DISTRICT GROUND WATER INFORMATION BOOKLET

CHHATARPUR DISTRICT
MADHYA PRADESH

Ministry of Water Resources
Central Ground Water Board
North Central Region
Government of India
2013

CHHATERPUR DISTRICT AT A GLANCE

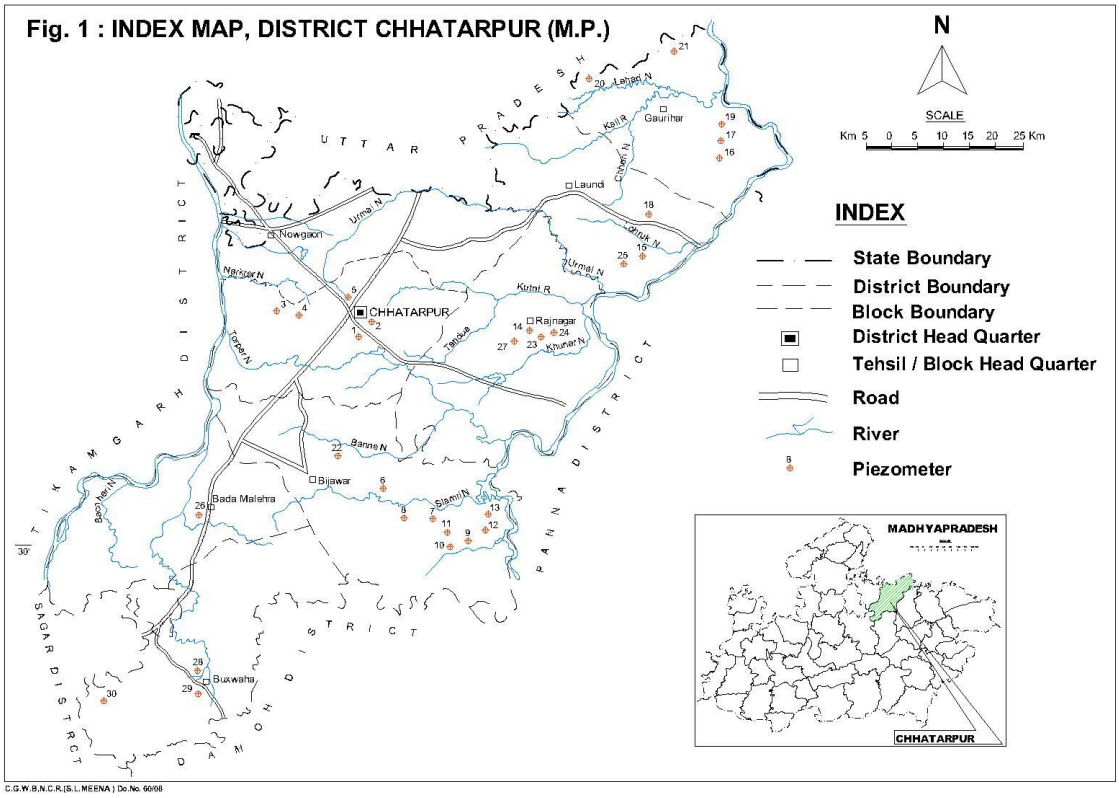
S. No.	Items	Statistic
1	**General Information**	
	(i) Geological Area	8687.36 Sq. km
	(ii) Administrative Division : (As on 2012)	
	Number of Tehsils	6
	Number of Blocks	8
	Number of Panchayat	558 Village& 8 Janpad Panchayats
	Number of villages	1080
	Number of villages with drinking water facilities	1049
	(iii) Population (As on 2011 Census)	1762857
3	(iv) Average Annual Rainfall (mm)	1068.3
2	**Geomorphology**	
	Major Physiographic Units:	Panna Range, Central Plateau and Northern Plains
	Major Drainages	Yamuna Sub-basin of Ganga basin
3	**Land Use (2009-10)**	
	(a) Forest Area	1808.02 Km2
	(b) Net area sown	5469.27 Km2
	(c) Cultivable area:	6073.87 Km2
4	**Major Soil Types**	Alluvial, Red & Yellow, mixed red & black and medium black soils
5	**Area Under Principal Crops (As on 20009-10)**	5469.27Km^2

6	**Irrigation by Different Sources**	**Nos.**	**Irrigated Area (Sq.Km)**
	Dug wells	80725	1536.06
	Tube well/Bore wells	2034	13.01
	Canal	68	125.07
	Tanks/Ponds	154	43.77
	Other Sources	-	211.08
	Net Irrigated Area	-	2085.12
7	**Number of Ground Water Monitoring Wells of CGWB. (As on 31.3.2012)**		
	No. of Dug Wells	28	
	No. of Piezometers	7	
8	**Predominant Geological Formations :**	Recent Alluvium, Deccan Traps, Vindhyans, Bijawar & Granite	
9	**Hydrogeology**		
	Major Water Bearing Formation.	Recent Alluvium, Deccan Traps, Vindhyans, Bijawar & Granite	
	Pre-Monsoon Depth to water level during 2012 **Post-Monsoon** Depth to water level during 2012 Long Term water level trend in 10 years (2003-2012)	5.49-14.88mbgl 2.26-9.24 mbgl **Rising trend during-** Pre-monsoon 0.007 to 0.305 m/year (At 5 Stations) Post-monsoon 0.005 to 0.98 m/year (At 10 Stations) Annual 0.0007 to 0.559 m/year (At 9 Stations) **Falling trend during-** Pre-monsoon 0.0256 to1.16 m/year (At 30 Stations) Post-monsoon 0.002 to 0.66 m/year (At 25 Stations) Annual 0.0015 to 0.649m/year (At 26 Stations)	

10	**Ground Water Exploration by CGWB (As on 31.3.2013)**	
	No. of wells drilled EW	90
	Depth range (m)	19.190 to 302.9 m
	Discharge (lps)	0.10 to 8.00 lps
11	**Ground Water Quality**	
	Presence of chemical constituents more that permissible limit. (e.g.EC, F, As, Fe)	EC less than 1000 µS/Cm at 9 villages NO_3 less than 45 mgl in 50% samples, Laundi has high F (2.65 mgl)
	Type of Water	Alkaline $C_2 S_1$ & $C_3 S_1$
12.	**Dynamic Ground Water Resources (2011)**	
	Net Ground Water Availability	685.67 MCM
	Gross Annual Ground Water Draft	450.55 MCM
	Projected Demand for Domestic and Industrial uses up to 2035	38.64 MCM
	Stage of Ground Water Development	66 %
13	**Awareness and Training Activity**	
A	Mass Awareness Programme organized. No. of Participant	At Chhatarpur 120
B	Workshop on Water Conservation and Artificial Recharge of Ground Water	At Khajurahoo
C	Tier III training on "Aquifer Mapping"	At Chhatarpur
D	Tier III training on "Aquifer Mapping"	At Khajurahoo

1.0 Introduction

Chhatarpur district in located on the central portion on the plateau of Bundelkhand in M.P. the district is spread over an area of 8616.82 sq. km and is located at the northern boundary of the state, laying between north latitudes 24^0 06' and 25^0 20' and east longitude 79^0 59' and 80^0 26 falls under the survey of India toposheet No. 54O, 54P, 63D. The district is bounded by Mohaba district U.P in the north, Panna district, in the east Tikamgarh district in the west and Sagar & Damoh district in the south (fig.-1).



The district is divided in to six Tehsil (Gourihar, Londi, Nowgaon, Chhatarpur, Rajnagar, Badamalhara and Bijawar) and eight development blocks (Gourihar, Loundi, Nowgarn, Chhatarpur, Rajnagar, Bijawar, Badamalhera & Buxwaha). These are 1080 inhabited villages in the district (Table- 1).

As per census 2011, the total population of the district is 1762857

Table – 1 : Administrative Units of Chhindward district.

S. No	Tahsils	S. No	Blocks	Area in Sq. km
1	Gaurihar	1	Gaurihar	888.47
2	Loundi	2	Loundi	787.99
3	Nowgaon	3	Nowgaon	800.83
4	Chhatrpur	4	Chhatrpur	1042.32
5	Rajnogar	5	Rajnogar	1373.83

6	Bijawar	6	Bijawar	1535.22
		7	Badamalheva	1080.85
		8	Buxwaha	785.02
			Total Area	**8616.82**

The district as a whole lies in the Yamuna sub basin of the Ganga basin and traversed by the left bank tributaries of the ken & the right bank tributaries of the Dhasen. The catchment area of Ken Dhasen rivers falling in the district are 6033.15 Sq.km and (69.99%) and 2594.25 Sq. km (30.10%) respectively.

Crops

Paddy, Jowar, Maize, Tuar, Urad, Til groundnut Soyabean, Sugarcane (Kharif) and wheat, Gram, Alsi, Muster, Rai & Vegetable (Rabi) are the main crops. The total irrigated area is 2265.81 sq. km of which 204.66 sq km irrigated by canals, 16.99 sq. km by tube wells and 1707.87 Sq. Km by open wells.

Activities Carried out by CGWB

- Shri U. I. Pitale (GSI) carried out reconnaissance hydrogeological survey of Chhatarpur district during field season 1971-72.

- Shri A. Mukkerji (CGWB) carried out systematic hydrogeological survey around Buxwaha during 1984-85.

- Shri. R. N. Sharma (CGWB) Carried out systematic hydrogeological survey in parts of Bijawar & Rajnagar blocks during 1985-86.

- Shri Babu Nair, (CGWB) Carried out integrated ground water development & management studies during AAP 1998-99 in Gourihar, Loundi & Rajnagar blocks.

- Shri. A. K. Budhauliya (CGWB) carried out detailed hydrogeological investigation for hard core source finding villages for Kishangarh block in the year 2001.

- Shri. M.L. Parmar and Shri. Rakesh Singh attended contractual drilling operation in the district during year 2002- 2005.

2.0 Rainfall and Climate

- A hot summer and general dryness except during the South west monsoon season. The year may divided into four season. The cold season. December to February is follwed by hot season from March to middle of June. The period from middle of June to September in the south west monsoon season. October and November from the post monsoon or transition period. The nearest IMD observatory in Nowgaon.

- The normal annual rainfall of Chhatrpur district is 1068.3 mm. the district receives maximum rainfall during south west monsoon period i.e. June to September. About 90.2% of the annual rainfall received during monsoon season. Only 9.8% of the annual rainfall takes place between October to May period.

- The normal maximum temperature received during the month of May is 42.3^0C & minimum during the month of January is 7.1^0 C the normal annual means maximum & minimum temperature of Chhatarpur district is 32.7^0 C and 18.1^0 C respectively.

- During the south west monsoon season the relative humidity generally exceeds 88% (August month) & the rest of the year is drier. The driest part of the year is the summer season, when relative humidity is less than 30% may is the driest month of the year.

- The Wind velocity is higher during the pre-monsoon period as compared to post monsoon observed during the month of June and minimum 1-8 km/hr. during the month of November. The average annual wind velocity in the district is 4.1 km /hr.

3.0 Geomorphology and Soil Types

Physiographically the district has been divided broadly in to three main geomorphic units. The Panna range, the central plateau & northern plains range which traverses district in a south west north east direction. This range separates the upper Bundelkhand from lower bundelkhand plateau. Overlying the archeans is if formed by Bijawar and vindhyan beds which are highly folded and are also dissected by the superimposed drainage system.

The highest peak likes at Ban pathar (24^0 37': 79^0 45') in the district at 607 m amsl. The central plateau runs to the north as an offshoot of Panna range. It lies mainly on the Bundelkhand granites & forms the central sub water divide. The give way to lower plains along the ken and Dhasan in the east & west respectively. The northern plateau lies between 150 to 300 m amsl & covers nearly the whole of loundi Tehsil. It is covered by varying thickness of alluvium but is cut in ravines resulting in "bad land" topography.

The soils in the district are generally of classified in four groups viz alluvial soils which occurs in north eastern part of the district. Red and yellow soil in north eastern parts mixed red & black yellow soil in central part and medium black soil in the south western extreme of the district.

4.0 Ground Water Scenario

4.1 Hydrogeology

(i) Aquifer System

About 65% of the district is occupied by Bundelkhand granite in northern & north central part with a thin soil cover. The granite is pink in colour, medium to coarse grained porphyiatic in texture. It is very hard & compact with well developed joints. The joints are open at the surface and persist to about 20 m below land surface. However, beyond 45m these are very tight, thus restricting the storage and movement of ground water. The depth of weathering is as high as 20m in areas where the granite in coarse grained & well jointed. The granite country in the district is traversed by quartz reef and basic dykes. The basic dykes generally occupy topographic depression where as quartz reefs stand out as wall like structure. From the ground water important & act as surface water barriers leading to prominent surface water tanks and also act as ground water barriers Bundelkhand granites are overlain by the rocks of Bijawar beries.

The exposure of Bijawars triangular in shape and constitute about 15% of the south eastern part of the district. The vindhyans are exposed in the form of NE-SW trending strike ridges and alternating valley in the southern part of the district these occupy about 20% of the district areas represented by conglomerates, sandstone, shale and limestone in a sequence. Exposure of Deccan trap flows are seen in the south western extremity of the district. Alluvium is restricted mainly to the area along the ken and Dhasan on the left bank of ken it has maximum thickness of 30 m and along Dhasan, it has maximum thickness of 10m.

Ground water in granites occurs in joints, fractures planes and in weathered zone mostly under water table conditions and its occurrence is controlled by extent, size and interconnection of joints and degree of weathering which varies from place to place and under favourable conditions tube wells having discharge of 0.5 to 7.8 lps. Bijawar limestone, where Karst and well developed solution cavities are available are quite promising from ground water point of view. Vindhyan sandstone and limestone when occurring at lower devation and having well developed joints, yield moderate amount of ground water generally below 3 lps. The semri limestone at places, has well developed and inter connected solution opening and ground water occurs under confined conditions. The yield recorded in vindhyans and Bijawar formation ranges from 1.8 lps to 9.5 lps(Table-7).

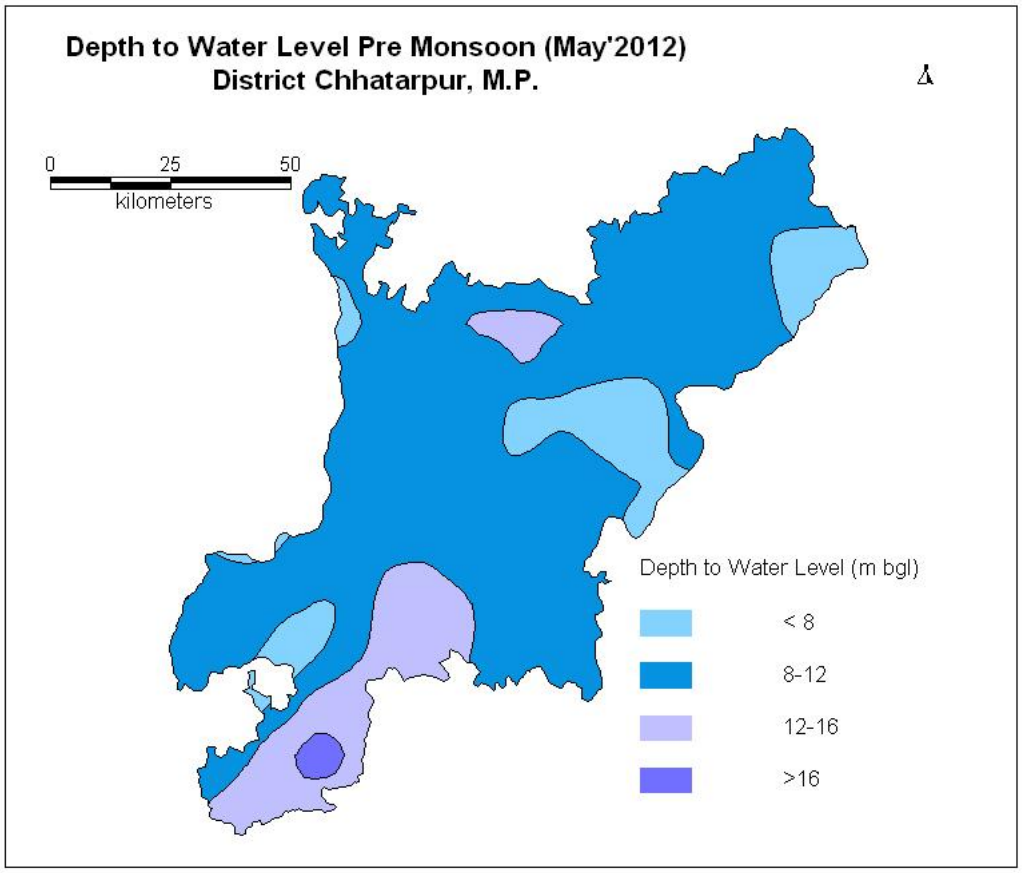
Ground water in the deccan traps also occurs in the weathered mantle in joints and fracture under water table conditions and can sustain well having upto 2 lps discharge ground water in the alluvium also occurs under water table conditions. The grain size of Dhasan alluvium is coarser as compared to ken alluvium and thus Dhasan alluvium can sustain tube

wells having discharge upto 15-20 lps and tube wells of ken alluvium have discharge in range of 10-15 lps (fig. – 2).

(ii) Water Levels

Water level data, including historical data are essential for not only to know the present ground water conditions but also for forecasting future trends in response to ground water reservoir operations. Using the water level data of 26 monitoring well of Chhatarpur district. Pre and post monsoon depth to water level maps are reproduced.

Pre Monsoon (May 2012)

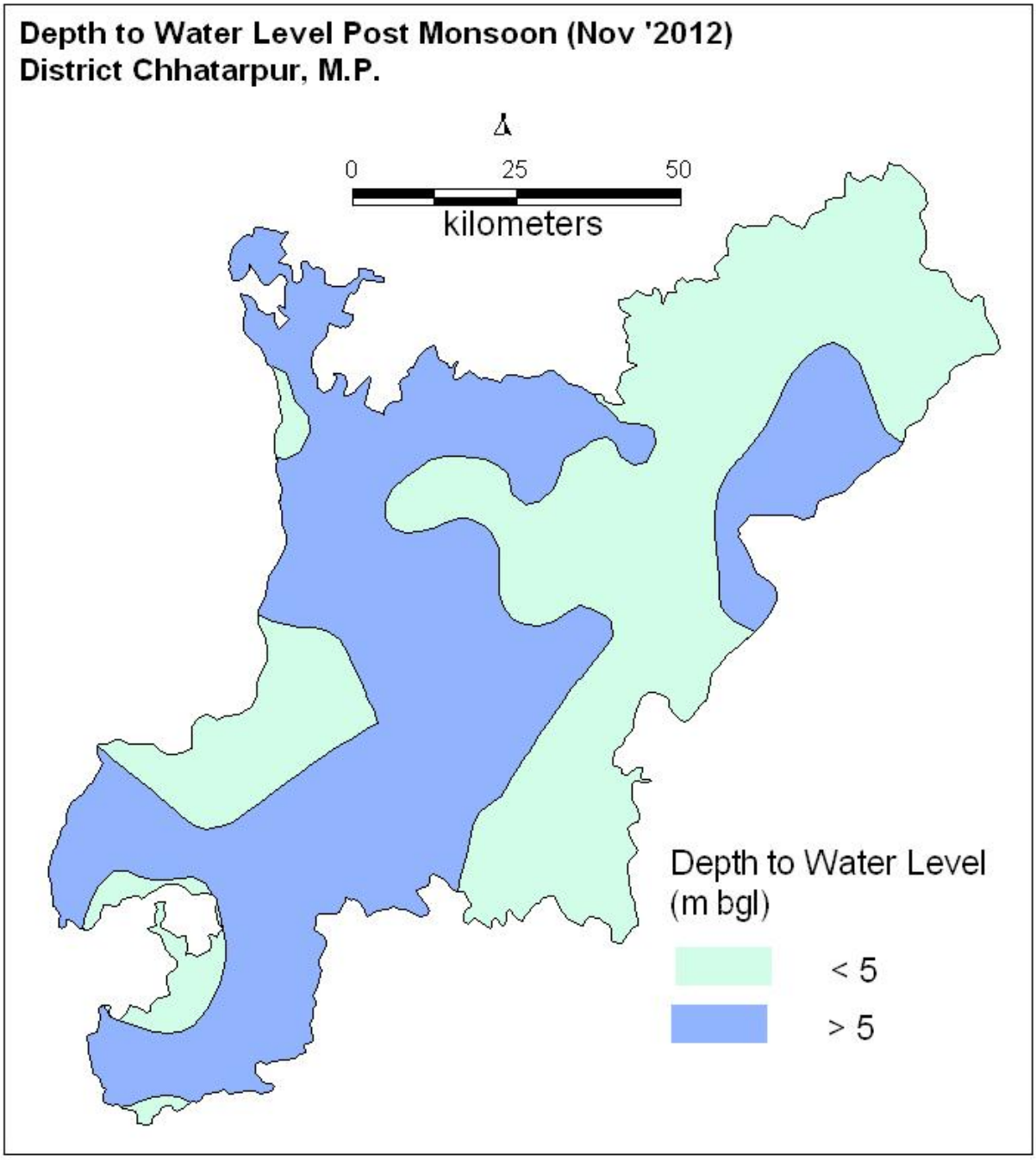


Pre-Monsoon depth to water level in the year 2012 range from 5.49 to 14.88 mbgl. Shallow water level (< 6.00 m) occurs north eastern and south eastern part of the district. The longterm water level trend (2003-2012) shows declining trend ranges from 0.0015 to 0.64 m/year (Annual) water level fall is noticed in all block where a large scale withdrawal of ground water for irrigation purpose is observed (Fig-2).

Post Monsoon November 2012.

During post monsoon period, water level ranges from 2.26 to 9.24 mbgl shallow water level (< 5 mbgl) occurs in northern central & southern parts while deep water levels (710 mgl) observed in North West and past (Fig-3).

Depth to Water Level Post Monsoon (Nov '2012)
District Chhatarpur, M.P.



4.2 Ground Water Resources :

Dynamic ground water resources of the district have been estimated for base year - 2008/09 on block-wise basis. There are eight number of assessment units (block) in the district which fall under none-command (96%) and command (3%) sub units. All blocks of the district in command area are categorized as safe blocks. Bijawar , Gaurihar and Loundi blocks in non command sub units are safe. Badamalhara, Buxwaha, Chhatarpur, Nowgaon and Rajnagar are under semi critical highest stage of ground water development is computed as 93 % for Chhatarpur Block. The net ground water availability in the district 68,567 ham and ground water draft for all uses is 45,054.66 ham, making stage of ground water development 66 % as a whole for district. After making allocation for future domestic and industrial supply for next 25 years, balance available ground water for future irrigation would be 22,264 ham, .

Table-2 : STAGE OF GROUND WATER DEVELOPMENT OF MADHYA PRADESH AS ON 31ST MARCH 2009.

District/ Assessment Unit	Sub-unit Command/ Non-Command/	Net Annual Ground water Availability (ham)	Existing Gross Ground water Draft for Irrigation (ham)	Existing Gross Ground water Draft for Domestic & Industrial water Supply (ham)	Existing Gross Ground water Draft for All uses (ham)	Provision for domestic, and industrial requirement supply to next 25 year (2033) (ham)	Net Ground water Availability for future irrigation d development (ham)	Stage of Ground water Development (%)
Chhatarpur								
Badamalhara	Command	1727	93	47	141	48	1586	8
	Non-Command	6655	4678	300	4978	433	1545	75
	Block Total	**8382**	**4771**	**348**	**5118**	**480**	**3131**	**61**
Bijawar	Command							
	Non-Command	10655	5280	485	5765	715	4661	54
	Block Total	**10655**	**5280**	**485**	**5765**	**715**	**4661**	**54**
Buxwaha	Command							
	Non-Command	6888	5029	171	5200	364	1496	75
	Block Total	**6888**	**5029**	**171**	**5200**	**364**	**1496**	**75**
Chhatarpur	Command	1230	203	12	215	33	994	17
	Non-Command	7385	6644	226	6870	226	516	93
	Block Total	**8615**	**6847**	**238**	**7085**	**260**	**1509**	**82**
Gourihar	Command							
	Non-Command	7414	1640	359	1999	448	5325	27
	Block Total	**7414**	**1640**	**359**	**1999**	**448**	**5325**	**27**
Loundi	Command							
	Non-Command	6481	3995	369	4364	544	1942	67
	Block Total	**6481**	**3995**	**369**	**4364**	**544**	**1942**	**67**
Nowgaon	Command							
	Non-Command	7167	5373	266	5639	597	1196	79

	Block Total	**7167**	**5373**	**266**	**5639**	**597**	**1196**	**79**
Rajnagar	Command	2071	526	76	602	91	1454	29
	Non-Command	10892	8978	304	9281	365	1550	85
	Block Total	**12964**	**9504**	**380**	**9884**	**456**	**3004**	**76**
	District Total	**68567**	**42438**	**2616**	**45055**	**3864**	**22264**	**66**

4.3 Ground Water Quality

Ground water quality (Shallow Aquifer) in Chhatarpur district has been brought out by analyzing the 6 water samples collected from National Hydrograph Monitoring wells during May. 2012. The water samples were analyzed for detailed chemical analysis for thirteen parameters.

Quality of Ground Water for Drinking Purpose: The pH value of water samples shows slight alkaline in nature and within permissible limit (6.5 to 8.5) as described by BIS (1991). The salinity of the water is represented by the electrical conductivity. The electrical conductivity depends upon the concentration of dissolved inorganic salts in the water. The EC values in district were within BIS limit (1000 µS/cm^2) and found to be in the ranges between 375 - 2160 µS/cm^2 at 25°CThe concentration of NO3 The nitrate concentration in the district ranges 2 to 288 mg/l. The fluoride concentration in the district ranges between 0.14 to 1.78 mg/l. There is no problem of excess fluoride in the shallow ground water of the district.