

# DISTRICT GROUND WATER INFORMATION BOOKLET



## SHEOPUR KALAN DISTRICT MADHYA PRADESH



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

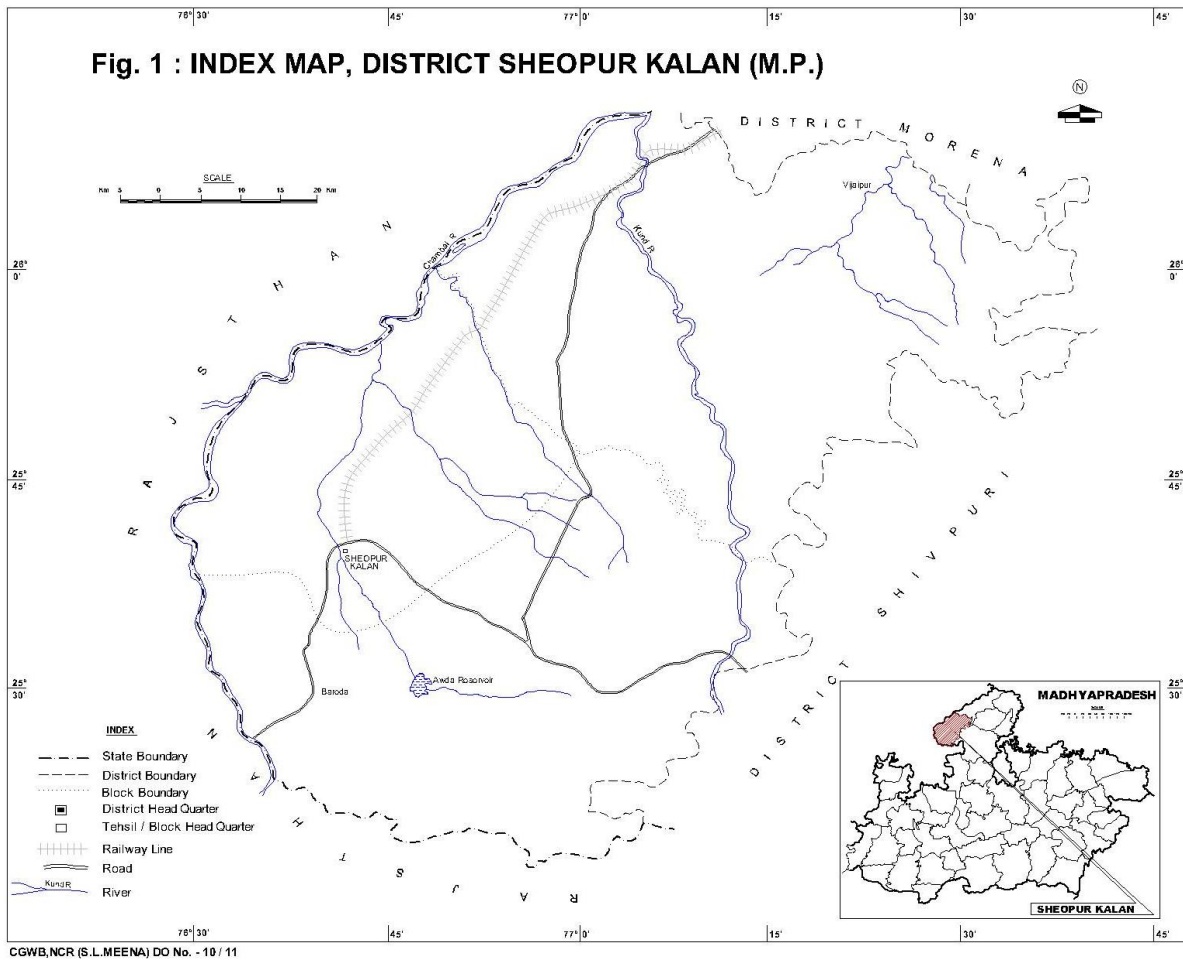
## SHEOPUR KALAN DISTRICT AT A GLANCE

S.N.	Items	Statistics
1	<b>General Information</b>	
	i) Geographical Area	6666 Sq. Km
	ii) Administrative Division Number of Tehsil Number of Panchayat/ Villages	3/3 (Vijaypur, Sheopur & Karahal) 219/533
	iii) Population (Census 2011)	6,87,861
	iv) Normal Rainfall	944 mm
2.	<b>Geomorphology</b>	
	1. Major Physiographic Units	Hilly, Valley fills
	2. Major Drainage	Chambal, Parvati, Kunnu, Sip nadi & Kadwal Nadi
	3. R.L. (amsl)	150 to 300 m
3.	<b>Land use</b>	
	a) Forest Area	2,922 Sq. Km
	b) Net area sown	1575 Sq. Km
	c) Cultivable area	1575 Sq. Km
4.	<b>Major Soil Types</b>	
	Soil Types-	Alluvial soil and soil formed by erosion from Vindhyan sand stone/ shale
5.	<b>Principal Crops (2012)</b>	
	Principal Crops-	Wheat, Paddy, Gram, Jawar, Bajra, Tuar and Udad etc.
6.	<b>Irrigation by different Sources</b>	
	<b>Structures</b>	<b>Numbers      Area (Sq. Km)</b>
	Dug Wells	3155      96
	Tube wells/Bore wells	8345      358
	Tanks/Ponds	12      11
	Canals	2      605
	Lift Irrigation Schemes	11512      46.5
	Net Irrigation Area	-      1131
	Gross Irrigated Area	-      1178
	7.	<b>Number of Ground Water Monitoring Wells of CGWB (As on 31.03.2013)</b>
Number of Dug Wells		<b>18</b>
Number of Piezometers		<b>02</b>
8.	<b>Predominant Geological Formations</b>	
9.	<b>Hydrogeology</b>	
	Major Water Bearing Formation	Alluvium & fractured/jointed sand stone
	Pre monsoon DTW level during 2012	3.9 - 33m
	Post monsoon DTW level during 2012	0.55 to 15.55m
	Long term water level trend in 10 years (2003-2012)	0.01 to 0.25m/year -Falling Trend (Pre-monsoon)

10.	<b>Ground Water Exploration by CGWB (As on 31.03.2013)</b>	
	No. of EW, OW, Pz, SH wells drilled through Out-sourcing) Depth range Discharge Range SWL Range	EW-10, PZ- 03 = 13 105.71m to 200m 0.50 to 14 lps 3.86 mbgl to 22.07 mbgl
11	<b>Ground Water Quality</b>	EC: 475 – 5620 mmhos/cm at 25° C Nitrate: 3.4 – 267 mg/l Fluoride: 0.08 – 1.7 mg/l
12	<b>Dynamic Ground Water Resources (2009)</b>	
	Net Ground Water Availability Gross Annual Ground Water Draft Projected demand for domestic/ industrial uses upto next 25 years Stage of Ground Water Development	<b>39679</b> ham <b>14509</b> ham  <b>1740</b> ham <b>37%</b>
13	<b>Efforts of Artificial Recharge and Rain Water Harvesting</b>	
	Projects completed by CGWB	Nil
	Projects under Technical guidance of CGWB	Nil
14	<b>Ground Water Control and Regulation</b>	
	No. of Over- exploited blocks	Nil
	No. of Critical blocks	Nil
	No. of Notified blocks	Nil

## 1.0 INTRODUCTION

Sheopur Kalan is a newly formed district situated in the North Western corner of Madhya Pradesh. It came into existence by reorganization of Morena District. The Sheopur Kalan district is bordered by Rajasthan on the west and Uttar Pradesh on the north. The adjacent districts are Morena, Gwalior and Bhind in the east and Shivpuri in the south. The district lies between North Longitude  $76^{\circ}30'$  to  $77^{\circ}40'$  and east latitude  $25^{\circ}15'$  to  $26^{\circ}15'$  falling in survey of India toposheet No's 54 C/10, 11, 14, 9, 13, 54 F/4 & 8 and 54 G/2, 3 & 9. Major Tourist attraction is Palpur (Kuno) wild life sanctuary. The well known Kakita reservoir is located in the district.



The area of the district is 6666.00 sq kms and it has been divided into 3 tehsils and 3 blocks. Total population of the district as per 2011 census is 6,87,861.

Table: Administrative Division, Sheopur Kalan District Madhya Pradesh.

S.No.	Block	Area (Km <sup>2</sup> )	No. of Villages	No. of Gram Panchayat
1.	Vijaipur	2893	182	77
2.	Sheopur	1426	249	94
3.	Karahel	2347	118	48

**Drainage :**

The Chambal & its tributaries forms the major drainage pattern. The Chambal river flows along the northern periphery of the district whereas the Parbati, the biggest tributary of Chambal forms the western boundary of the district. The length of the Chambal river is about 250 km. All other rivers which are tributaries of the Chambal are generally flowing from south to north. Other major tributary is Kunnu, Sip Nadi & Kadwal Nadi.

**Springs :**

There are numerous springs in the hilly areas of Sheopur-Kalan district. Most of the springs are located in difficult terrain and are unapproachable or ooze out in Nala beds and as such their discharge could not be measured.

**CGWB Activities**

Systematic hydrological surveys were carried out in parts of Sheopur-Kalan district during the year 1987-88 by Sh. A.K. Jain and Sh. Babu Nair and M. Muthukannan, Jr. Hydrogeologist.

Ground water exploration through out sourcing under accelerated exploratory drilling programme was carried out in the year 2001-02. No mass awareness or ground water management training programme had been organized in Sheopur-Kalan district. Short term water supply irrigation system was also carried out in Wild life sanctuary by geophysical surveys.

## 2.0 Rainfall & Climate

The climate of Sheopur- Kalan District, M.P. is characterized by a hot summer and general dryness except during the south – west monsoon season. The year may be divided into four seasons. The cold season, December to February is followed by the hot season from march to about the middle of June. The period from middle of June to Sept. is the south west monsoon season. October and November forms the post-monsoon or transition period.

The normal annual rainfall of the district is 944.0mm. The district receives maximum rainfall during south-west monsoon period i.e. June to Sept. About 92.1% of the rainfall received during monsoon period. Only 7.9% of the annual rainfall takes place between October to may period. Thus surplus water for ground water recharge is available only during the monsoon period.

The normal maximum temperature recorded during the month of may in 42<sup>0</sup>C and minimum during January is 7.4<sup>0</sup>C. The normal annual means of maximum and minimum temperature of Sheopur- Kalan district is 33<sup>0</sup>C & 18<sup>0</sup>C respectively.

The wind velocity is higher during pre-Manson period as compared to post monsoon period. The max. wind velocity (11.3 Km/hr) observed during the month of June and minimum 4.30 Km/hr. during December. The average normal annual wind velocity of Sheopur-Kalan is 6.9 Km/hr.

### **3.0 Geomorphology and Soil Types**

#### **3.1 Geomorphology**

The southern hilly and upland area constituting Vindhyan sandstone, shales and limestone occupies 6640 Sq km are of the district. The maximum elevation is 456m above MSL and the surface gradient is generally from South to North.

#### **3.2 Soils**

Mainly two types of soils are found in the area namely alluvial soil & soil formed from erosion/ degradation of Vindhyan sandstone/shale/limestone found near the foot hills of high hilly area/ forested area.

### **4.0 Ground Water Scenario**

#### **4.1 Hydrogeology**

The major geological formation in the district is upper Vindhyan which are overlain by Alluvial deposits belonging to Pleistocene to recent age. Occurrence & movement of ground water is mainly controlled by secondary porosity through joints & fractures. Ground water in general occurs under unconfined to semi-confined conditions. The occurrence and movement of ground water in different geological formations is described below -

#### **Vindhyan Formation**

The sandstones are hard compact with siliceous matrix and as such are completely devoid of primary porosity and permeability. But whenever they are jointed and weathered, secondary porosity and permeability are developed in them and such areas are water bearing.

The water bearing capacity largely depends upon the intensity of jointing and degree & thickness of weathering which varies from 2 to 4m in thickness.

The shales are fine grained and compact in nature. These are porous but not permeable. The water bearing capacity in shale depends upon degree of weathering and jointing along and across the bedding planes. In general these shale are not rich in ground water potential.

The limestone generally are compact and massive and occurs at the hill top and as such do not possess water bearing capacity. In Vindhyan rock, ground water occurs under water table condition.

#### **Alluvium**

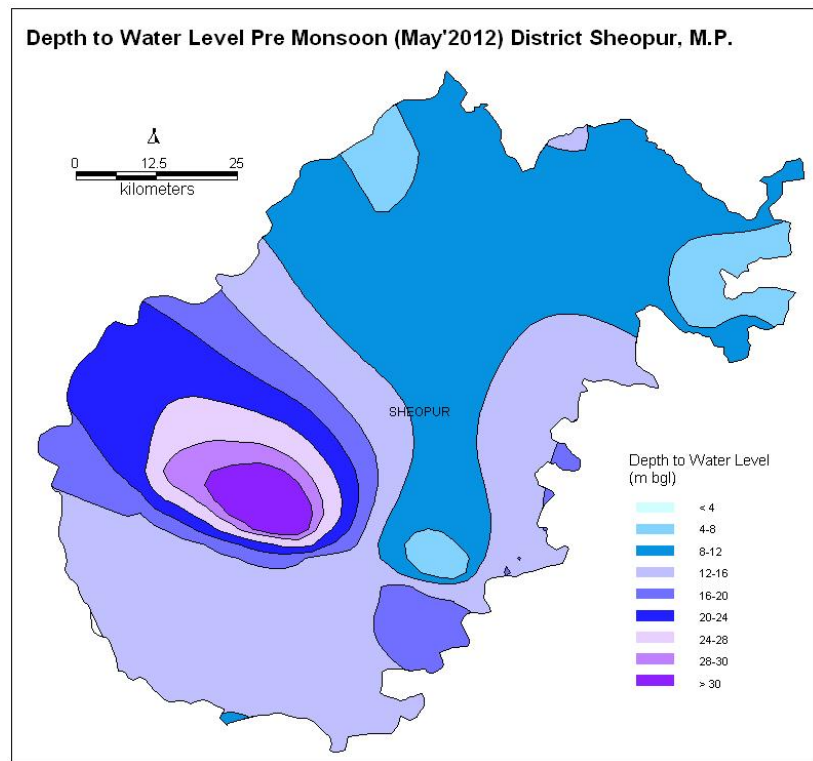
The alluvium consisting of clay and silt with intercalated bands of sand, gravel & pebbles and having vary good water bearing capacities. The thickness of these layers ranges from half a meter to more than a meter. The thickness of the alluvium deposits is more towards the Northern periphery of the district. In alluvium, ground water is found under phreatic as well as semi-confined to confined conditions.

### Depth to Water level

Central Ground Water Board has been carrying out water level monitoring in the district in these monitoring wells are being monitored four times in year during the month of January, May, August & November. To study the ground water regime of the area, pre-monsoon & post-monsoon depth to water level maps of the district has been prepared. These are 18 NHS & 2 peizometers in the district are being monitored.

#### Pre-monsoon (May 2012)

Depth to water level during pre-monsoon period ranges from 3.9m to 33m. In general, water level in major part of the district ranges between 10 & 20mbgl except in some parts where it ranges between 5-10 mbgl.



#### Post-monsoon (November 2012)

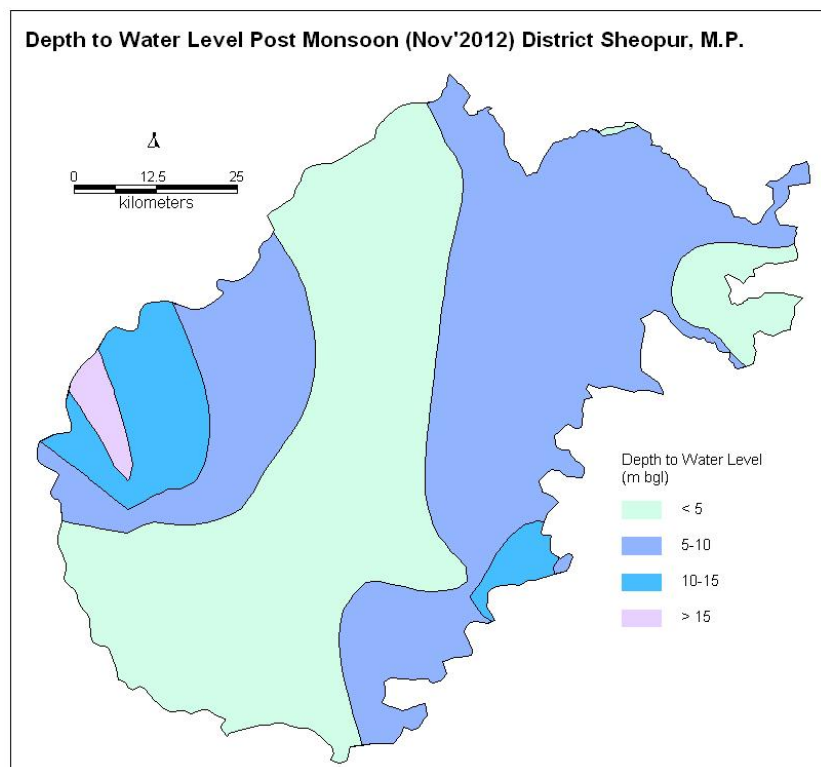
During post-monsoon period, depth to water level varies between 0.55 & 15.55mbgl.

#### Long Term Water level trends in last 10 years (2003-2012)

The water level trend indicates that during pre-monsoon period, there is a falling trend ranging between 0.01 to 0.25 m/yr.

#### Aquifer Parameters

CGWB had drilled 10 exploratory wells and 3 piezometers under accelerated exploratory drilling programme



during the year 2001-02 through outsourcing. Yield of tube wells ranges from 0.5 lps to 14 lps in Vindhyan S/stone and State Water level ranges from 3.68 to 22.07 msgl.

#### 4.2 Ground water Resources

Sheopur district is underlain by Vindhyan Sandstone and Alluvium. Dynamic ground water resources of the district have been estimated for base year -2008/09 on block-wise basis. Out of 666600 ha of geographical area, 5,33,480 ha (80 %) is ground water recharge worthy area and 1,33,120 ha (20 %) is hilly area. There are three number of assessment units (block) in the district which fall under non-command (87 %-Karhal) and command (13.%) sub units. All blocks of the district are categorized as safe.

**Table: Groundwater availability & stage of development (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 (11+12) (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 $\{(13/10)*100\}$ (%)	Category
Karhal	Command								
	Non-Command	8693	3526	255	3781	329	4837	43	Safe
	Block Total	<b>8693</b>	<b>3526</b>	<b>255</b>	<b>3781</b>	<b>329</b>	<b>4837</b>	<b>43</b>	<b>Safe</b>
Sheopur	Command	14257	659	239	898	252	13346	6	Safe
	Non-Command	6453	3351	289	3640	305	2797	56	Safe
	Block Total	<b>20710</b>	<b>4010</b>	<b>528</b>	<b>4538</b>	<b>558</b>	<b>16143</b>	<b>22</b>	
Vijaypur	Command	825	239	35	275	83	503	33	Safe
	Non-Command	9451	5449	467	5915	770	3231	63	Safe
	Block Total	<b>10276</b>	<b>5688</b>	<b>502</b>	<b>6190</b>	<b>853</b>	<b>3734</b>	<b>60</b>	
	<b>District Total</b>	<b>39679</b>	<b>13225</b>	<b>1285</b>	<b>14509</b>	<b>1740</b>	<b>24714</b>	<b>37</b>	

The highest stage of ground water development is computed as 60 % in Vijaipur block. The net ground water availability in the district 39,679 ham and ground water draft for all uses is 14509 ham, making stage of ground water development 37 % (19 % in 2003/04) 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 24,714ham.

#### 4.3 Ground water quality

Quality of ground water is generally low to medium saline as Electrical conductivity varies between 475  $\mu\text{S}/\text{cm}$  to 5620 $\mu\text{S}/\text{cm}$ . Constituents like chloride, fluoride, Sulphate, Calcium and magnesium are within safe limit as per BIS standards. Nitrate in the ground water varies between 3.4 to 267 mg/l. Nitrate more than 45mg/l was found in Pura, Panchol colony, Kuroh & Karhel villages. High Nitrate in the villages appears due to excessive use of fertilizers and agriculture waste. Fluoride varies from 0.08 to 1.7 mg/l. Arsenic has been detected in the district. Water samples in the district fall in  $C_1S_1$ ,  $C_2S_1$  &  $C_3S_1$  is U.S. salinity diagram. Ground water is generally safe for Irrigation.