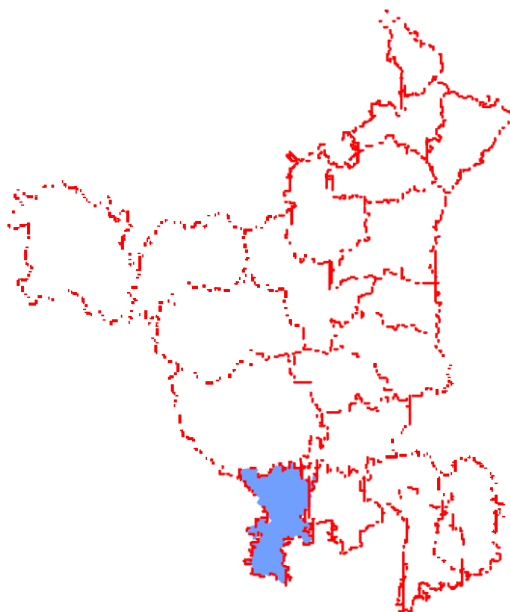




MAHENDRAGARH DISTRICT HARYANA



CENTRAL GROUND WATER BOARD
Ministry of Water Resources
Government of India
North Western Region
CHANDIGARH

2013

Contributors

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Our Vision
***“Water Security through Ground water
Management”***

GROUND WATER INFORMATION BOOKLET DISTRICT MAHENDRAGARH, HARYANA

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- 6.0 GROUND WATER RELATED ISSUES & PROBLEMS
- 7.0 RECOMMENDATIONS

MAHENDRAGARH AT A GLANCE

Sl. No	ITEMS	Statistics
1	GENERAL INFORMATION	
	i) Geographical area (sq.km)	1899 Sq. km
	ii)Administrative Divisions (as on 31.03.2011) Number of Tehsil/Block Number of Panchayat/Villages	03 (Tehsils)/08(Blocks) 370
	iii)Population (as on 2011 Census)	9,21,680
	iv) Normal Annual Rainfall (mm)	500 mm
2.	GEOMORPHOLOGY	
	Major Physiographic units	Alluvial plains
	Major Drainages	Dohan & Krishnavati rivers
3.	LANDUSE (Sq.Km)	
	a) Forest area	-
	b)Net area shown	1460 sq.km
	c) cultivable area	1500 sq. km.
4.	MAJOR SOIL TYPES	Arid soil, Blown sand & Alluvium
5.	AREA UNDER PRINCIPAL CROPS (As on 31.03.11)	-
6.	IRRIGATION BY DIFFERENT SOURCES (Areas and Numbers of Structures)	
	Dug wells	-
	Tube Wells/ Boreholes	470 sq. km.
	Tanks/Ponds	-
	Canals	20 sq km
	Other Sources	-
	Net Irrigated area	1210 sq km
	Gross irrigated area	1310 sq km
7.	NUMBERS OF GROUND WATER MONITORING WELLS OF CGWB (As on 31-3.2012) No. of Dug Wells No. of Piezometers	10 04 06
8	PREDOMINANT GEOLOGICAL FORMATIONS	Aravali range & Alluvial formation
9	HYDROGEOLOGY	
10	GROUND WATER EXPLORATION BY CGWB (as on 31-03.2007)	
	No of wells drilled (EW,OW,PZ,SH,Total)	35 (Hard rock) and 19 (Alluvium)
	Depth Range (m bgl)	50 -135 m bgl (Hard rock) 170 -235 m bgl (Alluvial)

	Discharge (liters per min.)	220-1200 lpm (Alluvium) 100-1325 lpm (Hard rock) 100-1325 lpm (Lime stone) 22-820 lpm (Quartzite)
	Storativity (S)	-
	Transmissivity (m ² /day)	150-810 m ² Day (Alluvium) 370-1685m ² /Day(Hard rock)
.11	GROUND WATER QUALITY	
	Presence of chemical constituents more than permissible limit (e.g. EC, F, As, Fe)	-
	Type of Water	
12	DYNAMIC GROUND WATER RESOURCES (As on 31.03.2008) in Ha.m.)	-
	Annual Replenish able Ground Water Resources	21435
	Net Annual Ground water Draft	22778
	Projected Allocation for Domestic and Industrial Uses up to 2025	1115 Ha.m.
	Stage of ground Water Development	103.6% (Say 104%)
13	AWARENESS AND TRAINING ACTIVITY	
	Mass Awareness Programmes Organized	one
	Water Management Training Programmes	one
14	EFFORTS OF ARTIFICIAL RECHARGE & RAINWATER HARVESTING	-
	Projects completed by CGWB	2 (Deroli Ahir and Hamidpur Bund Project)
	Projects under technical guidance of CGWB (Numbers)	-
15	GROUND WATER CONTROL AND REGULATION	
	Number of OE Blocks	03
	Number of Critical Blocks	01
	No. of Blocks notified	02
16	MAJOR GROUND WATER PROBLEMS AND ISSUES.	Ground water level decline and Quality

GROUND WATER INFORMATION BOOKLET

DISTRICT MAHENDRAGARH, HARYANA

1.0 INTRODUCTION

Mahendragarh district occupies the southern extremity of the Haryana state jointly with Rewari and Gurgaon districts of Haryana. It has a total geographical area of 1776 sq km. and falls between Latitudes 27°48'10" and 28°8'30" and Longitudes 75°54' 00" and 76°51' 30". Mahendragarh district is bounded by Bhiwani and Rohtak districts in its north, Rewari in its east and Alwar and Jhunjhunu (Rajasthan) districts in its south and west respectively. Administratively, the district is divided into two sub divisions, namely Mahendragarh and Narnaul. There are eight development blocks in the area namely Ateli, Kanina, Mahendragarh, Nangal Choudhary and Narnaul, Sihma, Nizampur and Satnali. The district is comprised of 370 villages and 5 towns with the population of 9,21,680 souls as per 2011 census.

2.0 RAINFALL AND CLIMATE

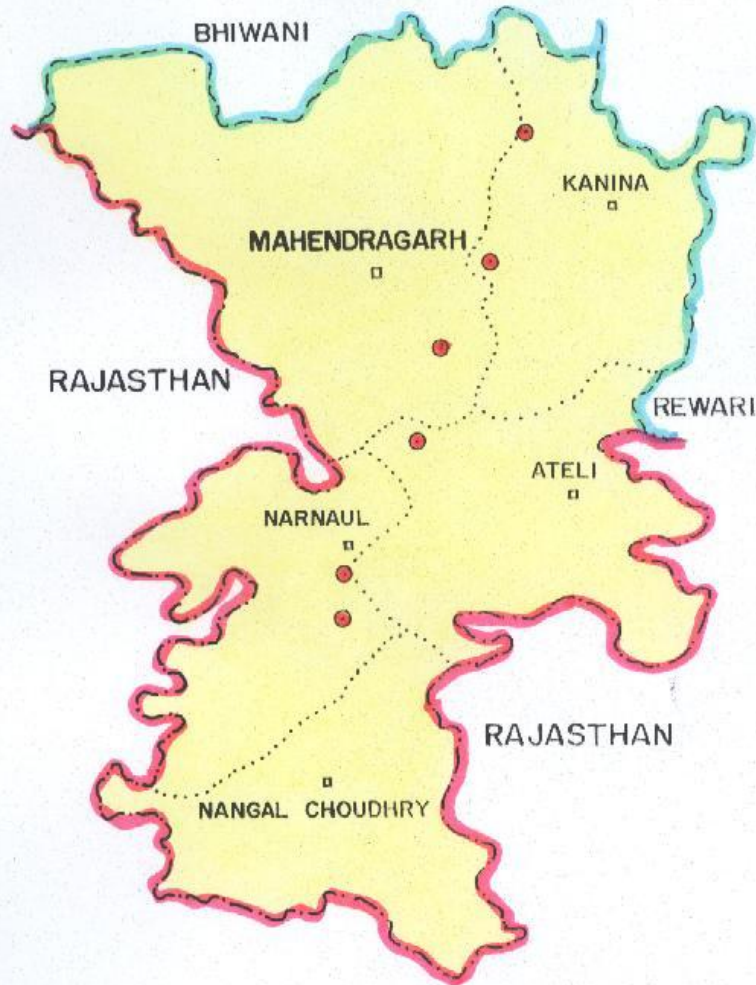
The climate of Mahendragarh district can be classified as tropical steppe, semi-arid and hot which is mainly dry with very hot summer and cold winter except during monsoon season when moist air of oceanic origin penetrates into the district. There are four seasons in a year. The hot weather season starts from mid March to last week of the June followed by the south- west monsoon which lasts up to September. The transition period from September to October forms the post-monsoon season. The winter season starts late in November and remains up to first week of March.

The normal annual rainfall of the district is 500 mm which is unevenly distributed over the area 26 days. The south west monsoon sets in from last week of June and withdraws in end of September, contributed about 84% of annual rainfall. July and August are the wettest months. Rest 16% rainfall is received during non-monsoon period in the wake of western disturbances and thunder storms. Generally rainfall in the district increases from southwest to northeast.

Normal Annual Rainfall	: 500 mm
Normal monsoon Rainfall	: 420 mm
Temperature	
Mean Maximum	: 41°C (May June)
Mean Minimum	: 5.6°C (January)
Normal Rainy days	: 26

INDEX MAP
MAHENDRAGARH DISTRICT, HARYANA

Km 10 0 10 20 Km



INDEX

- GROUND WATER MONITORING STATION
- DISTRICT HEADQUARTER
- ▣ BLOCK HEADQUARTER
- STATE BOUNDARY
- DISTRICT BOUNDARY
- BLOCK BOUNDARY

3.0 GEOMORPHOLOGY & SOIL TYPE

The area forms the part of Indo - Gangetic plains and has vast alluvial and sandy tracts. It is interspersed with strike ridges which are occasionally covered by blown sands. South western part of the district is occupied by blown sand and alluvium. The sand dunes attain heights upto 30m but on an average they attain height of about 7m with respect to surrounding.

The hill ranges are marked features of the district and are part of great Aravali chain. The Dhosi hill touches the height of 7090m amsl. The master slope of the area is north ward. The main streams of the district are Dohan & Krishnawati which flow from south to north. These streams are known to carry copious supply of water to inundate large part of the district during monsoon and remain dry for major part of the year.

Light colored arid soils are found in the major part of the district. These soils are calcareous and have lime nodules in the subsurface horizons. Most of the soils in district are medium textured. Loamy sand is the average texture in all the blocks of the district.

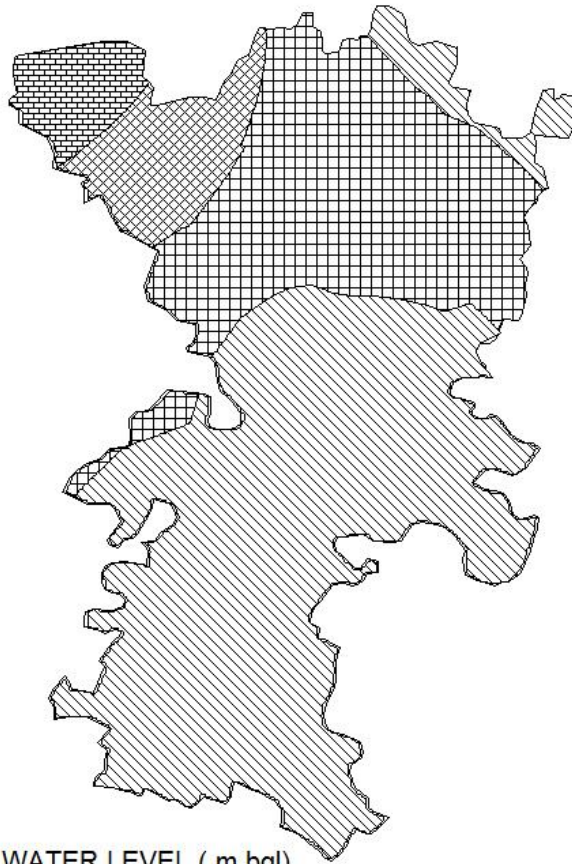
4.0 GROUND WATER SENARIO

4.1 HYDROGEOLOGY: The district is underlain by alluvium and blown sand of Recent to sub Recent age which are overlying the rocks of post Delhi and Delhi system. The alluvium in the area belongs to older alluvium stage comprising of sand, silt, clay and calcareous nodules. The alluvium is the fresh water deposit of Indo- Gangetic river system.





In alluvium the granular zones exist down to entire thickness, which is negligible near the out crop of Delhi system to about 150m in the northern part of district. The average thickness of the alluvium in the district is more than 50m. Exploratory drilling has been carried out at 19 exploratory sites in alluvial formation and 35 in Hard rock areas. In alluvial formations the successful exploratory tube well tapped aquifer zones down to the depth of 170m & 235 m yielding 220 lpm to 1200 lpm for 6 to 23m drawdown.

The transmissivity value ranges from 150 to 810 m^2/day in alluvial formations and between 370 and 1685 m^2/day in hard rocks. The lateral hydraulic conductivity ranges from 1.5 to 20 m/ day. In hard rock area the depth of bore holes ranges between 50 to 135 m and the water bearing zones in weathered fractured quartzite and limestone were tapped. The discharge of tube wells varies between 100 to 1325 lpm with 3 to 15m draw down in lime stone aquifers. The discharge of tube wells constructed in quartzite formation ranges between 22 and 820 lpm for reasonable drawdowns.

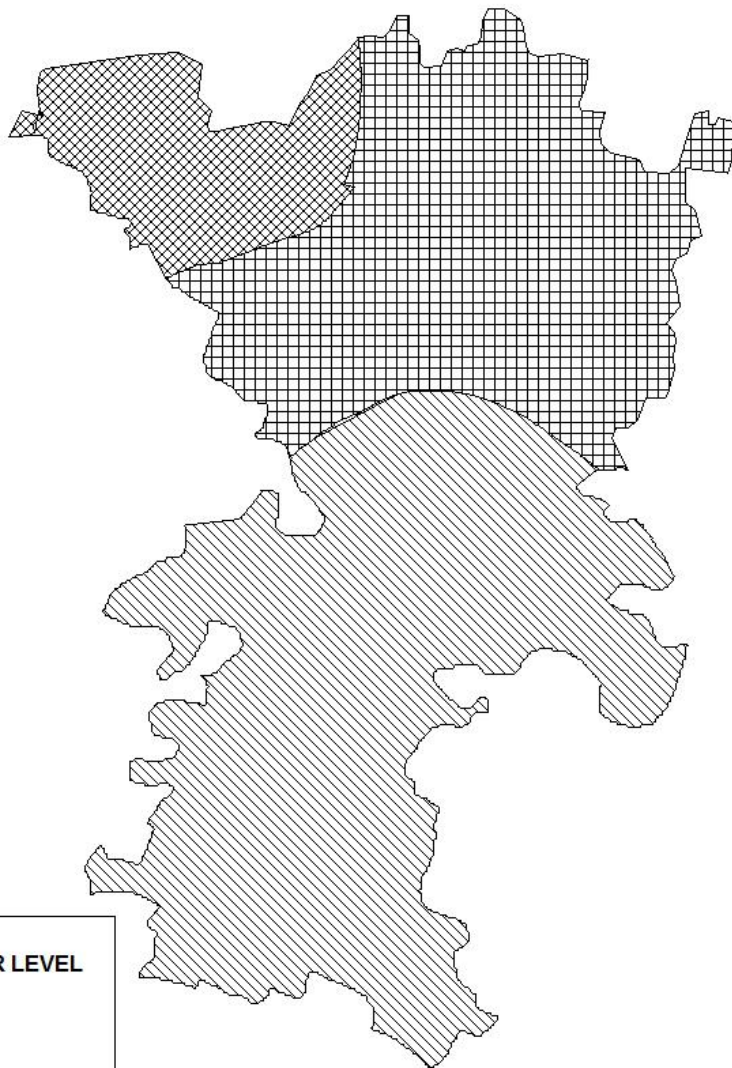
DISTRICT MAHENDRAGARH, HARYANA
DEPTH TO WATER LEVEL
(MAY-2012)



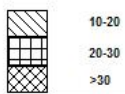
LEGEND
DEPTH TO WATER LEVEL (m.bgl)

	10.0 to 20.0		30.0 to 40.0
	20.0 to 30.0		> 40.0

DISTRICT MAHENDRAGARH
DEPTH TO WATER LEVEL
NOV.2012



DEPTH TO WATER LEVEL
(m.bgl)



4.2 GROUND WATER RESOURCES: The block wise ground water resource potential in the district has been assessed as per GEC 97. The stage of ground water development in the district ranges between 49% (block –Narnaul) to 178% (block –Kanina). The total replenishable ground water resource in the district is 21435 Ham. The net ground water draft is 22778 Ha.m., thus over exploiting 1343 Ha.m of ground water. The stage of ground water development in the district is 104%. Ground water resource and development potential of Mahendragarh district is given as under:

GROUND WATER RESOURCE AND DEVELOPMENT POTENTIAL
(As on 31st March, 2008 in HAM)

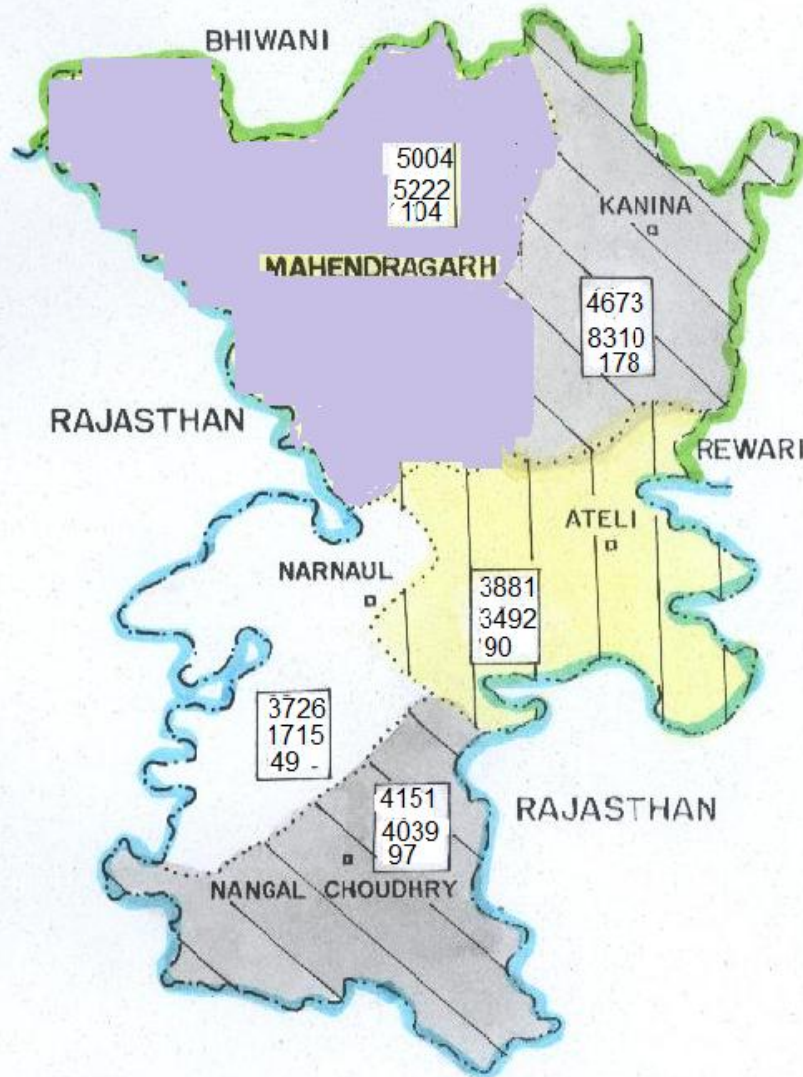
Assessment unit/ block	Net ground water available	Existing ground water draft for irrigation	Existing GW draft for domestic & industrial supply	Existing GW draft for all users	Allocation for domestic and industrial supply next 25 yrs	Net GW draft available for future irrigation development	Stage of GW development (%)
Ateli	3881	3422	70	3492	90	369	90
Narnaul	3726	1694	116	1715	108	1924	49
Kanina	4673	8266	44	8310	44	-3636	178
Mahendragarh	5004	5140	82	5222	82	-219	104
Nangal Choudhary	4151	3931	108	4039	791	-571	97
TOTAL	21435	22453	420	22778	1115	-2133	103.60 Say 104

4.3 Ground Water Quality: The shallow ground water of the district is alkaline in nature (pH 7.46 to 8.40) and is fresh to highly saline. Among anions, bicarbonate as well as chloride dominates in 40% samples and in the remaining samples, none of the anion dominates. Among cations, sodium dominates in about 60% of the samples whereas calcium and magnesium dominate in the remaining 40% samples.

Comparing the concentration values of major ions with the recommended desirable and permissible concentration limits for drinking waters (Bureau of Indian Standards) it is found that ground waters are not suitable for drinking purposes either due to high nitrate or due to high fluoride which exceeds the recommended limit of 45mg/l and 1.5 mg/l, respectively. High nitrate has been found at Buchawas (250mg/l), Kheri (210mg/l) and Narnaul (1270mg/l).

STAGE OF GROUND WATER DEVELOPMENT MAHENDRAGARH DISTRICT, HARYANA

Km 0 10 20 Km



INDEX

21435	NET GROUND WATER AVAILABILITY
22778	EXISTING GROUND WATER DRAFT
104 %	STAGE OF GROUND WATER DEVELOPMENT
	SAFE
	CRITICAL
	OVER EXPLOITED

Salinity (EC), Sodium Adsorption Ratio (SAR) and Residual Sodium Carbonate (RSC) are the parameters for ascertaining the suitability of ground water for irrigational uses. These parameters range from 608 to 6330 μ S/cm at 25⁰C, 1.78 to 11.18 and – 23.30 to 9.46 mill equivalents respectively. From RSC values it is concluded that groundwater of the district is, by and large, suitable for irrigation. Plot of USSL diagram (based on EC and SAR) used for the classification of irrigation waters indicated that ground waters fall under classes C₂S₁, C₃S₂, C₃S₃, C₄S₁ and C₄S₄. Waters belonging to classes C₂S₁ and C₃S₂ are suitable for customary irrigation for semi-salt tolerant crops like wheat, rice, maize, gram etc without any fear of salinity hazards to the crops. However, waters falling under class C₃S₃ and C₄S₄ are likely to cause both sodium and salinity hazards and those falling under class C₄S₁ may cause salinity hazards. It would be better if such waters are used for irrigating salt tolerant crops along with appropriate amount of gypsum on well drained soils.

5.0 GROUND WATER MANAGEMENT STRATEGY

The water supply of the district is mainly based on ground water through tube wells. The water supply of the villages is met out through installation of hand pumps and construction of and dug wells by the local villagers.

Water for irrigation in the district is also based mainly on ground water. Out of total irrigated area of 1210 sq km an area of 1190 sq km is based on ground water irrigation. Only in 20 sq km irrigation is based on canals. Ground water is being extracted through large no of tube wells and dug wells in the district.

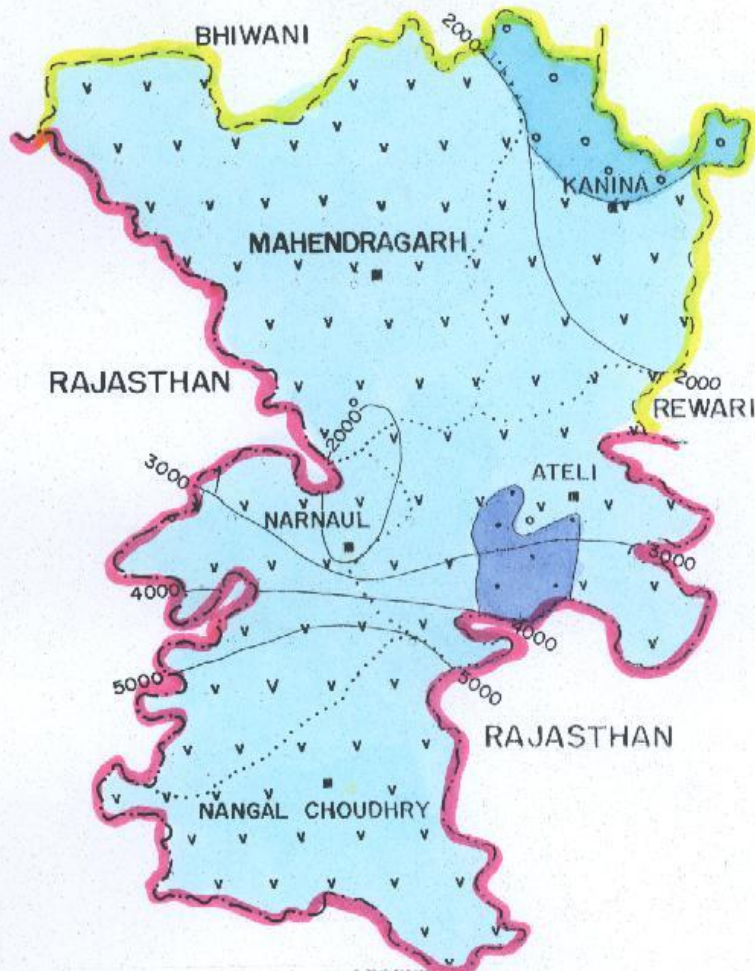
The stage of ground water development in the district is 107% .This means that the ground water in the district is under stress and there is very limited scope for ground water development. Two numbers of artificial recharge schemes were implemented in the district in collaboration with the state agencies in order to create awareness in the district.

6.0 GROUND WATER RELATED ISSUES





Ground water level decline is the major problem in the district. Though the ground water quality is not a major problem in the area, the declining water level is imposing a major problem in the district. In absence of any major canal net work in the district almost complete dependence on ground water for all types of water needs is a major concern. Out of five blocks in the district two blocks namely Nangal Chaudhary and Narnaul have been notified by Central Ground Water Authority for ground water regulation up to the depth of 100 m bgl. Mahendragarh bock of the district has been notified for registration of ground water abstraction structures. The Central Ground Water Board, North Western Region, Chandigarh has organized one mass awareness program and one

HYDROGEOLOGY MAHENDRAGARH DISTRICT, HARYANA

Km 10 0 10 20 Km



LEGEND

	Wells feasible	Rigs suitable	Depth of Well (m)	Discharge (lpm)	Suitable Artificial Recharge Structures
 Soft Rock Aquifer	Tube Wells	Reverse / Direct Rotary	70-150	>480	Recharge Trench with Injection Well.
 Soft Rock Aquifer	Tube Wells	Reverse / Direct Rotary	40-150	360-480	Recharge Trench with Injection Well.
 Soft Rock Aquifer	Tube Wells	Reverse / Direct Rotary	60-200	240-360	Recharge Trench Injection Well.
			Electrical Conductivity (Micro mhos/cm at 25° C)		
			 2000		

training program in the district to make people and officials of the district aware of the artificial recharge techniques and conservation of water,

7.0 RECOMMENDATIONS

The following recommendations are made:-

- In order to arrest the declining trend of water levels in the district, the roof top rain water harvesting techniques should be adopted and recharge structure may also be constructed in area of depression where water gets accumulated during rainy season.
- The crops consuming less quantity of water may be grown in the district.
- The abandoned dug wells may be cleared and should be used for recharging ground water utilizing monsoon runoff.
- The canal net work in the district should be strengthened.
- Aforestation should be taken up in the district in order to increase the rain fall in the area and subsequently more recharge to Ground water.