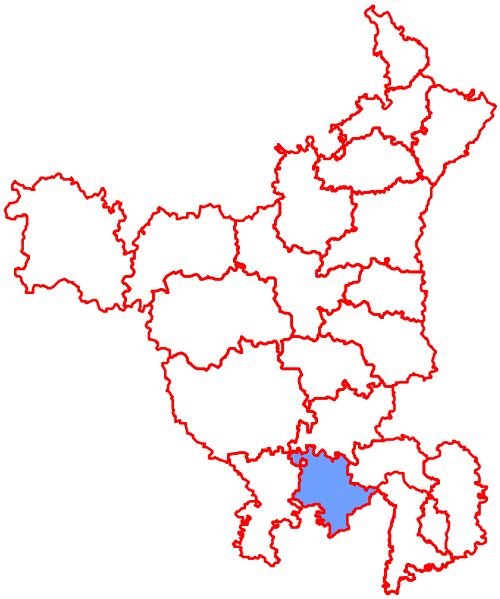
REWARI DISTRICT HARYANA



CENTRAL GROUND WATER BOARD
Ministry of Water Resources
Government of India
North Western Region
CHANDIGARH
2013

GROUND WATER INFORMATION BOOKLET

REWARI DISTRICT, HARYANA

C O N T E N T S

REWARI DISTRICT AT A GLANCE

Sl.No	ITEMS	Statistics
1.	GENERAL INFORMATION	
	i. Geographical Area (sq. km.)	1582
	ii. Administrative Divisions	
	Number of Tehsils	03- Bawal, Kosli and Rewari
	Number of Blocks	05- Bawal, Jatusana, Khol, Nahar and Rewari
	Number of Panchayats	348
	Number of Villages	412
	iii. Population (As per 2001Census)	896129
	iv. Average Annual Rainfall (mm)	560
2.	GEOMORPHOLOGY	
	Major physiographic Units	Indo-Gangetic Plain
	Major Drainage	Sahibi and Krishnawati
3.	LAND USE (Sq.km.)	
	a. Forest Area	41
	b. Net area sown	1290
	c. Cultivable area	1330
4.	MAJOR SOIL TYPES	Tropical arid brown and arid brown
5.	AREA UNDER PRINCIPAL CROPS	1130 sq.km.
6.	IRRIGATION BY DIFFERENT SOURCES (Areas and Number Of Structures)	
	Dugwells	-
	Tubewells/Borewells	1010 sq.km (28,102)
	Tanks/ponds	-
	Canals	-
	Other sources	-
	Net Irrigated area	1430 sq.km.
	Gross irrigated area	1430 sq.km.
7.	NUMBERS OF GROUND WATER MONITORING WELLS OF CGWB	
	No. of dug wells	10
	No of Piezometers	03
8.	PREDOMINANT GEOLOGICAL FORMATIONS	Alluvium
9.	HYDROGEOLOGY	
	*Major Water bearing formation *(Pre-monsoon depth to water level) *(Post-monsoon depth to water level) *Long term water level trend in 10 yrs in m /yr	Sand, Gravel 13.39- 24.20mbgl 8.50 - 25.32mbgl 0.16m-1.07m (Fall) 0.00 - 0.24 m. (Rise)

10.	GROUND WATER EXPLORATION BY CGWB	
	No. of wells drilled EW OW PZ SH	 16 - 05 -
	Depth range(m)	52.20-203.85
	Discharge(liters per minutes)	358-2911
	Storativity (S)	$1.14x10^{-3}$ -4.36x10-3
	Transmissivity (m^2/day)	110-1060
11.	GROUND WATER QUALITY	
	Presence of Chemical constituents more than the permissible limit EC (micro mhos at 25^oC) F (mg/l) As (mg/l) Fe (mg/l)	 955-4590 0.51-3.88 0.0- 0.0075 0.13 to 0.54
	Type of water	Na HCO_3 & mixed type
12	DYNAMIC GROUND WATER RESOURCES(2009)-in MCM	
	Annual Replenishable Ground water Resources	279.99
	Net Annual Ground water Draft	313.71
	Projected Demand for Domestic and industrial Uses upto 2025	1.31
	Stage of Ground Water Development	112%
13	AWARENESS AND TRAINING ACTIVITY	Nil
14.	EFFORTS OF ARTIFICIAL RECHARGE& RAIN WATER HARVESTING	Nil
15.	GROUND WATER CONTROL AND REGULATION	
	Number of Over Exploited Blocks.	04Khol, Nahar, Rewari&Bawal
	No. Semi Critical Blocks	01Jatusana
	No.of blocks notified	01 (Khol block)
16	MAJOR GROUND WATER PROBLEMS AND ISSUES.	Ground water salinity, Water level decline, High Fluoride

GROUND WATER INFORMATION BOOKLET
REWARI DISTRICT, HARYANA

1.0 INTRODUCTION

Rewari district of Haryana state lies between 27^{o} 46' ; 28^{o} 28' North latitudes and 76^{o} 15' ; 76^{o} 51' East longitudes. Total geographical area of the district is 1594 sq.km. The Rewari district is divided into three sub-divisions (tehsils) namely Bawal, Kosli and Rewari comprising five-community development blocks viz. Bawal, Jatusana, Khol, Nahar and Rewari for the purpose of administration .The district headquarter, Rewari town falls in RewariTehsil.

The main streams in the district are Sahibi and Krishnawati rivers. Sahibi River is an ephemeral river and rises from Mewat hills in Jaipur Alwar in Rajasthan and after gathering water from several tributaries, forms a broad stream and enters the district near Ranawi after which it enters Rajasthan and then re-enters Haryana near village Jaithal. The district, except in its Eastern part is flat and sandy and absorbs all the rain water. There are heavy floods created by Sahibi River in Haryana and Delhi. To moderate these floods a barrage has been constructed near masani village and is called Masani barrage. The Krishnawati River enters in the Southern part from Mahendragarh district and nearly makes a border between Mahendragarh and Rewari district. This is a blind river and it s water gets absorbed by sandy soils.The flooding water is useful for crops and contributes to ground water reservoir. There are various other small nalas also carry rain water from the hills during monsoon season.

The agriculture constitutes the main source of economy, and most of the area fit for agriculture is being cultivated. The total irrigated area of 1430 sq.km in Rewari district is irrigated by shallow nd deep tube wells.

Central Ground Water Board (CGWB) has carried out ground water exploration and various Hydrogeological studies in the district. So far ,16 exploratory wells and 5 Piezometers have been drilled in the district.

2.0 RAINFALL &CLIMATE

The climate of Rewari 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 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 upto September. The transition period from September to October forms the post monsoon season. The winter season starts late in November and remains upto first week of March.

जल वर्ष 2007 Water Year 2007

INDEX MAP
REWARI DISTRICT,HARYANA

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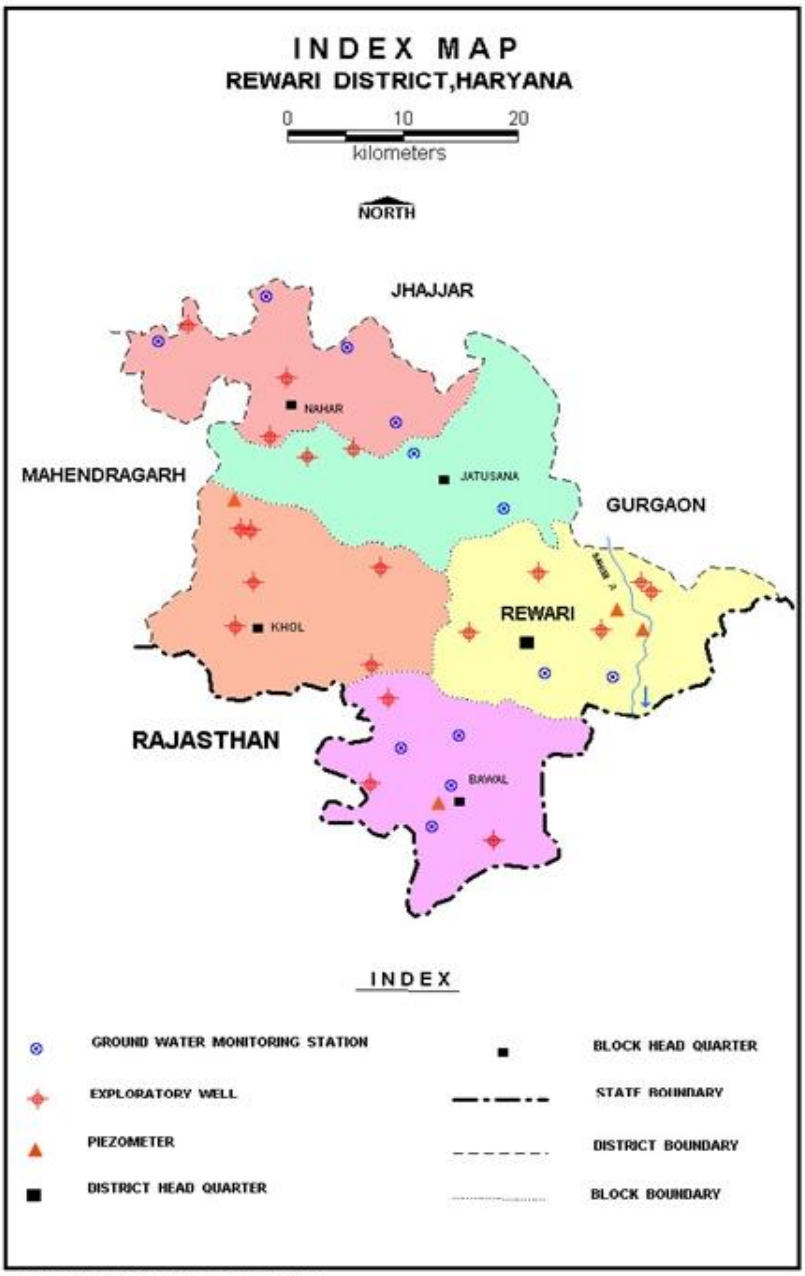
kilometers



C G W B / N W R (S.K. Singh) D.O. NO. 76 / 2008

The normal monsoon and annual rainfall of the district is 489 mm and 553 mm, respectively, which is unevenly distributed over the area 23 days.. The south west monsoon sets in from last week of June and withdraws in end of September, contributing about 88% of annual rainfall. July and August are the wettest months. Rest 12% rainfall is received during non-monsoon period in the wake of western disturbances and thunderstorms. Generally rainfall in the district increases from southwest to northeast. The mean minimum and maximum temperature in the area ranges from 5.6^{o} C to 41^{o} C during January and May or June respectively.

3.0 GEOMORPHOLOGY AND SOIL TYPES

The district broadly forms part of Indo-Gangetic alluvial plain of Yamuna sub basin. It has vast alluvial and sandy tracts and is interspersed strike ridges which are occasionally covered with blown sand. The Sand dunes attain a height of 30m but on an average they have height of 7 m with respect to surroundings. Some of the dunes support light vegetation where as others are of shifting nature depending upon the direction of wind. The hill ranges are part of great Aravalli chain and contain valuable mineral deposits and natural meadows. The elevation of land in the area varies from 232 m in the north to 262 m above mean sea level in south. The master slope of the area is towards the north.

Due to arid climate, the soils are light coloured and moreover. Due to excessive evaporation, soils are calcareous and have lime nodules in the subsurface horizon. Tropical arid brown soils (Ustocheept, haplustarp and sales thids) exist in the Eastern part of the district : most of the soils are of medium texture. Loamy sand is the average textured in all blocks. The organic content of the soil rages sand upto 0.40%. The available phosphorus in the soils ranges ground 21.5 kg/hectare. Soils have moderate salinity hazards, high salinity and moderate alkalinity hazard in the major part of the area.

4.0 GROUND WATER SCENARIO

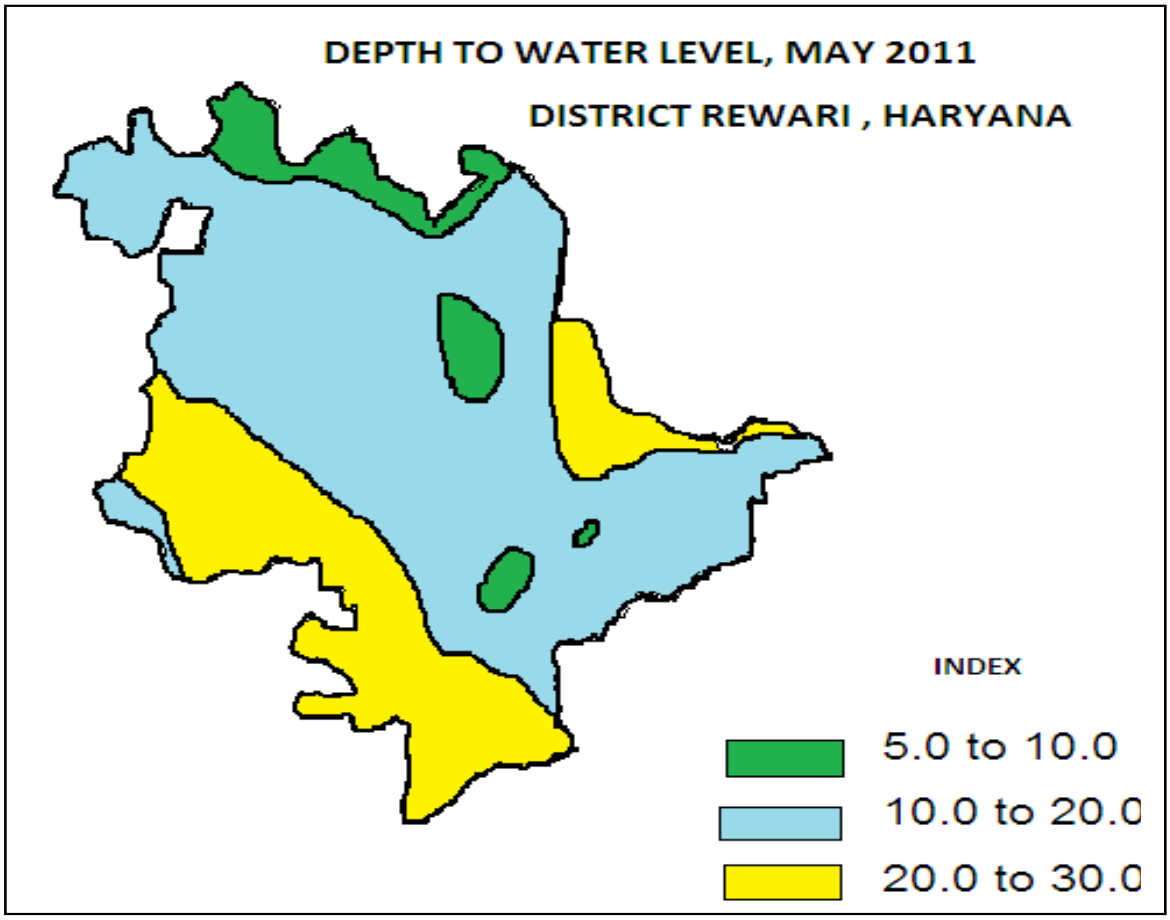
4.1 Hydrogeology

The district is occupied by Indo-Gangetic alluvial plain of Quaternary age, and falls in Ghaggar basin. The principal ground water reservoirs in the area is unconsolidated alluvial deposits of quaternary age. Hard rocks also have some amount of ground water which circulate through joint, fractures & cracks. Over most part of the area ground water occur under phreatic conditions, whereas in deeper water bearing zones which are overlain by impermeable clay it occurs under semi confined to locally confined conditions. The shallow aquifers is being tapped by the handpumps and shallow tubewells, which are widely used for the domestic purposes. CGWB has drilled 16 exploratory borewells and 5 piezometer to delineate and determine potential aquifer zones, evaluation of the aquifer characteristics. The deepest slim hole was drilled upto the depth of 203.85m at Chandanwas.

Alluvium comprises very fine to coarsesand, gravel, silt and clay with kanker in varying proportions.The permeable granular zones comprising sand and occasionally coarse sand and gravel. Their lateral and vertical extent is limited. The borehole data reveals that clay group of formations dominate over the sand group in the district area. The discharge of deep tubewell in the area varies between 358 and 2911 lpm. The transmissivity values ranges from 110 to 1060 m^2/day and storativity ranges from $1.14*10^{-3}$ to $4.36*10^{-3}$.

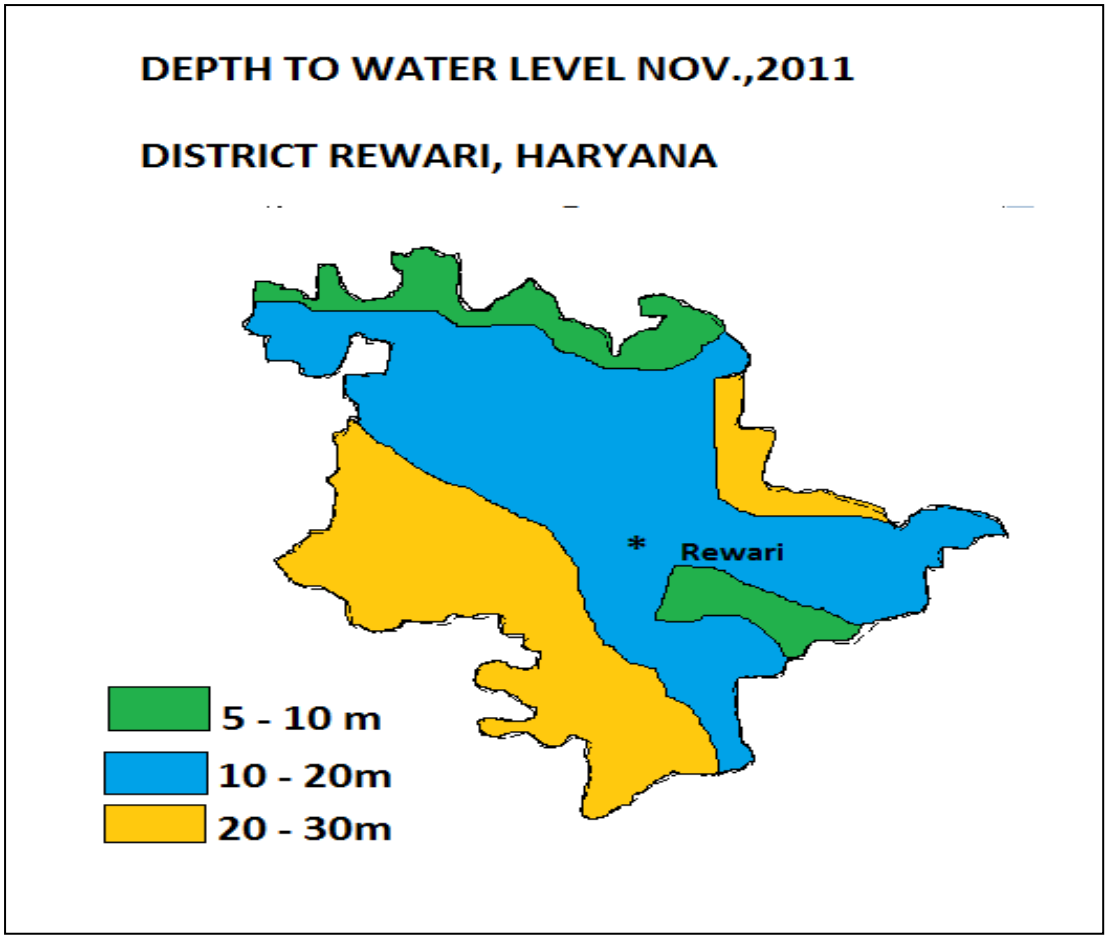
Water level behavior

The depth to water level ranges from 6.67 to 26.31 m bglduring pre monsoon period and 6.79 to 25.14 m bgl during post monsoon period. The seasonal fluctuation varies from 4m to (-) 2 m in the area. The long-term water levels trend indicates average fall varies between 0.25m/ year to 1.50 m/year.



Ground water flow

The elevation of the water table in the district varies from 220 m to 280 m above mean sea level. The highest elevation is in the southern part and the lowest in the northeastern part and reflects the topographic gradients. The hydraulic gradient in the southern part is steep, whereas, in the northeastern part, it is gentle. The overall flow of ground water is from south- west to northeast direction.



4.2 Ground Water Resources

The blockwise ground water resource potential in the district has been assessed as per GEC-97. The stage of ground water development ranges between 50% (Bawal)

to 194% (Khol).The net ground water resource of Rewaridistrict have been estimated to be 279.98 MCM and the gross ground water draft of the district is 313.71 mcm leaving behind a shortfall of (-)33.87 MCM. The stage of ground water development in the district is 112%.

GROUND WATER RESOURCE AND DEVELOPMENT POTENTIAL OF REWARI DISTRICT, HARYANA (AS ON 31ST 31-03-2009)

Assessment unit/ Block	Net groundwater availability (Ham)	Existing Gross GW Draft for Irrigation (Ham)	Existing Gross GW draft for Domestic and Industries (Ham)	Gross GW Draft for all uses (Ham)	Allocation for domestic and industrial supply up to 2025 (Ham)	Net GW availability for future irrigation development (Ham)	Stage of GW Development %	Category
Bawal	7265	3600	40	3640	51	3614	50	OE
Jatusana	6212	6129	9	6138	14	69	99	OE
Khol	2891	5578	18	5596	18	-2705	194	OE
Nahar	5571	6244	5	6249	5	-678	112	Critical
Rewari	6060	9704	44	9748	44	-3688	161	OE
Total District	27999	31255	116	31371	131	-3387	112	OE

4.3 Ground Water Quality

CGWB has carried out studies for chemical quality of ground water in the area. The ground water of the district is alkaline in nature. Ground water is highly mineralized, alkaline and soft to hard in nature. The electrical conductivity varies from 836µmhos cm at 25ºC to 13210µmhos/ cm at 25ºC. The highest value is observed in sample collected from tubewell located in north-eastern part of the city. The southern part of the Rewari city has highle saline groundwater and EC is more than 2000µmhos/cm at 25ºC. It indicates that shallow groundwater is not suitable for drinking purposes due to constituents more than permissible limits.Among the trace elements, Iron have been found above the permissible limits.

Constituents	Minimum limit	Maximum limit
EC Micromhos /cm at 25 ^{0}C	560	5740
NO_3 "	5.0	172
F "	0.59	2.26
As "	n.d	0.0075
Fe "	0.13	0.54

(i) Groundwater quality for domestic purpose: The quality of water is alkaline in nature. EC is found more than permissible limits at GangaiChaj(3650µs). Balawas (5740µs) and Guriani(3040µs). Nitrate is as high as 62mg/l in Gangai, 54mg/l in Balawas and 172mg/l in Bawal. Fluoride is above permissible limits aiKosli (2.13mg/l), Bahu (2.26 mg/l), Gangaichaj(1.60mg/l), Karanwas (1.99mg/l) and Massani (2.18mg/l). The groundwater is occurring in shallow aquifers is moderately saline Apart from above, other areas have potable quality of groundwater.

(ii) The suitability of groundwater for irrigation purposes is good on soil with adequate permeability and for growing semi tolerant variety of crops. However, groundwater at Balawas area falls under C4S4 class & is not fit for irrigation and can cause salinity and sodium hazards.

4.4 Status of Ground Water Development

The drinking water supply is mainly through ground water in the district. The short fall in water supply to towns, cities and villages is met with the installation of hand pumps by public individually as spot and convenient source of water. The shallow tube wells tap unconfined aquifer and depth varies from 30 to 150 m.The tube wells constructed by the municipal corporation and other agencies have been constructed tapping deeper aquifer down to 200m. Most of these shallow tube wells are cavity type and either run by diesel engines or electric motors. The discharge of these shallow tube wells/cavity wells range 240 - 480 lpm.

4.5 Geophysical Studies

CGWB has carried out surface geophysical studies in the district. The findings of surface geophysical studies in the central, western and south western part of the Rewari district show that approximate depth to fresh or brackish saline water interface lies within the alluvium formation. The irregular bedrock topography does not support the proper movement or circulation of ground water, which may be one of the reasons for deterioration of ground water quality. The major part of study area below 20 m depth is under the grip of brackish or saline ground water. In the proximity of foothills tracts from villages Didauli to Masti-Lohana and Khori, the quality of interstitial formation water has been inferred to be fresh while for villages Khori to Pali. The quality of interstitial formation water has been inferred to be brackish. The depth to bedrock is maximum towards the western and northwestern parts of study area between 140 to 160m. The depth to the bedrock along the eastern boundary of the study area is more than 130 m as estimated by the study.

5.0 GROUND WATER MANAGEMENT STRATEGY

5.1 Ground Water Development

The present stage of block wise ground water development varies from 50%(Bawal) to 194% (Khol). Out of five blocks, four fall in Over Exploited and one in Semi critical category. In Critical block i.e. Jatusana , there is scope for ground water development but with caution. Shallow ground water can be exploited with cautionthrough shallow tube wells (Cavity Type). PVC pipes are commonly used for constructing these tube wells.

5.2 GROUND WATER RELATED ISSUES & PROBLEMS

The major problem in respect of ground water in the district is decline in the water level. It is apprehended that the declining ground watertrend can further aggravate with installation of more tube wells. High fluoride (F) content, more than the permissible limit of 1.5 mg/l, in shallow ground water is observed at few places in the district, thus making the water harmful (unfit) for human consumption. High values of nitrates, more than the prescribed limit of 45 mg/l is also observed in shallow ground water at few places in the area.

5.3 Areas Notified By CGWB/SGWA

In view of depletion in ground water resources due to overexploitation in the area, Khol block has been declared notified area and imposes prohibition and restriction on the construction and installation of any structure for extraction of ground water resources to avoid its further depletion and deterioration in its quality.

6.0 RECOMMENDATIONS

1. The dug wells traditionally used for the monitoring the water levels area are either dried or abandoned. It is recommended to install shallow piezometers in the blocks.

2. To arrest declining trend of groundwater levels, water level should be monitored through good network of hydrograph stations uniformly distributed to represent horizontal and vertical extent of aquifer scenario.

3. High Fluoride and Nitrate areas need to be mapped and the public be educated about its harmful effect on human body. Small defluoridation plants can be used and mixing of water can be practiced.

4. PVC pipe assembly may be used in case of shallow tube wells.

5. Registration of all groundwater abstraction structures are to be done and for the construction of any new tube well, prior permission should be sought.

6. Mass awareness programme should be organized to educate the people regarding consequences of mining of ground water and need for its effective/economic use.

7. Conjunctive use of canal and groundwater use should be practiced for irrigation so that stress on ground water can be reduced and saline water can also be utilised.

8. Farmers are to be educated about change in cropping pattern in the area from paddy to low water consuming crops.

9. Water efficient irrigation practices should be followed by farmers to reduce burden on irrigation water.