MANSA DISTRICT PUNJAB

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

Contributors

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Regional Director

Our Vision

"Water Security through Ground water Management"

GROUND WATER INFORMATION BOOKLET
MANSA DISTRICT, PUNJAB

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MANSA DISTRICT AT A GLANCE

Sl.No	Contents	Statistics
1.	**GENERAL INFORMATION**	
	i. Geographical Area (Sq.Km)	2171
	ii.Location	$N29^0$ 32`: $30^0$ 12` $E75^0$ 10`: $75^0$ 46`
	iii. District Head Quarters	Mansa
	Administrative Divisions	
	iv. Sub Divisions	3
	v. Number of Tehsils	3 (Mansa, Budhlada, Sardulgarh)
	vi. Number of Blocks	5 (Mansa, Budhlada, Sardulgarh, Bhiki, Jhunir)
	vii. Number of Towns	5
	viii. Number of Villages	244
	ix. Population (As per Census 2011)	7,68,808
	x. Average Annual Rainfall (mm)	378 mm
2.	**GEOMORPHOLOGY**	
	i. Major Physiographic Units	Quaternary Alluvium comprising clays, sands and kankar
	ii.Major Drainage	Ghaggar River and Sirhind Drain
3.	**LANDUSE (Sq.Km)**	
	i. Forest Area	27
	ii.Net area sown	1900
	iii. Cultivable Area	
4.	**MAJOR SOIL TYPES**	Clayey Loam Sandy Loam
5.	**AREA UNDER PRINCIPAL CROPS**	337000 ha
	Wheat(170000ha) , Rice (74000), Cotton (92000 ha) , Bajra (1000 ha)	
6.	**IRRIGATION BY DIFFERENT SOURCES (Area of Structures)**	
	i. Dugwells	92000 ha
	ii.Tubewells/ Borewells	29999 No.
	iii. Tanks/Ponds	---
	iv. Canals	96000 ha
	v.Other sources	---
	vi. Net Irrigated Area	188000 ha

	vii. Gross Irrigated Area	363600 ha
7.	**NUMBERS OF GROUNDWATER MONITORING STRUCTURES / WELLS OF CGWB**	11
	i. Number of Dugwells	6
	ii. Number of Piezometers	5
8.	**PREDOMINANT GEOLOGICAL FORMATIONS**	Quaternary Alluvium Comprising Clays, Sands and Kankars
9.	**HYDROGEOLOGY**	
	i. Major Water Bearing Formation	Quaternary Alluvium
	ii. Pre-monsoon depth to water level	5.56 to 15.01 m.bgl
	iii. Post-monsoon depth to water level	2.18 to 10.33 m.bgl
	iv. Long-term water level trend in 10 yrs in m/yr (2002 – 2011)	-0.14 to -0.82 m/yr
10.	**GROUNDWATER EXPLORATION BY CGWB**	
	i. Number of wells drilled	24
	Exploratory Well Observation Well Piezometer Slim Holes	15 3 5 1
	ii. Depth Range (m)	85 to 380.60 m
	iii. Discharge (lpm)	870 to 3000 lpm
	iv. Storativity (S)	0.00135 to 0.00038
	v. Transmissivity (m^2/day)	43 to 1590
11.	**GROUNDWATER QUALITY**	
	i. Presence of chemical constituents more than the permissible limit	
	EC, in micromhos (> 3000µ s/cm) (n=12)	(i) Rash (4280), (ii) Burj Bhalaike (6990)
	F, in mg/l (> 1.5 mg/L) (n=12)	Akalia (2) Rash (1.5), Bhikhi 8.2 and Mofar (3.0
	As, in mg/l	Nil
	Fe, in mg/l (> 1.0 mg/L) (n=16)	Mansa (1.581), Narinder Pura (1.551), Burj Bhalike (16.85) and Fatta Malluka (2.876)
	ii. Type of water	Na-HCO3 & Na mixed anion water
12.	**DYNAMIC GROUNDWATER RESOURCES (MCM)**	As on 31.03.2009
	i. Annual Replenishable Groundwater	672.46 MCM

	Resources	
	ii. Net Annual Groundwater Draft	1438.04 MCM
	iii. Projected Demand for Domestic and Industrial uses upto 2025	0.13 MCM
	iv. Stage of Groundwater Development	214 %
13.	**AWARENESS AND TRAINING ACTIVITY**	--
14.	**EFFORTS OF ARTIFICIAL RECHARGE & RAINWATER HARVESTING**	--
15.	**GROUNDWATER CONTROL AND REGULATION**	
	i. Number of Over Exploited blocks	5
	ii. Number of Critical blocks	Nil
	iii. Number of Semi Critical blocks	Nil
	iv. Number of blocks notified	Nil
16.	**MAJOR GROUNDWATER PROBLEMS AND ISSUES**	Depletion in ground water resources & Deterioration of ground quality.

GROUND WATER INFORMATION BOOKLET

MANSA DISTRICT, PUNJAB

1.0 INTRODUCTION

Mansa District is located in the southern part of Punjab State and covers an area of 2,171 sq. km and lies between North latitude $29^0$32' to $30^0$12' and East longitude $75^0$10' to $75^0$46'. It is bounded by Sangrur district in the East, Bathinda Districts in the west, Barnala District in the North and Haryana State in the South. The district has total Population of 7,68,808 as per census 2011, with a population density of 350 persons/km^2 and the decennial growth of 11.2%. As per 2011 census, 70.40 % population of Mansa districts lives in rural areas of villages. The total population of Mansa district living in rural areas is 605,356 out of which males and females are 322,466 and 282,890 respectively. In rural areas of Mansa district, sex ratio is 880 females per 1000 males.

This district is a newly created district of Punjab by reorienting parts of adjoining Bathinda District in 1992, and is divided into five development blocks for the purpose of administrative control.

2.0 RAINFALL & CLIMATE

The climate in the area is typical semi-arid type with distinct wet and dry seasons. The normal average annual rainfall of the district is 378.2 mm. The rainfall occurs due to southwest monsoon which sets in the last week of June and withdraws towards end of September. The climate of Mansa district is classified as sub-tropical steppe, semi-arid and hot which is mainly dry except in rainy months and characterized by intensely hot summer and cold winter. During three months of monsoon season from July to September the district experiences high humidity, cloudiness and good monsoon rainfall.

The period from October to November Constitutes post monsoon season. The cold weather season prevails from December to February followed by hot weather season or Pre monsoon season which ends up to the last week of June.

The normal annual rainfall of Mansa District is 378 mm in 23 days which is unevenly distributed over the district. The southwest monsoon sets in last week of June and withdraws towards end of September and contributes about 83% of annual rainfall. July and August are rainiest month. Rest 17% of the annual rainfall occurs during Non-monsoon months of the year in the district increases from southwest to northeast.

Normal Annual Rainfall	378 mm
Normal Monsoon Rainfall	320 mm
Temperature	
Mean Maximum	48^0C (May & June)
Mean Minimum	3.5^0C (January)
Normal Rainy days	23

3.0 GEOMORPHOLOGY & SOILS

The district mainly represents a flat alluvial plains interrupted by sand dunes in southwestern part. There is no perennial river in the district. The area is mainly irrigated by the network of canals.

INDEX MAP

MANSA DISTRICT, PUNJAB

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- EXPLORATORY WELL
- SLIM HOLE
- PIEZOMETER
- DISTRICT HEAD QUARTER
- BLOCK HEAD QUARTER
- STATE BOUNDARY
- DISTRICT BOUNDARY
- BLOCK BOUNDARY

4.0 GROUND WATER SCENARIO

4.1 HYDROGEOLOGY:

The area falls under the Indo-Gangetic alluvial plains. The geological formations met within the district comprise Alluvium of Quaternary age. It consists of alternating beds of sand, silt and clay. In the southwestern part, the alluvium is overlain by thin layer unstratified loam.

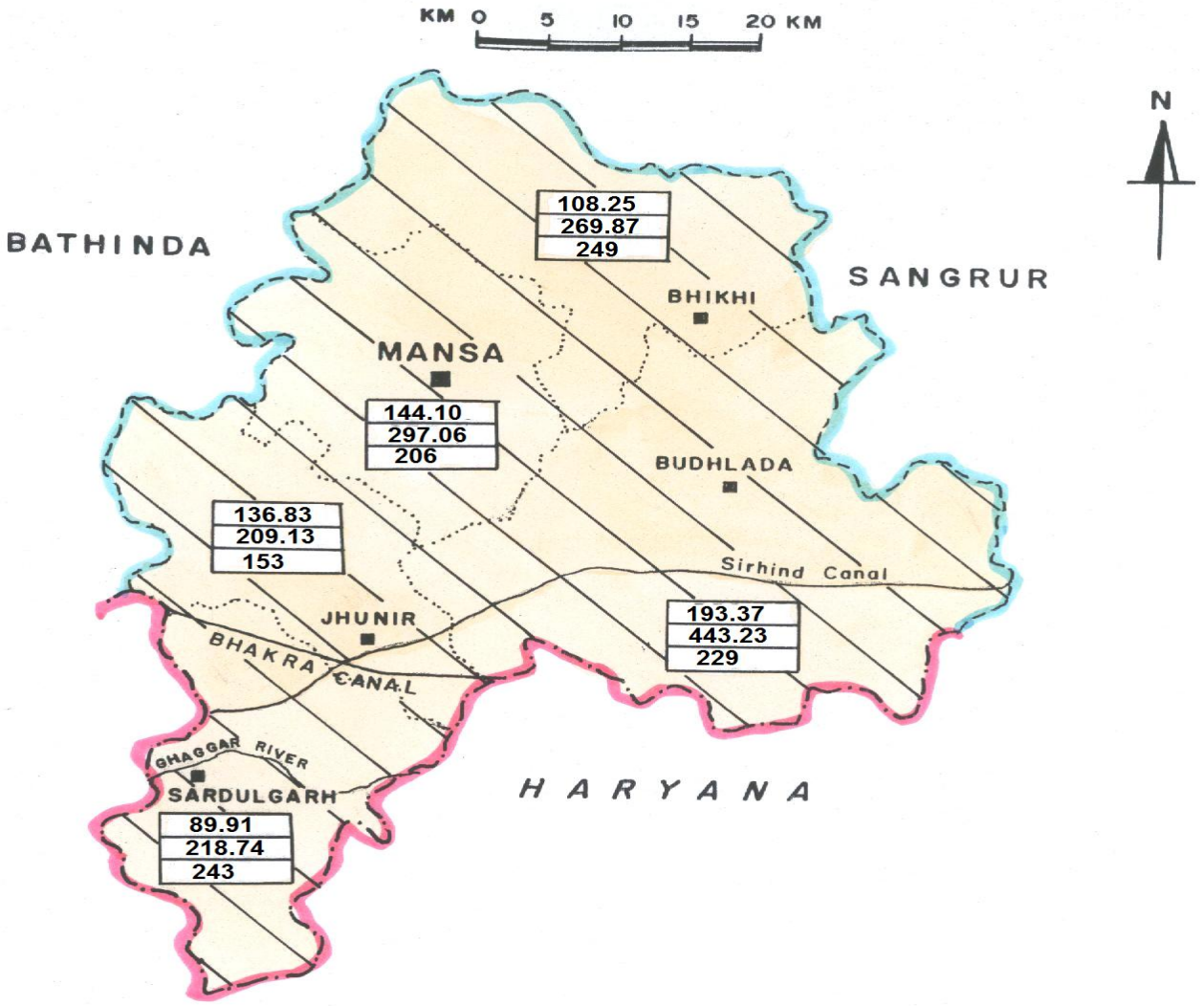
The pre monsoon depth to water level ranges from 5.56 to 15.01 m bgl, and post monsoon value ranges from 2.18 to 10.33 m bgl .In most of the area depth to water level occurs within 10m b.g.l. The area experiences a rise in water level from pre-monsoon to post monsoon periods due to recharge from rainfall occurred in the area. The long-term water level fluctuation over the past shows the rising trend in the northeastern part up to 5m. The rise in water table is due to less withdrawal of ground water owing to its bad quality and / or the intensive irrigation by network of canals. The decline in water level at few places may be attributed to withdrawal of ground water due to its fresh and marginal quality and/ or non-availability of canal water to meet the requirement for agricultural purposes. The water table elevation ranges from 210 m to 217 m above mean sea level. The general ground water flow is from northeast to southwest direction. The yield of the shallow tube wells varies from 870 to3000 litres per minute for 4 to 13 m drawdown. The long term trend of water level ranges in the district from -0.14 (Burj Bhalaike) to -0.82 m/yr (Rar).

4.2 GROUND WATER RESOURCES:

Groundwater resource estimation has been done as per GEC-1997 methodology as on 31.03.2009. The total utilizable ground water potential of district is 672.46 MCM and the net ground water draft is 1438.04 MCM, leaving a balance of 13 MCM for future development. All the five blocks fall under over-exploited category with stage of ground water development as much as 214%.

GROUND WATER DEVELOPMENT POTENTIAL AND CATEGORIZATION OF BLOCKS

MANSA DISTRICT, PUNJAB



I N D E X

672.46	NET GROUND WATER AVAILABILITY (HAM)
1438.04	GROSS ANNUAL DRAFT FOR ALL USES (HAM)
214	STAGE OF GROUND WATER DEVELOPMENT (%)
	OVER EXPLOITED

Table : Block wise Groundwater Resources of Mansa District

Block Name	Net Annual Ground Water Availability (Ham)	Existing Gross Ground Water Draft for irrigation (Ham)	Existing Gross Ground Water Draft for all uses (Ham)	Allocation domestic industrial up to next 25 years (Ham)	Net Ground Water Availability for future irrigation development (Ham)	Stage of Ground Water Develop-ment (%)	Category of Block
BHIKHI	10825	26987	26987	0	-16163	249	OVER-EXPLOITED
BUDHLADA	19337	44319	44323	5	-24986	229	OVER-EXPLOITED
JHUNIR	13683	20913	20913	0	-7230	153	OVER-EXPLOITED
MANSA	14410	29701	29706	5	-15295	206	OVER-EXPLOITED
SARDULGARH	8991	21870	21874	4	-12883	243	OVER-EXPLOITED
TOTAL	**67246**	**143790**	**143804**	**13**	**-76558**	**214**	OVER-EXPLOITED

4.3 GROUND WATER QUALITY:

The ground water quality scenario of the district is alkaline in nature and is fresh to moderately saline. The electrical conductivity (EC) values are less than 3000 ms/cm except at Rash (EC=4280) and Burj Bhalaike (EC=6990) Ms/cm at 25°c average anions bicarbonate predominates at some places, whereas other places are of the anion dominants. Among cations, by and large sodium is the dominant cat ions. Generally, it is suitable for drinking purposes as chemical parameter as well within the permissible limits of safe drinking waters set by Bureau of Indian Standards (BIS) ground water is not suitable for drinking purpose at few places due to fluoride and nitrate content. Places are Mansa (Fe= 1.581), Narinder Pura (1.551), Burj Bhalike (16.85) and Fatta Malluka (2.876) mg /l.

Plot of USSL diagram used for the classification of irrigation waters indicates that ground water fall under C2 S1, C3 S1, C3 S2, C3 S4, C4 S2 and C4 S4. These types of waters are not suitable for customary irrigation as they may cause salinity and sodium hazards.

4.4 SCOPE OF GROUND WATER DEVELOPMENT:

Detailed ground water exploration is essential in the district where there is possibility of encountering fresh water horizons at different depths. This will help in bringing more area under assured irrigation. The whole district is suitable for ground water development but due to over exploitation of GW in all blocks of the district a check is required for overall ground water development. Based on the ground water exploration carried out in the district a well assembly of 305mm/203mm with about 50m of casing length and 1.19mm slot-size with1.6 -8mm gravel shrouding would be suitable in the district.

5.0 GROUNDWATER MANAGEMENT STRATEGY:

Proper ground water management practice are required to be adopted in the district where the rising trend in water levels continues which can lead to water logging conditions as adjoining districts have already suffered from severe water logging menace. In order to arrest the rising trend and to save the area becoming waterlogged, the conjunctive use of ground water and surface water is need of the day. In northeastern parts where water levels are slightly declining, measures of artificial recharge study may be taken up. For this purpose, surplus canal water if available during rainy season may be utilized for recharging the ground water regime.

HYDROGEOLOGY

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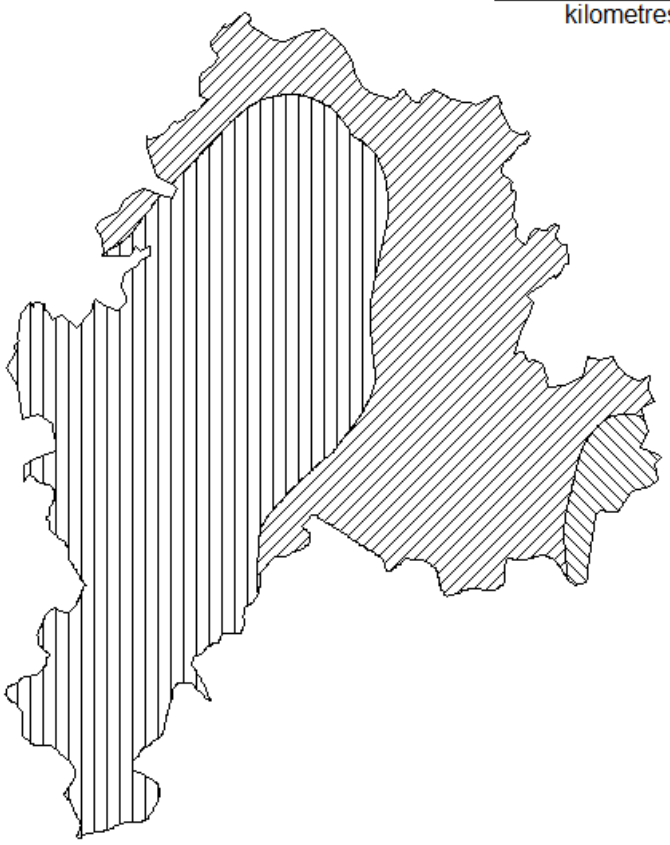
	WELLS FEASIBLE	RIGS SUITABLE	DEPTH OF WELL (m)	DISCHARGE (lpm)	SUITABLE ARTIFICIAL RECHARGE STRUCTURES
	TUBE WELLS	REVERSE / DIRECT ROTARY	45 – 140	1500 – 2000	RECHARGE TRENCH WITH INJECTION WELL
	TUBE WELLS	REVERSE / DIRECT ROTARY	35 – 160	1000 – 1500	WATER LEVEL IS SHALLOW RECHARGE NOT REQUIRED
	TUBE WELLS	REVERSE / DIRECT ROTARY	20 – 80	600 – 1000	WATER LEVEL IS SHALLOW RECHARGE NOT REQUIRED

ELECTRICAL CONDUCTIVITY (MICROMHOS/CM AT 25°C)
4000

F: FLUORIDE > PERMISSIBLE LIMIT (1.5ppm)
Fe: IRON > PERMISSIBLE LIMIT (1.0ppm)

DEPTH TO WATER LEVEL
PRE MONSOON
(MAY 2011)

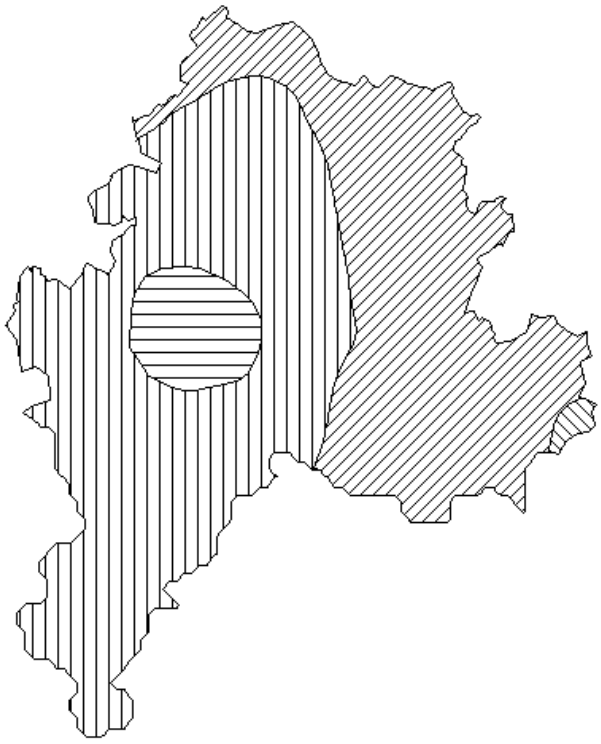


LEGEND

MAP SYMBOL	DTW Range (m.bgl)
	< 10.00
	10.00 -- 20.00
	> 20.00

DEPTH TO WATER LEVEL
POST MONSOON
(NOVEMBER - 2011)

N



0 12.5 25
kilometres

LEGEND

MAP SYMBOL	DTW Range (m.bgl)
	< 5.00
	5.00 - 10.00
	10.00 - 20.00
	> 20.00

5.2 WATER CONSERVATION AND ARTIFICIAL RECHARGE:

Rain water harvesting and artificial recharge to ground water should be adopted to check further decline in ground water level since natural recharge to aquifer system is not adequate to support heavy withdrawal of ground water. Farmers have adopted paddy cultivation due to its profitability and incentives from Govt. Paddy requires much more water in comparison to other crops Thus, a change in cropping pattern is required. Paddy sown in the month of May requires more evapo transpiration than paddy sown after 15thJune. Thus, a lot of water can be saved by timely plantation of paddy. Effective irrigation practices like sprinkler, laser leveling should be adopted.

6.0 GROUND WATER RELATED ISSUES & PROBLEMS

Water levels are declining in the district. Rate of decline is quite considerable in all parts of the district. In general ground water is potable in the district. Awareness was provided to local administration and other Govt. agencies by providing guidance for various recharge projects in the district. Central Ground water broad has not yet notified any block in the district for ground water registration and regulation. There is an urgent need to adopt proper regulatory measures for management of groundwater resources in the district.

7.0 RECOMMENDATIONS

- The following - measures are recommended to reduce the over - exploitation of ground water in Mansa district and declining trend of ground water level.
- All the five blocks of Mansa district are over exploited and it is necessary to notify all blocks for registration of ground water abstraction structures and for regulation of groundwater

abstraction. After the notification permission should be sought from Central Ground Water Authority for construction of any tube well.

- Rain water harvesting and artificial recharge to ground water should be adopted to check further decline in ground water level since natural recharge to aquifer system is not adequate to support heavy withdrawal of ground water.

- Farmers have adopted paddy cultivation due to its profitability and an incentive from Govt. Paddy requires much more water in comparison to other crops. Thus, a change in cropping pattern is required.

- Paddy sown in the month of May requires more evapo-transpiration than paddy sown after 15th June. Thus a lot of water can be saved by timely plantation of paddy.

- Effective irrigation practices like sprinkler, laser leveling should be adopted.

- Mass awareness camps be organized throughout the district to educate people for GW management and need for its efficient/ economic use.