

DISTRICT GROUND WATER INFORMATION BOOKLET



BURHANPUR DISTRICT
MADHYA PRADESH



Ministry of Water Resources
Central Ground Water Board
North Central Region
Bhopal
2013

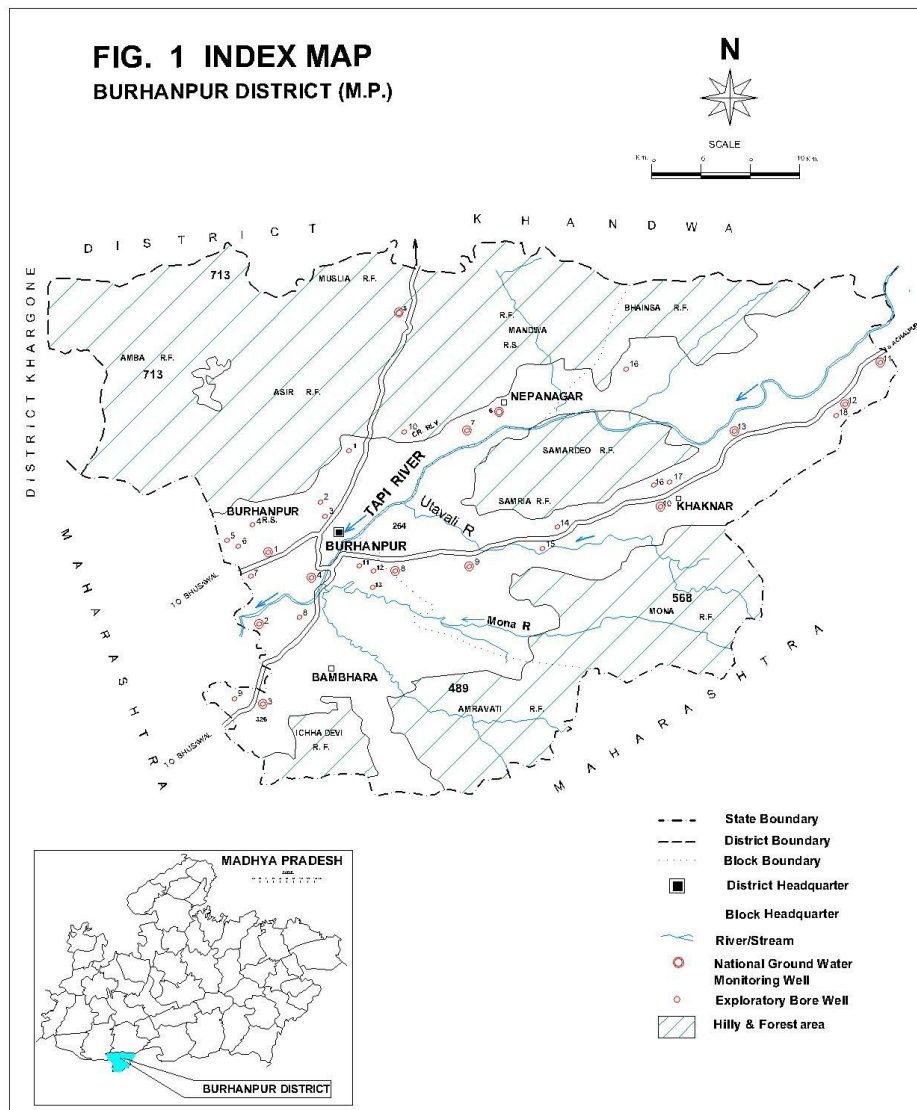
BURHANPUR DISTRICT PROFILE

| S. No | ITEMS | STATISTICS | |
|-------|---|--|-----------------------------|
| 1. | GENERAL INFORMATION | | |
| | i) Geographical area | 323300 Ha | |
| | ii) Administrative Divisions (As on 31.03.2013) Number of Tahsil Block Number of Villages | = 3 = 2 = 263 | |
| | iii) Population (As on 2011 Census) | 756993 | |
| | iv) Normal Rainfall | 978.90 mm | |
| 2. | GEOMORPHOLOGY | | |
| | Major Physiographic units | Northern hilly region Central high plateau region Southern low grounds Upland trough of <i>Jam & Kanhan</i> rivers | |
| | Major Drainages | Tapi | |
| 3. | LAND USE (in '000) | | |
| | a) Forest area: | 202 Ha | |
| | b) Net area sown: | 104 Ha | |
| | c) Cultivable area: | 119 Ha | |
| 4. | MAJOR SOIL TYPES | Black cotton soil, Sandy loam and Clayey loam soil | |
| 5. | PRINCIPAL CROPS | Wheat, Soyabean, Maize, Banana, Sugarcane | |
| 6. | IRRIGATION BY DIFFERENT SOURCES | Number of Structures | Area irrigated in Ha ('000) |
| | Dug wells | 14761 | 25.9 |
| | Tube wells/ Bore wells | 3386 | 15.0 |
| | Others sources | | 15.4 |
| | Total irrigated area | | 43.4 |
| 7. | NUMBER OF GROUND WATER MONITORING WELLS OF CGWB (As on 31- 3- 2013) | No of Dug Wells= 8 No of Piezometers = Nil | |
| 8. | PREDOMINANT GEOLOGICAL FORMATIONS | Recent Alluvium, Deccan Traps Gondwanas and Archaeans (Sausar series) | |
| 9. | HYDROGEOLOGY | | |
| | Major water bearing formation | Archaeans (Gneisses, Schist, Granites & Pegmatite), Gondwanas, Deccan traps and Alluvium | |

| | | |
|-----|--|---|
| | Pre- monsoon depth to water level range during 2012 | 6.38 m to 32.35 m |
| | Post- monsoon depth to water level range during 2012 | 1.47 m to 32.35 m |
| | Long term water level trend range in 10 yrs (2003- 2012) in m/yr | Pre monsoon: Rising trend: 10.83 – 12.31 cm/yr Post Monsoon Declining trend: 5 – 10.14 cm/yr |
| 10. | GROUND WATER EXPLORATION BY CGWB (As on 31- 03- 2013) | |
| | No of wells drilled (EW, OW, PZ, Total) | Exploratory Wells = 19 Observation Wells = 10 Piezometers (H.P) = 11 Total = 40 |
| | Depth range (m) | 35.60-201.30 m (EW) |
| | Discharge | 0.10-10.00 lps |
| | Transmissivity range | 4.78 –32.00 m ² / day |
| 11. | GROUND WATER QUALITY | Ec 456 - 1246 Micromhos NO ₃ 1 - 85 mg/l F 0.03- 0.54 mg/l |
| 12. | DYNAMIC GROUND WATER RESOURCES (YEAR-2009) | |
| | Net Ground Water Availability | 31556 Ham |
| | Gross Ground Water Draft | 22086 Ham |
| | Projected Demand for Domestic and industrial Uses for next 25 years 2035 | 1359 Ham |
| | Stage of Ground water Development | 70 % |
| 13 | Awareness and Training Activity | |
| | Mass Awareness Programme organized | 1 (Burhanpur) |
| | No. of Participants | 350 |
| 14 | Number of Semi-Critical Blocks | 1. Burhanpur |
| 15. | Major Ground water problems | Decline of water levels in some areas. |

1.0 INTRODUCTION

Burhanpur district is located in the south western part of Madhya Pradesh, covering an area of about 2316 Sq. Km falling between North Latitudes $21^{\circ} 11' 00''$ and $21^{\circ} 32' 00''$ and East longitudes $75^{\circ} 59' 00''$ and $76^{\circ} 46' 00''$ and falls under the Survey of India Topo Sheet No. 46 O & 55C. The district is bounded in the North by Khandwa district, in the East by Amaravati district of Maharashtra State, in the South by Buldana and Jalgoan districts of Maharashtra state and in the West by West Nimar district of Madhya Pradesh. The district is divided into two development blocks namely Burhanpur and Khaknar. As per Census 2011, the total population of the district is 756993.



Major part of the area is drained by Tapti river and its tributaries. A small portion in the North is drained by Sukta river, a tributary of Narmada.

CGWB Activities

- The Central Ground Water Board carried out Reappraisal hydrogeological surveys during Annual Action Plan 1991-92. These investigations were carried out by Sh. Parvinder Singh, Scientist 'B'; M.V. Gopal, S.C. Paranjpe, Shrinandan Bangar, Asst. Hydrogeologists.
- Ground water exploration and Piezometers construction work were taken up in the area during Annual Action Plan of CGWB, 1993-94, 1994-95 1995-96 and 1996-1997, under field observation of Sh. Seraj Khan, Hydrogeologist,
- Khan Seraj (1999) : Retrospect and prospect of water supply to Burhanpur, district Khandwa, M.P. Technical Volume of Indian Water Works Association (PP211-216). 1999
- Khan Seraj (2003) : Need for harnessing surplus monsoonrun-off in Micro Watersheds around Burhanpur, District Khandwa, Madhya Pradesh – A Case Study , proc. of Nat, Sem. on ground water Management Future Challenges and its impact on Environment. A.M.U.Aligarh (pp 287-293) 2003

2.0 RAINFALL AND CLIMATE

The normal annual rainfall of the district is 978.9 mm. About 89% of the annual rainfall takes place during the southwest monsoon. July is the wettest month of the year and about 28% of the annual rainfall takes place only during this month. During the southwest monsoon season, the relative humidity generally exceeds 84% (August month) and the rest of the year is drier. The driest part of the year is the summer season, when relative humidity is less than 41%.

The wind velocity is higher during the pre-monsoon period as compared to post-monsoon period. The maximum wind velocity, 15.8 km/hr observed during the month of June and minimum, 4.3 km/hr during the month of November.

3.0 GEOMORPHOLOGY AND SOIL TYPES

The area of the district exhibits an undulating topography which includes highly dissected plateau, linear ridges, residual hills and low lying plains. It can be divided into two distinct physiographic units Viz., the northern and southern uplands and the Central low lands. A prominent hill range (Satpura Range) traverses the southern part of the district. The highest elevation in the district is 778 m amsl, seen on the Satpura Range in the Western part. The river Tapti carves out a narrow valley bifurcating this range into two parts. The northern area exhibits a low rising hill range and the area in the central part is generally plain dotted with isolated residual hills. The lowest elevation is around 249 m a msl, along Tapti River, southwest of Burhanpur town.

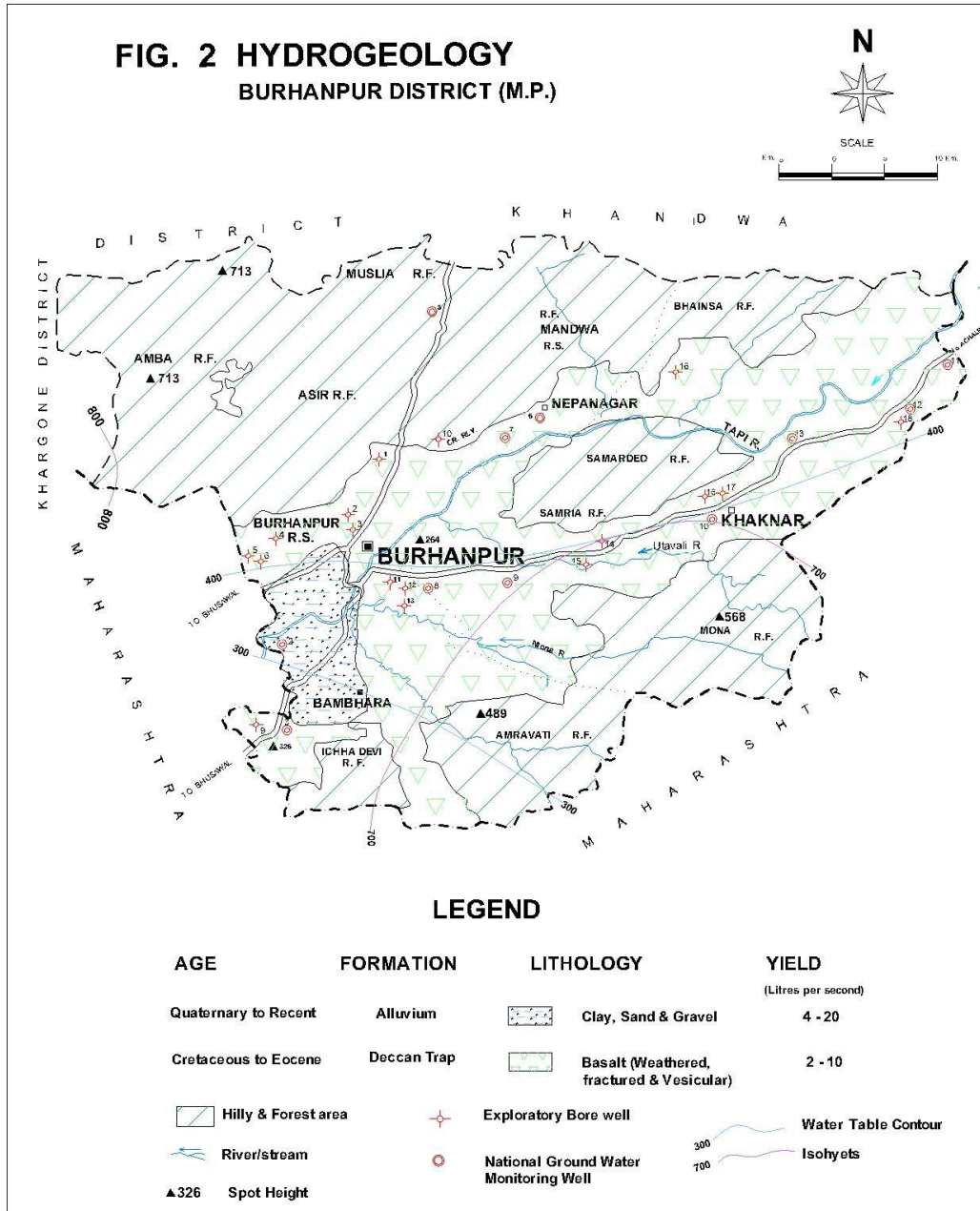
Alluvium consisting of sand, clay and gravels occurs along Tapi river course. Black cotton soil is found as a thin surface soil cover mainly in a country mainly covered with Deccan Trap.

4.0 GROUND WATER SCENARIO

4.1 Hydrogeology

4.1.1 Aquifer System

Deccan Trap, consisting of different lava flows whose thickness ranges between 15 to 20 m, occupies the major part of the district. There are mainly two types of sedimentary deposits in the area. The predominant deposits are formed due to



deposition from the river sediments transported by the Tapi river and its tributaries and is defined as *alluvium*. The second predominant formation is due to deposition of material transported from the Satpura hill ranges by small streams through gravity. These *talus* and *scree* deposits are commonly known as *bazada*. *Satpura Fault (Burhanpur lineament)* is a major fault trending ENE-WSE across the entire northern part of the watershed area along the Satpura foot hills which correspond to the Narmada lineament. The fault zone is distinct and evidence of faulting in the area the *Nawanath temple* along the Ambapani and Jhiri stream, is marked by crushing of basalt, presence of brecciated basalt, fault escarpment, presence of spring, sharp contact of Basaltic lava flows with Bazada formation. The geomorphic location of fault zone favors arresting surface runoff and recharge to ground water.

Alluvium

It is deposited at the foot hill of Satpura ranges stretching upto Tapi River, lying over Deccan Trap. It is valley fill deposit in tectonic depression resulted by sympathetic faults. The thickness of this formation increases towards Satpura, which is found to be more than 236 m. Alluvium consisting of sand, clay and gravels occurs along Tapi river course and formed unconfined, semi-confined to confined ground water conditions. Thickness of alluvium ranges from 30 to 229 m. Granular zones were encountered between 32 and 42 m bgl. The yields of the bore wells constructed in the formation ranges from 4.41 to 15.8 l/s.

Bazada formation

It occurs between 320 m and 290m amsl in the foothill of Satpura and covers around 4.5 km² in the upland of watershed area of well-known infiltration galleries. It consists of mainly big boulders admixed with pebbles, gravels, silt & clay in the loose form. These deposits are partly sorted and generally devoid of any layer sequence. These are formed due to the deposition of rock fragments transported mechanically from the local streams from the Satpura hill ranges. The maximum thickness of these deposits is yet to be ascertained.

Deccan Trap

Basaltic lava flows of Deccan Trap forming Satpura, underlain by alluvium and exposed also as inliers in southern part of the area closer to Tapi River. Basaltic lava flows are fractured and jointed constituting two aquifer systems. The unconfined aquifer is restricted up to 15 m bgl while semi-confined and confined aquifers are encountered between 45 to 190 mbgl. The potentiality of aquifers is very diversified in nature due to structural disturbances. Higher potential aquifers occur only at the influenced zone of lineaments.

Shallow ground water occurs in the weathered, vesicular, jointed and fractured basalts under semi-confined to confined conditions. In irrigation wells the aquifer zone forms below thick clay of 4 to 7 m in the depth ranges of 6.70 to 25.80 m bgl, around

Burhanpur town area. The water of these wells is mainly being used in Banana cultivation with installation of drip irrigation. The sustainable yield of wells varies from 1.5 lps to 4.0 lps.

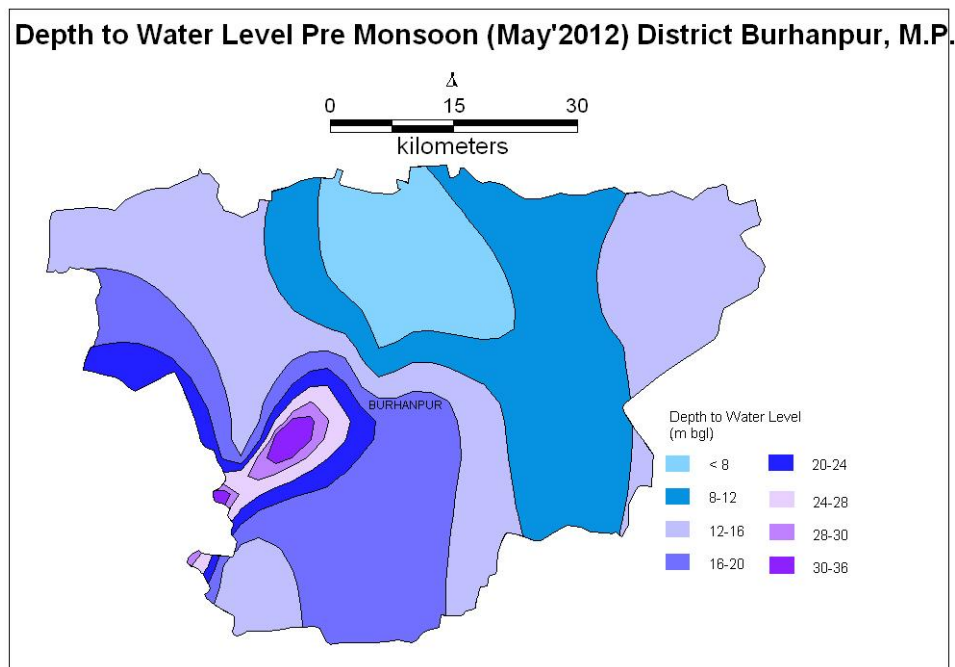
Shallow aquifer zones were noticed in the boreholes at Chandni, khoknar, Diaphodia, Khar kheda, Ritalai between 6.50 – 29.00 m bgl. Deeper aquifers were encountered at Diaphodia, Haiderpur, Dariyapur. The discharges of exploratory wells found to be 0.08 – 10 l/s. The transmissivity of wells constructed in Deccan Trap ranges from 2 to 96 m²/day and storage co-efficient from 8.4×10^{-5} to 0.41×10^{-3} .

4.1.2 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 8 monitoring wells located in the district, Pre and Post monsoon depth to water level maps are prepared.

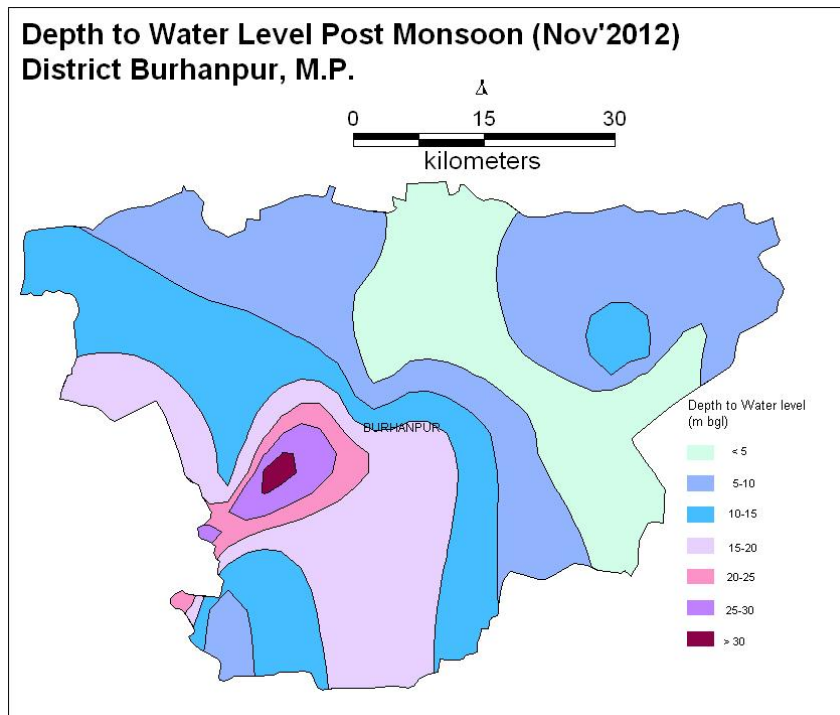
Pre- monsoon (May, 2012)

Depth to water level during pre-monsoon period ranges from 6.38 to 32.35 m bgl.



Post- monsoon (Nov. 2012)

Depth to water level during post-monsoon period ranges from 1.47 to 32.35 m bgl.



Groundwater level trend (May2003 to May 2012)

Analyses of Groundwater level data of pre-monsoon period indicate that there is rise as well as decline in water level in the district. In general, the district shows only rise in water level in the range of 10.83 – 12.31 cm/yr.

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 two number of assessment units (block) in the district which fall under non-command sub unit. Khaknar block of the district is categorized as safe blocks and Burhanpur as semi critical (same in 2003/04) with highest stage of ground water development is computed as 85 %. The net ground water availability in the district is 31,556 ham and ground water draft for all uses is 22,086 ham, making stage of ground water development 70% (70 % in 20003/04) 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 9,207 ham.

Table: Ground water availability and Stage of development

| 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 (%) |
|---------------------------------|--|--|--|--|---|---|---|---|
| Burhanpur | | | | | | | | |
| Burhanpur | Command | | | | | | | |
| | Non-Command | 14733 | 11813 | 672 | 12484 | 700 | 2219 | 85 |
| | Block Total | 14733 | 11813 | 672 | 12484 | 700 | 2219 | 85 |
| Khaknar | Command | | | | | | | |
| | Non-Command | 16824 | 9177 | 424 | 9601 | 634 | 7013 | 57 |
| | Block Total | 16824 | 9177 | 424 | 9601 | 658 | 6988 | 57 |
| District Total | | 31556 | 20990 | 1096 | 22086 | 1359 | 9207 | 70 |

4.3 Ground Water Quality

Ground water quality in the district is assessed annually on the basis of analysis of ground water samples collected from hydrograph stations located in the district. On the basis of analysis of data, EC values ranges from 456 to 1246 μ hos/cm, the concentration of NO₃ ranges from 1 to 1246 mg/l and Fluoride concentration ranges from 0.03 to 0.54 mg/l