

GROUND WATER BROCHURE OF GONDA DISTRICT, U.P.

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GONDA DISTRICT AT GLANCE

1. GENERAL INFORMATION

i. Geographical Area (Sq. Km.)	: 3987
ii. Administrative Division (as on 31.3.2008)	
a) Number of Tehsil	: 4
b) Number of Block	: 16
c) Number of Panchayat (Nyay)	: 166
d) Number of Village	: 1815
iii. Population (as on 2001 census)	: 27,65,586
iv. Average Annual Rainfall (mm)	: 1151.8

2. GEOMORPHOLOGY

Major Physiographic Units	: Ghaghara alluvial plain underlain by quaternary alluvium comprising clay, silt, sandy clay & kankar
Major Drainages	: Ghaghara, Kuwano, Tirhi & Monwar

3. LAND USE (Sq. Km.)

a) Forest area	: 129.33
b) Net area sown	: 2939.83
c) Cultivable area	: 3019.70

4. MAJOR SOIL TYPES : Alluvial, Sandy Clay

5. AREA UNDER PRINCIPAL CROPS (2006-2007) : 430512 ha

Rabi + Kharif

6. IRRIGATION BY DIFFERENT SOURCES

(Areas in hac. and Number of Structures)

Dugwells	: 10712
Govt. Tubewells :: Private Tubewells	: 10929 / 439 :: 227372 / 109794
Canals	: 1181 / 304
Other sources	: 678 / 337
Net Irrigated Area	: 263672 ha
Gross Irrigated Area	: 303586 ha

7. NUMBER OF GROUND WATER MONITORING WELLS OF CGWB (As on 31-3-2008)

No. of Dugwells	: 10
No. of Piezometers	: 2

- 8. PREDOMINANT GEOLOGICAL FORMATIONS :**
- 9. HYDROGEOLOGY :**
- Major water bearing formation : Sand of various grades, clay and kankar.
- (Pre-monsoon Depth to water level during 2008) : 2.97-5.20 mbgl
- (Post-monsoon Depth to water level during 2008) : 1.36-2.66 mbgl
- Long term of water level trend (1998-2007) in m/yr : Rise -
Fall 0.0302 to 0.2737 m/yr
- 10. GROUND WATER EXPLORATION BY CGWB (As on 31-3-2008)**
- No. of wells drilled (EW, OW, PZ, SH, Total) : EW-5, OW-Nil
- Depth Range (m) : 36.00-559.65
- Discharge (litres per second) : 29.00-38.50
- Draw-down : 0.95-9.10 m
- Transmissivity (m²/day) : -
- 11. GROUND WATER QUALITY**
- Presence of Chemical constituents more than permissible limit (e.g. EC, F, As, Fe) : Nil
- Type of water
- 12. DYNAMIC GROUND WATER RESOURCES (2004)-in MCM**
- Annual Ground Water Recharge : 150356.64 ham
- Gross Annual Ground Water Draft : 112710.86 ham
- Net Annual Ground Water Availability : 142127.02 ham
- Stage of Ground Water Development : 79.30%
- 13. AWARENESS AND TRAINING ACTIVITY :**
- Mass Awareness Programmes organized : Nil
- Date
- Place
- No. of Participants
- Water Management Training Programme (Artificial Recharge) organized
- Date : 31.01.2006
- Place : Lalitpur D.M. Auditorium
- No. of Participants : 150

- 14. EFFORTS OF ARTIFICIAL RECHARGE & RAINWATER HARVESTING** : Nil
- Projects completed by CGWB (No of Amount Spent)
- Projects under technical guidance of CGWB (Numbers)
- 15. GROUND WATER CONTROL AND REGULATION** : -
- Number of OE blocks : Nil
- Number of critical blocks : Nil
- Number of semi-critical blocks : 1
- 16. MAJOR GROUND WATER PROBLEMS AND ISSUES** : Water logged / Prone to logged area

Note: Latest available data may be incorporated,

GROUND WATER BROCHURE OF GONDA DISTRICT, U.P.

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1.0 INTRODUCTION

Gonda district lies between latitudes 26⁰46' and 27⁰27' north and longitude 81⁰31' and 82⁰37' east, in Survey of India Toposheet No. 63E & 63I. The total geographical area of the district is 3987 sq. km. There are four number of tehsils and sixteen number of developmental blocks, the district headquarter is Gonda. As per 2001 census, district population was 2765586 of which 1451101 males and 1314485 females. Rural population is 2571270 and urban population is 194310, scheduled caste population is 433491 and scheduled tribe population is only 182.

The district Gonda is a part of the Ghaghra alluvial plains and is underlain by quaternary alluvium comprising mainly sands of various grades with clay and kankar. The central alluvial plains extends from north to south are makeup of finer clastics comprising mainly clay, silt, sandy clay with kankar and subordinate sands. The main source of irrigation in the district is state / private tubewells and canals. Length of canal in the district is 304 km. The surface water irrigation covers an area of 14659 ha. which is about 6% only of the total irrigated area. Rest of the area irrigated by tubewells. The total irrigation area is 263672 ha & total cultivable land is 293983 ha. It shows that about 90% area is under irrigation & only 10% area depends upon rainwater. The main source of drinking water is ground water in the form of dugwells & handpumps India Mark-II.

The area chiefly drained by the river Ghaghra which form the southern and south western boundary of the district, the Kuwano river which form the north eastern boundary of the district. Except these rivers the area also drained by the Tirhi N. and Monwar N. also.

Earlier the hydrogeological investigation in the district have been conducted by Dr. B.D. Pathak in 1956, Shri P.S. Misra in 1968, Shri M.C. Dubey in 1969, Shri P.J.S. Bhamrah in 1969 & Shri B.K. Baweja in 1970. The systematic hydrogeological surveys in parts of Gonda district was carried out by Shri O.P. Pal in 1977, and by Shri S.A.H. Jaffery in 1978. The reappraisal hydrogeological survey of Gonda district was also carried out by Shri S.N. Sinha & Shri A.K. Bhargawa in 1990-91. In 1999-2000 and the ground water management studies was carried out by me.

2.0 RAINFALL & CLIMATE

The average annual rainfall is 1151.80 mm. The climate is sub-humid and it is characterised by good rainfall mainly during southwest monsoon season and a dry hot summer. About 90% of rainfall takes place from June to September. During monsoon surplus water is available for deep percolation to ground water.

January is generally the coldest month with mean daily maximum temperature at 22.9⁰C and mean daily minimum temperature at 8.3⁰C. After February there is steady increase in temperature. May is generally the hottest month with the mean daily temperature is 39.9⁰C and mean daily minimum temperature is 25.6⁰C, with the advance of the monsoon there is appreciable drop in temperature. The mean monthly maximum temperature is 31.70⁰C and the mean monthly minimum temperature is 18.5⁰C.

In morning relative humidity is high except in summer season. The mean monthly morning relative humidity is 68% and mean monthly evening relative humidity is 56%.

Winds are generally high with some strengthening in the summer season. The mean wind velocity is 4.8 k.m.p.h.

The potential evapotranspiration is 1422.7 mm

3.0 GEOMORPHOLOGY & SOIL

Physiographically Gonda district is divided into two units, the upland plains underlain by older alluvium and the low land plains underlain by newer alluvium. The

older alluvium occupies the north & eastern part of the district and the newer alluvium covers the central, western and southern part with low lying slightly undulating tract deposited in comparatively recent times by the river Kuwano, Tirhi and Ghaghra.

The different geomorphic units observed in the district like sand bar (River Sand) observed at river bed of Ghaghra consists of sand deposits of varying sizes produced due to the fluvial action.

Flood plain (alluvium) areas are extensive, low lying flat areas adjacent Ghaghra river. The deposit is thickest near the river margins and thinning outward the valley slopes and composed of unconsolidated alluvial materials of varying lithology.

Ravines, younger alluvial plain and older alluvial plain are also observed in the district.

4.0 GROUND WATER SCENARIO

Gonda district is a part of the Ghaghra alluvial plains and is underlain by quaternary alluvium comprising mainly sands of various grades with clay and kankar. The central alluvial plains extends from north to south are made up of finer clastics comprising mainly clay, silt, sandy clay with kankar and subordinate sands.

4.1 HYDROGEOLOGY:

The ground water in the area occurs both under confined and water table conditions. It occurs in the zone of saturation within the granular zones encountered below the land surface. The principal source of replenishment to the ground water body is precipitation. The district lying south of river Ghaghra and north of river Kuwano is suitable for construction of shallow and deep tubewells. The aquifer material is comprised of fine to medium sand and coarse sand with gravel.

DEPTH TO WATER LEVEL:

As per depth to water level data of 8 permanent ground water monitoring stations of the year 2008. Premonsoon water level varies from 2.97 (Chapia) to 5.20 mbgl (Mankapur). In postmonsoon period depth to water level varies from 1.36 mbgl

(Umri Begumganj) to 2.66 mbgl (Bhauriganj). The water level fluctuation varies from 1.53 m (Baleswarganj) to 2.72 m (Mankapur).

LONG TERM WATER LEVEL TREND:

Water level recorded of 14 NHS of the district from the period of 1998 to 2007 (10 years). After calculations & compilation of long term it is found that all the NHS of the district are showing declining trend. The declining trend varies from 0.0302m/year (Parsa Gondri) to 0.2737 m/year (Parsapur).

In Gonda district Central Ground Water Board constructed exploratory wells at depth range 65.00 to 100 mbgl with a discharge of 29 to 38.50 lpm.

4.2 GROUND WATER RESOURCES:

As per report on dynamic ground water resource of Gonda district as on 31.03.2004, the annual ground water recharge of the district is 150356.64 ham. The net annual ground water availability is 142127.02 ham, the existing gross ground water draft for all uses is 112710.86 ham, the net ground water availability for future irrigation development is 25680.28 ham and the stage of ground water development is 79.30%. As per the estimates worked out 15 blocks are in 'safe' category and only one block (Padri Kripal) is under 'Semi-critical' category.

DYNAMIC GROUND WATER RESOURCES OF GONDA

(As on 31.03.2004)

Sl. No.	Assessment Units-Blocks	Annual Ground Water Recharge (in ham)	Net Annual Ground Water Availability (in ham)	Existing Gross Ground Water Draft For All Uses (in ham)	Net Ground Water Availability For Future Irrigation Development (in ham)	Stage of Ground Water Development (in %)	Category of Block
1.	Babhanjot	9174.72	8715.98	7773.64	749.61	89.19	Safe
2.	Belsar	10300.03	9785.03	7410.16	2100.42	75.73	Safe
3.	Chhipiya	8185.75	7776.46	6862.12	750.95	88.24	Safe
4.	Colonelganj	8938.16	8491.25	6174.89	2087.66	72.72	Safe
5.	Haldharmau	5434.59	5162.86	4604.00	388.34	89.18	Safe
6.	Itiathok	8499.02	7649.12	6702.49	787.04	87.62	Safe
7.	Jhanjhari	8694.73	8259.99	6877.43	1127.84	83.26	Safe

Sl. No.	Assessment Units-Blocks	Annual Ground Water Recharge (in ham)	Net Annual Ground Water Availability (in ham)	Existing Gross Ground Water Draft For All Uses (in ham)	Net Ground Water Availability For Future Irrigation Development (in ham)	Stage of Ground Water Development (in %)	Category of Block
8.	Katra Bazar	7407.44	7037.07	4856.74	2000.45	69.02	Safe
9.	Mankapur	11190.72	10631.18	9257.39	1030.92	87.08	Safe
10.	Mujhena	8636.90	8205.05	7361.79	667.98	89.72	Safe
11.	Nawabganj	11823.11	11231.95	9006.34	1892.05	80.18	Safe
12.	Padri Kripal	5736.74	5163.07	5036.12	7.04	97.54	Semi Critical
13.	Paraspur	14023.89	13322.69	8085.26	4937.98	60.69	Safe
14.	Rupaideeh	10757.12	10219.27	9040.70	843.73	88.47	Safe
15.	Trabganj	11593.66	11013.98	6519.97	4252.53	59.20	Safe
16.	Wazirganj	9960.07	9462.07	7141.83	2055.73	75.48	Safe
	TOTAL	150356.64	142127.02	112710.86	25680.28	79.30	

4.3 GROUND WATER QUALITY IN GONDA DISTRICT:

Ground water in shallow aquifer zone in general, is colourless, odourless and slightly alkaline in nature. The specific electrical conductance of ground water ranges from 341 to 1890 $\mu\text{s}/\text{cm}$ at 25⁰C. Conductance below 750 $\mu\text{s}/\text{cm}$ at 25⁰C has been observed in ~87% of the analysed samples.

It is observed that the ground water is suitable for drinking and domestic uses in respect to all constituents except for high total hardness in one sample from Itiathok associated with 830 mg/l total hardness.

The Arsenic content has been found upto 123 micro gram / litre in the district which is beyond maximum per limit of 10 ppb. The high content has been found in Katra Bazar, Tarabganj & Wajirganj blocks of the district.

The Iron has been found 3.6 mg/l beyond the limit of permissibility at Colonelganj & other trace element Ca, Zn, Mn, Ni, Pb & Cr are within the limit of permissibility by BIS.

4.4 STATUS OF GROUND WATER DEVELOPMENT:

In all blocks of the district ground water development takes place through dugwells, borewells, state tubewells. The shallow dugwells are found along Ghaghra

river and also in canal command area and the deeper water level observed around Mankapur between Kuwano and Manwar N. in eastern part of the area. The wells generally meet out the domestic and irrigation requirements. In area the total number of government tubewell is 439. The maximum number of 68 tubewells in Itiathok block and minimum number of 6 tubewells in Haldharmau block. The total number of pumpsets including electric, diesel and others are 110031 in which electric pumpsets are 1051, diesel pumpsets are 108643 and others are 337. The maximum number of electric pump (294 no.) observed in Nawabganj block and minimum 6 are in Katra Bazar and Haldharmau blocks. The diesel pumps are maximum found in Chhapia (9457 no.) and minimum in Tarabganj block (4563 no.). About 95% irrigation takes place by ground water and the rest of 5% irrigation takes place by surface water (by canal and ponds).

Drinking water tubewells have been constructed by CGWB under exploration programme in town area and villages. District so far is fine. Maximum number of handpumps are in Chhapia block (173 no.) and minimum number of handpump are in Tarabganj block (74 no.). Depth of these handpumps are maximum down to 100 mbgl with a discharge from 20 to 45 lpm.

5.0 GROUND WATER MANAGEMENT STRATEGY

GROUND WATER DEVELOPMENT:

The stage of ground water development in the district is 79.30%. The maximum stage of ground water development is in the Padari Kripal block (97.54%). Out of 16 blocks only one block Padari Kripal is 'semi-critical' and remaining 15 blocks are in 'safe' category.

6.0 GROUND WATER RELATED ISSUES AND PROBLEMS

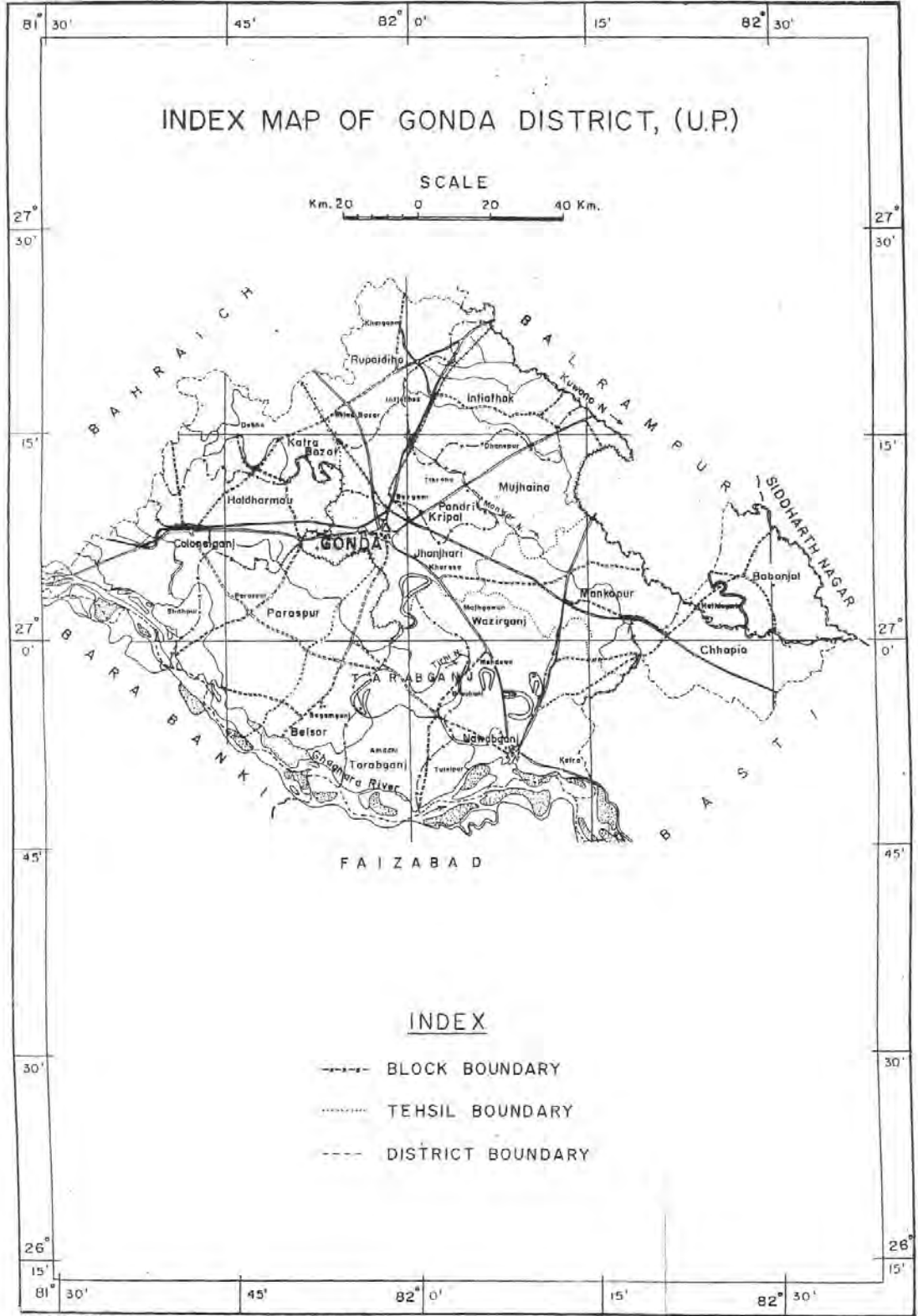
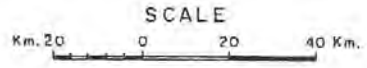
The ground water quality is observed in Colonelganj, Wazirganj and Subhogpur block where Arsenic is >permissible limit, in these blocks Arsenic is 50ppb.

The water logging problem is also a major issue with this soil salinity and other associated problems are common.

7.0 RECOMMENDATIONS

- (1) The canal should be discouraged in water logging area and prone to logged area, the canal command area leads to water logging, soil salinity and other associated problems.
- (2) Necessary steps must be taken in Colonelganj, Wazirganj & Subhagpur blocks to minimise concentration of Arsenic in ground water.

INDEX MAP OF GONDA DISTRICT, (U.P.)



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- BLOCK BOUNDARY
- TEHSIL BOUNDARY
- DISTRICT BOUNDARY

