.58			
	Pathari	Non Command	992.27	324.33	18.55	342.88			

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 (%)
	Pathari	Total	7965.68	3606.11	163.35	3769.46	314.94	4091.16	47.32
7	Purna	Command	12642.52	3065.71	167.03	3232.74			
	Purna	Non Command							
	Purna	Total	12642.52	3065.71	167.03	3232.74	336.97	9043.14	25.57
8	Selu	Command	118.85	28.83	1.08	29.91			
	Selu	Non Command	8036.86	3151.00	129.47	3280.47			
	Selu	Total	8155.71	3179.83	130.55	3310.38	274.74	4901.36	40.59
9	Sonpepth	Command	1273.86	211.97	22.32	234.29			
	Sonpepth	Non Command	2270.16	466.23	44.43	510.66			
	Sonpepth	Total	3544.01	678.20	66.75	744.95	132.45	2681.87	21.02

6.0 Ground Water Quality

CGWB is monitoring the ground water quality of the district since 4 decades through its established monitoring wells. The objective behind the monitoring are to develop an over all picture of the ground water quality of the district. During year 2011, Board has carried out quality monitoring of 8 monitoring wells. The results of chemical analysis are given in **Table 4.**

Based on quality analysis results, the samples are broadly classified into classes as given in **Table-4**.

Table-4 Results of Chemical Analysis of Ground water Samples

Well No.	Village	pH	EC	TA	TH	NO3	F
G/PB-001	Chikhalthana	8.3	620	280	210	29	0.75
G/PB-004	Jintur	8.0	1850	235	530	254	0.41
G/PB-005	Manwat	8.0	1220	180	370	158	0.40
G/PB-006	Gojegaon	8.2	650	210	210	68	0.25
G/PB-021	Kerwadi	8.3	770	360	335	17	1.06
G/PB-022	Mankeswar	8.4	650	245	200	44	0.64
G/PB-024	Tadkalas	7.9	1710	225	330	61	0.58
G/PB-025	Selu	8.3	1110	370	210	78	1.01

6.1 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., TH, TA, F 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	4	4	0
TA (mg/L)	200	600	1	7	0
NO_3 (mg/L)	45	No relaxation	3	-	5
F (mg/L)	1.0	1.5	6	2	0

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

The perusal of **Table-5** shows that concentration of TH, TA and F is within the DL & MPL. However, the concentration of nitrate is found more than MPL at 5 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.

6.2 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. Sodium Absorption Ratio (SAR) and Residual Sodium Carbonate (RSC) are 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	%
8	6	74%	1	13%	1	13%

The **Table-6** shows that out of 8 samples, 6 samples are having RSC values below 1.25 indicating that the possibility of sodium hazard is low if the water is used for irrigation purpose. The RSC values of one of the samples collected from the well located in the district is more than 2.50 which falls in unsuitable range for irrigation.

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

7.0 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 aquifer existing in the area. The ground water is prominently 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 31324 irrigation dug wells in the district with created irrigation potential of 77021 ha. Shallow tube wells are 2915 with created irrigation potential of 4948 ha. There are 174 deep tube wells with irrigation potential of 474 ha.

State Govt has drilled large number of bore wells fitted with hand pumps and electric motors for rural drinking water purposes in the district.

8.0 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.

8.1 Ground Water Development

The present stage of ground water development in the district through dug wells for irrigation purposes is only 33.30%. The net ground water availability for future irrigation is estimated at 575.50 MCM.

Thus there is scope for ground water development in the district. However, 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 and recommended for further ground water development judiciously.

8.2 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, Parbhani district have 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.

9.0 Ground Water Related Issues and Problems

Although a modest area in Parbhani 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 not 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.

10.0 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.

11.0 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.

12.0 Recommendations

1. About 98 % of the area is occupied by the basaltic lava flows belonging to the Deccan traps. Each flow comprises 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. 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. Areas such 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 of 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.