DISTRICT GROUND WATER INFORMATION BOOKLET

SEONI DISTRICT
MADHYA PRADESH

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

2013

SEONI DISTRICT AT A GLANCE

S. N0.	ITEMS	STATISTICS
1	**GENERAL INFORMATION** 1) Geographical area 2) Administrative Divisions (As on 2013) Number of Tehsil/Blocks Number of Panchayats/Villages 3) Population (Census 2011) 4) Normal Rainfall (mm)	 **8758 Km^2** **8/8** **598/1593** **13,78,876** **1323.7 mm**
2	**GEOMORPHOLOGY** Major Physiographic Units Major Drainage	 1. Lakhanedon Plateau. 2. Upper Wainganga Valley 3. Lower Wainganga Valley 4. Sagar & Hirri River Valley 5. Southern Lower Land
3	**LAND USE (Km^2)** i) Forest land ii) Cultivable land v) Net area sown	 **3282** **4267** **3717**
4	**MAJOR SOIL TYPES**	Black Cotton soil, sandy loam. Loamy soil & moland soils.
5	**PRINCIPAL CROPS**	Soyabean, Groundnut, wheat and Rice
6	**IRRIGATION BY DIFFERENT SOURCES** Dug wells Tube wells/ Bore wells Tank/Ponds Canals Other sources Net Irrigated area	**No.** **Area (Km^2)** 24367 318 954 33 790 89 79 568 --- 132 --- 1137
7	**NUMBER OF GROUND WATER MONITORING WELLS OF CGWB (As on 31.03.2013)**	No of GWM Wells **: 39** No of Piezometers **: 04**

8	**PREDOMINANT GEOLOGICAL FORMATIONS**	Alluvium, Deccan Trap, Basalt Granite, Migmatite.
9	**HYDROGEOLOGY** Major Water bearing Formation Pre-Monsoon depth to water level (2012) Post-Monsoon depth to water level (2012) Long-term water level trend in 10 years.(2010-2010)	 Weathered/Fractured Basalt Weathered/Fractured Granite **2.32 mbgl-26.56 mbgl** **0.90 mbgl-17.00 mbgl** Pre monsoon Fall 0.04-.12 Rise -0.08-.12
10	**GROUND WATER EXPLORATION BY CGWB**	**NIL**
11	**GROUND WATER QUALITY** Presence of Chemical constituents more than permissible limits (e.g. Nitrate, EC, F, AS, Fe)	 EC- 150-1358, Nitrate- 7-143, Fluoride - ..01-1.45 in phreatic aquifer
12	**DYNAMIC GROUND WATER RESOURCES (2009)** Net Ground Water Availability Existing Gross Ground Water Draft Projected Demand for Domestic and Industrial Uses upto 25 years Stage of Ground Water Development	 **79239 ham** **20456 ham** **4328 ham** **26 (%)**
13	**EFFORTS OF ARTIFICIAL RECHARGE &RAIN WATER HARVESTING BY CGWB**	-
14	**AWARENESS AND TRAINING ACTIVITY**	MAP-1
15	**GROUND WATER CONTROL AND REGULATION** Number of OE Blocks Number of Critical Blocks Number of Notified Blocks	 All blocks are under safe category

1.0 INTRODUCTION

The Seoni District came into existence in its present form on 1st November 1956. It lies in the Southern part of Madhya Pradesh state between the parallels of latitude 21°36′ to 22°57′ and 79°19′ to 80°17′ East Longitude falling in Survey of India toposheets Nos. 55N, 0 and 64B. It is bounded by the district Jabalpur in North, Mandla in Northeast, Balaghat in the East, Narsinghpur in Northwest, Chhindwara in West and Nagpur- Bhandana in South.

The District is divided into 08Thesils and 08 Blocks. There are 1593 Villages and 08 Towns in the District. (Table-1).

Table – 1: Administrative Divisions, District SEONI, (M.P).

S.No.	Tehsil	Area Sq.Km
1.	Seoni	1363
2.	Kurai	1783
3.	Lakhnadon	1704
4.	Ghansor	963
5.	Keolari	827
6.	Barghat	720
7.	Chhapara	731
8.	Dhanora	667

SOILS

The district is broadly covered by four types of soils. The Keolari block and Northern part of Baighat block covered by Black cotton soils. The Sandy loam is found in Barghat area. The Kurai and southern part of the district is covered by loamy soil, while the Morand soils are developed in central part of the district.

DRAINAGE

Most part of the drainage is controlled by the Godavari System. While the northern part of the district is controlled by the Narmada system. The northern area is drained by the rivers Sher, Kalon and Kanera while the Central and Southern part is drained by the rivers Wainganga, Bijna, Hirri, Bawa, Pench and Bawanthari. The pattern of drainage on the whole is dendritic.

IRRIGATION

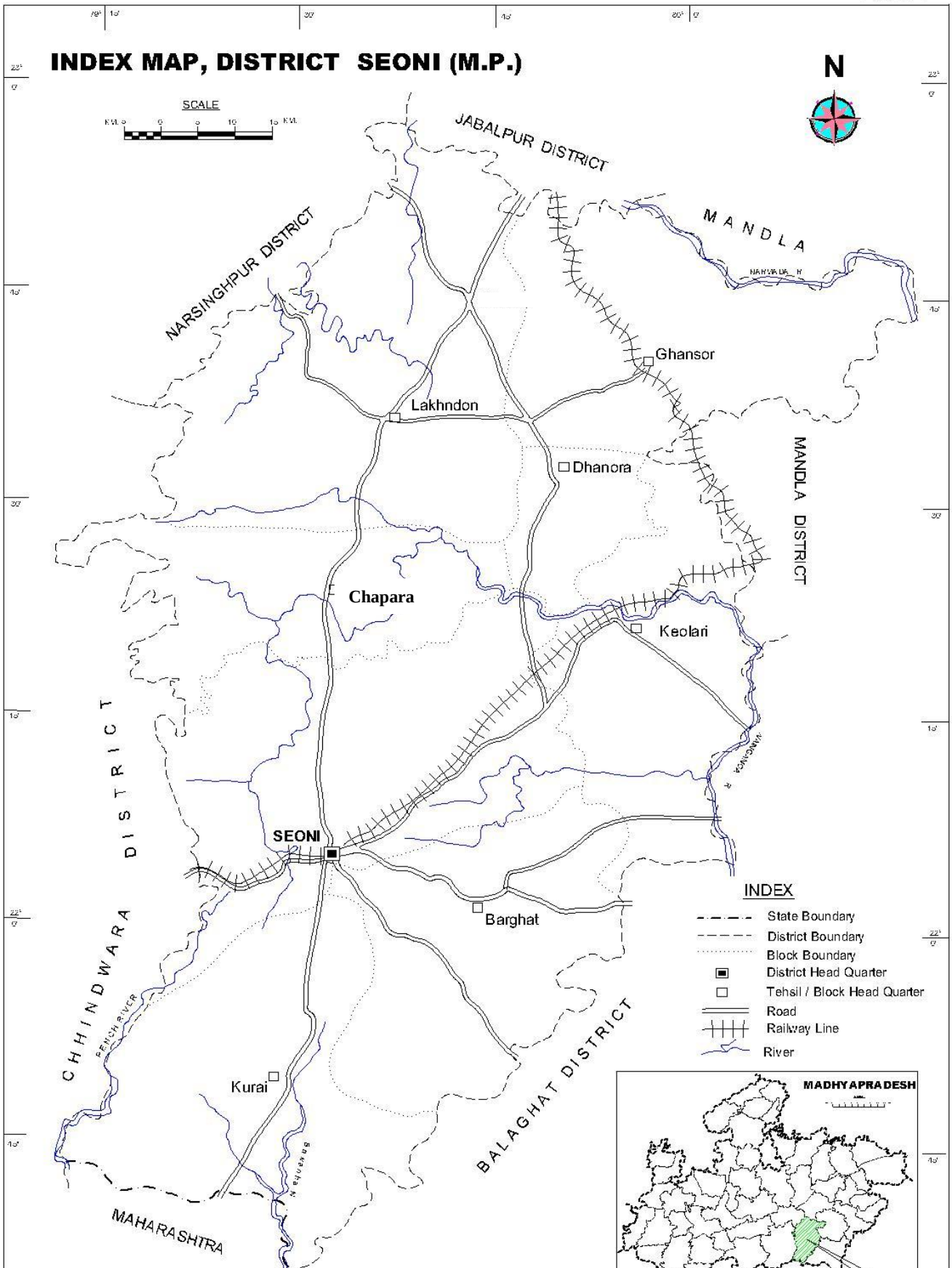
The main source of irrigation in the district are canals and dug wells while the tube wells and ponds contributes about 10%. Table-2

Table-2: Irrigation and net irrigated area. (SqKms).

Canals		T/W		D/W		Ponds	
Nos.	Irrigated area	Nos.	Area	Nos.	Area	Nos.	Area

79	586	954	33	24367	318	790	71.6089

Palte No - I



CROPPING PATTERN

The principal crops grown in the district are Rice, Wheat, Soya bean, Gram and Kondo.

Table-3 : Principal Crops & Area Sown in Seoni district.

SEONI	2008-09 (Area Sq. Kms)	000 Ton
Rice	1204	126.8
Kondokutiki	160	4.0
Wheat	-	95.3
maize	118	14.4
Soya bean	1107	98.1

CGWB ACTIVITIES

The area covered under systematic hydrogeological surveys in different parts and span of time from 1979 to 1986 by the Central Ground Water Board, NCR Bhopal (M.P).

The area was covered under Ground Water Management studies in the year 2003-04 (RHS) by S/Shri.A.K. Jain, Scientist 'B', D.K. Rai, Scientist 'B' and S.K. Shrivastava, AHG. The Jal-mass on 29th August 2003 was organised by CGWB at Seoni with special emphasis on Fluorosis and Fluoride effected areas.

2. 0 CLIMATE AND RAINFALL

The Climate of Seoni District, M.P. characterized by a hot summer and general dryness except during the southwest monsoon season. The year may 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 the middle of June to September is the southwest monsoon. October and November form the post monsoon or transition period.

The normal annual rainfall of Seoni district is 1323.7 mm. Seoni District received maximum rainfall received during southwest monsoon period i.e. June to September. About 86.3% of the annual rainfall received during monsoon season. Only 13.7% of the annual rainfall takes place between October to May period. Thus, surplus water for ground water recharge is available only during the southwest monsoon period.

The maximum rainfall received at Roomal i.e. 1600.1 mm and minimum at Lakhnandan i.e. 1289.9 mm.

The normal maximum temperature received during the month of May is 40.3° C and minimum during the month of December is 11.3°C. The normal annual means maximum and minimum temperatures of Seoni district are 31.3°C & 18.9°C respectively.

During the southwest monsoon season the relative humidity generally exceeds 88% (August month). In the rest of the year it is drier. The driest part of the year is the summer season, when relative humidity is less 34%. May is the driest month of the year.

The wind velocity is higher during the pre monsoon period as compared to post monsoon period. The maximum wind velocity 7.7 km/hr observed during the month of June and minimum 3.9 km/hr during the month of December.

The average normal annual wind velocity of Seoni district is 5.9 km/hr. Normal climatologically parameter of Seoni district is given in Table-4.

Table-4 : NORMAL CLIMATOLOGICAL PARAMETERS FOR SEONI DISTRICT

S.No.	Parameter	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Annual
1	Maximum Temp (°C)	26.1	29.3	33.8	38.0	40.3	35.9	29.5	28.5	29.8	30.6	28.3	26.0	31.3
2	Minimum Temp (°C)	11.4	13.8	18.0	22.4	25.5	24.5	22.6	22.2	21.7	18.8	14.1	11.3	18.9
3	Relative Humidity (%)	62	53	41	35	34	65	87	88	81	65	57	61	61
4	Wind Velocity (Km/Hr)	5.1	5.8	5.8	6.3	6.9	7.7	7.2	6.7	6.0	5.2	4.3	3.9	5.9
5	Rainfall (m.m.)	17.1	18.2	25.6	12.3	20.9	186.6	393.6	370.7	191.0	50.9	19.8	17.0	1329.8 1323.7

3.0 GEOMORPHOLOGY AND SOIL TYPES

The area has undulating topography comprising hills of Satpura plateau from South to North. While the North Eastern part covered by Deccan plateau and falls at the altitude in between 325 to 740 m above MSL. The general trend of hills in the district is North-south with some isolated hillocks. Physiographically the area is divided into five parts.

1. Lakhnadon Plateau.
2. Upper Wainganga Valley.
3. Lower Wainganga Valley.
4. Sagar and Hirri River Valley.
5. Southern Lower Land.

The area is undulating plane, hilly and forested. The area North of Barghat is plane and Rice producing belt has covered by Bori Canal system.

The Keolari block has plateau like appearance and covered by good network of canals under Sanjay Sarovar Pariyojna.

The Wainganga is the main river flowing in the area having perennial flow. The other rivers are Thawari, Hiui, Sagar, Thal and Shadu and Pench.

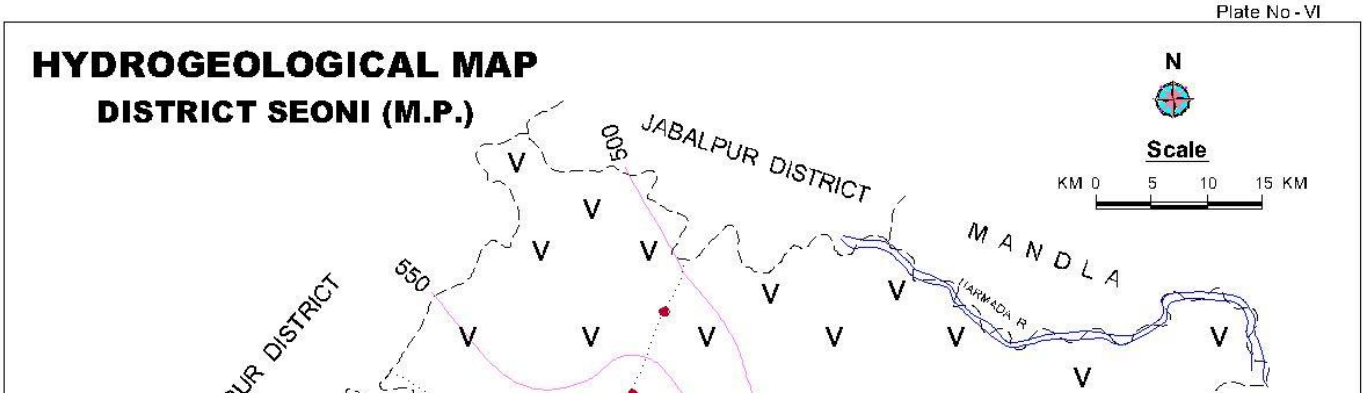
The black cotton soil, sandy loam, loams soil and moland soils are main soils in the area.

4.0 GROUND WATER SCENARIO

4.1 HYDROGEOLOGY

The occurrence and movement of ground water in hard rock areas is widely controlled by the secondary priority present in them like joints, fractures, weathering and linearity etc. The district is mainly occupied by Archean rocks and Basaltic lava flows. The weathering of Archean rocks ranges from 0.50 mbgl to 10.00 mbgl. The weaker zones in Deccan traps are also developed at the contacts of two consecutive lava flows, which facilitate downward movement of ground water. In Vesicular basalts the voids provide more space for the accumulation of ground water.

The Laterite is porous enough in nature and absorbs rain water very fast and looses it also. The water bearing properties of these formations varied widely depending upon their lithological properties and structural control.



WATER BEARING FORMATIONS

The Ground Water occurs under water table and semi confined to confined conditions in all formations of the area. Topographic depressions, nature and extent of weathering, presence of joints and fractures play an important role in the occurrence and movement of ground water.

The area occupied by Archean rocks is mostly undulating. The ground water in these rocks occurs under unconfined conditions, which is widely controlled by the weathering of the rocks, presence of joints, fracture and lineament in them.

The area occupied by Deccan trappean rocks, where ground water occurs under phreatic conditions in the weaker zones of weathered, vesicular, fractured and jointed parts of the flows. The sheet joints, basal parts of flows and inter-connection of joints and fractures controls the horizontal as well as vertical movement of ground water. The plateau like topography plays an important role in occurrence and movement of ground water.

Under semi-confined conditions the ground water occurs at the contacts of two flows and at the contact of trappean rocks with Archean basement.

The Laterites are highly porous in nature and allows fast movement of ground water as well.

AQUIFER GEOMETRY

The Ground Water occurs in shallow aquifers under unconfined to semi-confined conditions in Deccan trap areas whereas in granitic and Archean formations it is restricted to unconfined conditions.

The Ground Water in deeper levels occurs under semi-confined to confined conditions. The discharge of tube wells varies from 0.5 lps to 12 lps. The extent of aquifer restricted to their regional extends. The recharge of the deeper aquifer takes place through deep joints, fractures and contact zones, whereas the shallow aquifer recharges through weathered portion of the formation. The wells yielding in range from 3 m^3/day to 182 m^3/day.

OCCURRENCE, MOVEMENT AND DISTRIBUTION OF GROUND WATER

The Ground Water occurs under water table conditions in the area. Topographic depressions, nature and extent of weathering, presence of fractures and joints play an important role in the occurrence and movement of ground Water in Archean formations, whereas in trappean rocks the thickness and percentage of vesicularity present in them play an important role in the occurrence of ground water.

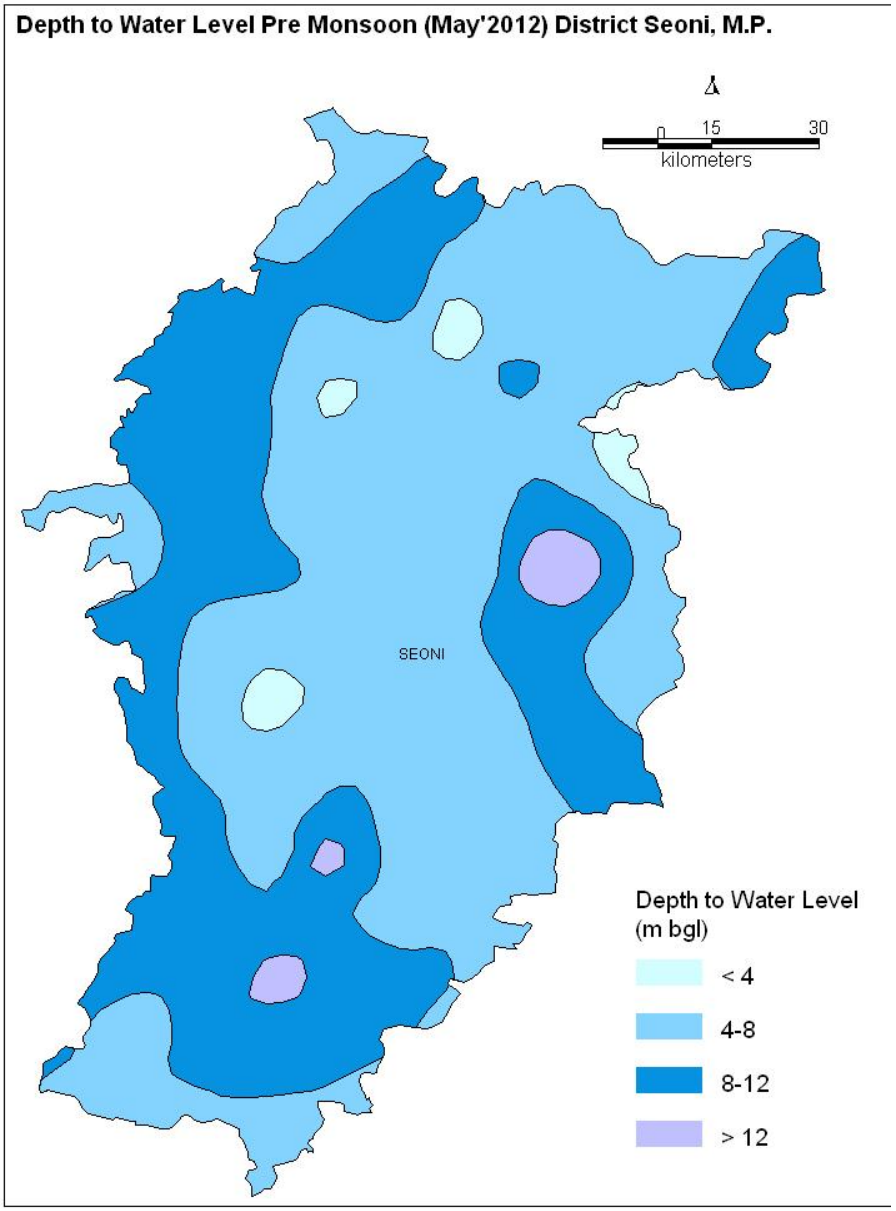
Water levels

Ground water levels form a very important parameter of the ground water system, as these are its physical reflection. The groundwater balance expresses itself in the change in water levels; hence a continuous record is important and useful. CGWB has 39 National Hydrograph Monitoring Wells in Datia district.

Pre-monsoon (May 2012)

During May 2012, pre-monsoon the depth to water level in the district ranges between 2.32to 26.52 mbgl (Fig.3).. The water level is between 4-8 m is recoded in the entire district. The water level is between 8-12 m is recoded in the western part of the district district. Deeper water level over 12 mbgl is recorded is recoded in isolated patches. Deeper water level over 12 mbgl is recorded is recoded in isolated patches.

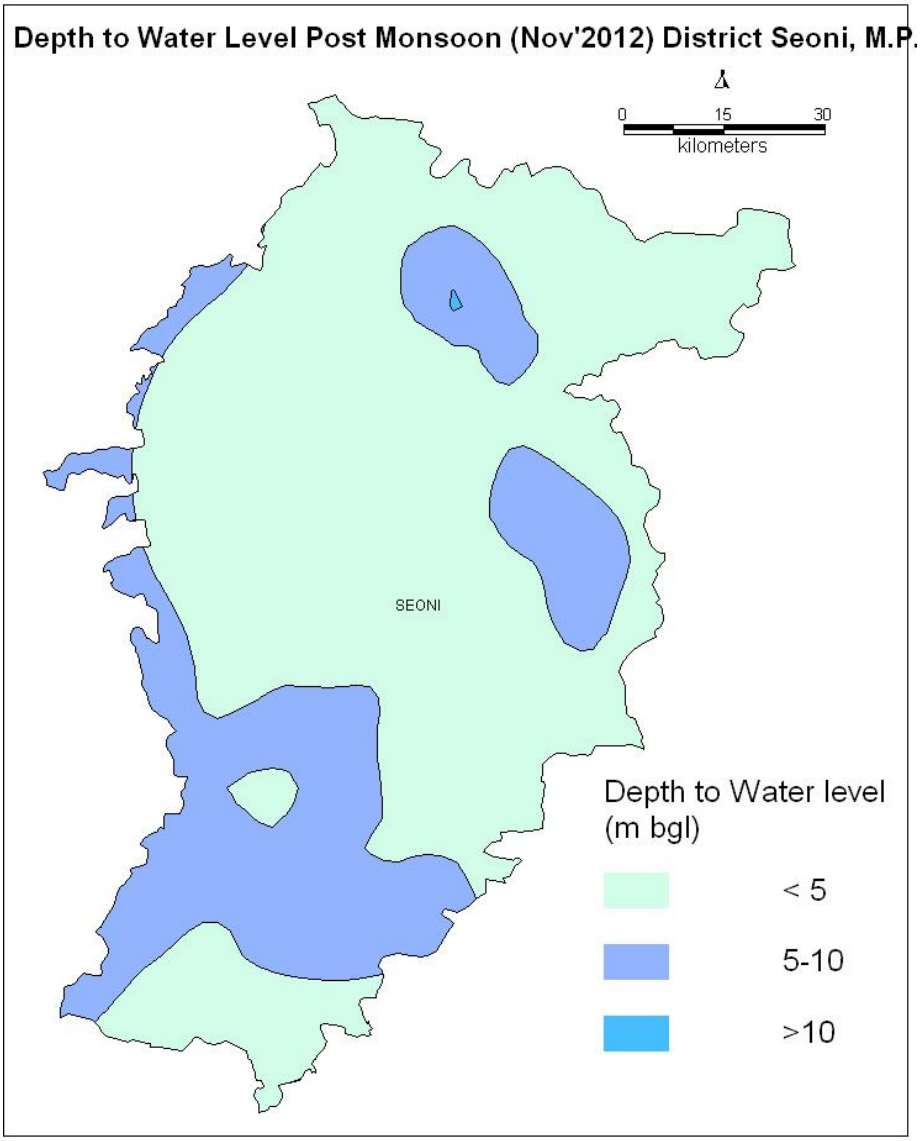
Fig.3



Post-monsoon (November 2012)

The behaviour of post monsoon water level represents the same as pre-monsoon water level (Fig.4) During post-monsoon period of, November 2012, the water levels vary from .90 to 17.0 mbgl.

Fig.4



Decadal Average Water Level (May 2001-2010)

There are 9 no of national hydrograph monitoring wells of CGWB falling in the district,. Visualizing trend analysis of all NHMW, it is observed that, the water level trends are falling in all over the district This is the average of water levels for the last 39 years. This gives a more realistic picture as the water level of any particular year depends on rainfall and draft and may vary widely.

The long-term water level trend shows declining of 0.04-0.12 m/yr during pre –monsoon. The long-term water level trend shows rising of 0.08-0.2 m/yr during pre –monsoon.

AQUIFER AND GROUND WATER REGIME

The North-Central and Western part of the district is occupied by a good shallow aquifer. The topography of the area and nature of formation play an important role in the occurrence of ground water in the area.

The Archaean rocks include Granitic Genesis Amphibolites and schists having moderate occurrence of ground water at deeper levels.

The Laterite and alluvial deposits are restricted around Seoni town forms good phreatic aquifers.

4.2 GROUND WATER RESOURCES (2009)

Seoni district is underlain by Deccan trap basalts and Archaeans granite-gneisses. Dynamic ground water resources of the district have been estimated for base year -2008/09 on block-wise basis (Table 5). There are eight assessment units (block) in the district which fall under non command (95 %) and command (5 % Barghat, Dhanora, Keolari and Seoni) sub units. All the blocks of the district are categorized as safe blocks. Seoni is with highest stage of ground water development is computed as 46 %. The net ground water availability in the district is 79239 ham and ground water draft for all uses is 20,456 ham, making stage of ground water development 26 % 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 57784 ham at 50 % stage of ground water development's safe limits in the district.

Table-5: DYNAMIC GROUND WATER RESOURCES (2009)

S. No.	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 (%)	Category
1	Barghat	Command	923	125	73	198	111	686	21	Safe
		Non-Command	6217	2095	474	2569	593	3529	41	Safe
		Block Total	**7140**	**2220**	**547**	**2767**	**704**	**4215**	**39**	Safe
2	Chhapara	Command								
		Non-Command	6933	1910	363	2273	412	4611	33	Safe
		Block Total	**6933**	**1910**	**363**	**2273**	**412**	**4611**	**33**	Safe
3	Dhanora	Command	243	15	9	24	11	218	10	Safe
		Non-Command	4991	609	186	795	295	4088	16	Safe
		Block Total	**5234**	**624**	**195**	**819**	**305**	**4305**	**16**	Safe
4	Ghansore	Command								
		Non-Command	8545	615	387	1003	450	7479	12	Safe
		Block Total	**8545**	**615**	**387**	**1003**	**450**	**7479**	**12**	Safe
5	Keolari	Command	2102	19	117	136	186	1897	6	Safe
		Non-Command	4738	894	243	1137	385	3459	24	Safe
		Block Total	**6840**	**913**	**360**	**1274**	**571**	**5356**	**19**	Safe
6	kurai	Command								
		Non-Command	14651	2259	372	2631	427	11965	18	Safe
		Block Total	**14651**	**2259**	**372**	**2631**	**427**	**11965**	**18**	Safe
7	Lakhnadon	Command								
		Non-Command	15871	2823	519	3342	657	12391	21	Safe

		Block Total	**15871**	**2823**	**519**	**3342**	**657**	**12391**	**21**	Safe
8	Seoni	Command	1636	272	53	324	83	1280	20	Safe
		Non-Command	12389	5491	532	6023	717	6181	49	Safe
		Block Total	**14025**	**5763**	**585**	**6348**	**801**	**7461**	**45**	Safe
		District Total	**79239**	**17127**	**3329**	**20456**	**4328**	**57784**	**26**	

4.3 GROUND WATER QUALITY OF SEONI DISTRICT

Groundwater quality in Seoni district is assessed annually by CGWB on the basis of samples collected from 33 number of hydrograph stations in the district. On the basis of examination of data for the year 2012, the water quality is described as follows.

Quality of ground water for Drinking Purpose

The pH value of water samples of all the stations (ranging in between 6.98 to 8.05) did not show significant variations since all the values were of alkaline in nature and within permissible limit (6.5 to 8.5) as set by BIS (1991). The EC values were found to be in the range of 150 and 1358 μS/cm.

The concentration of NO_3^- exceeding 45 mg/l (BIS 1990) was reported in 29.03% wells and highest as 180 mg/l of Mehta village. The NO_3^- ranges between 7-147 mg/l.

The presence of fluoride in Ground Water is very important from health point of view for human consumption as in lower concentration it prevents the dental caries. However, the higher concentration of fluoride above the permissible limit of 1.5 mg/l in drinking water is harmful for human consumption. A scrutiny of data shows that only one well of **Banjal** village had 3.05 ppm fluoride greater than 1.5 ppm of BIS (1990) limit.

5.0 GROUND WATER MANAGEMENT STRATEGY

5.1 GROUND WATER DEVELOPMENT

The entire district falling under safe category of Ground water development (both command and non command area). The existing stage of Ground water development is 29% (2011). The net available ground water resources in Seoni district is 70970 ham and total draft is 20532 ham. The net annual ground water available in the district for surface irrigation is 49055 ham. The highest stage of ground water development is 555 in Seoni block and lowest 12% in Dhanora Block.

In general geology, climatologic and pedalogical parameters governs the ground water development in the district. The southern part of the district is feasible for tube wells in Archean formation while the Deccan Trap areas are feasible for dug cum bore wells.

5.2 WATER CONSERVATION AND ARTIFICIAL RECHARGE

The Water conservation and Artificial recharge to ground water has not taken up in the district on a large scale. However, during the ground water management studies in Keolari, Barghat & Kurai blocks AAP 2003-04 about 21 Nos. sites identified for Artificial recharge to ground water by CGWB.

6.0 GROUND WATER RELATED ISSUES & PROBLEMS

6.1 FLUOROSIS

In many parts of the district excess fluoride content is found in tube wells and hand pumps constructed by tapping deeper aquifers, while it is least in the shallow aquifer.

The desirable limit of fluoride is to be 0.6-1.0 mg/lit and to a maximum permissible limit of 1.5 mg/lit. The excess fluoride content in ground water causes Fluorosis in the human body.

7.0 RECOMMENDATIONS

1. The district Seoni falls under the 'Safe' category of ground water development. Only Seoni block hasground water development more than 50%. Therefore, the effect for Artificial recharge to ground water may be initiated in these blocks.

2. The ground water of shallow aquifer is potable while the deeper aquifer is affected with fluoride. Therefore, the ground water abstraction structures may be constructed by tapping shallow aquifer in the district.

3. Restricted development of mining and industry of Dolomite, Building stone, Basalt, Sand, and Wood is also recommended.

4. Activities related to tourism may be increased in Karmajhiri hill and Mongli land forest area.

5. Ground water exploration work may be taken up in fluoride affected and water scarcity areas to meet drinking water requirement and evolve aquifer parameters.