CENTRAL GROUND WATER BOARD

DEPARTMENT OF WATER RESOURCES,

RIVER DEVELOPMENT AND GANGA REJUVENATION,

MINISTRY OF JAL SHAKTI

GOVERNMENT OF INDIA

INCEPTION REPORT

KORBA INDUSTRIAL AREA, KORBA DISTRICT

CHHATTISGARH

(NAQUIM-2.0)

CHHATTISGARH

AAP: 2023-24

Team Lead – Uddeshya Kumar

Scientist-C (Hydrogeology)

NORTH CENTRAL CHHATTISGARH REGION, RAIPUR

APRIL - 2023

CONTENTS

INCEPTION REPORT ON NAQUIM-2.0 OF KORBA INDUSTRIAL AREA, KORBA DISTRICT, CHHATTISGARH

1	**STUDY AREA**	**Korba Industrial city**
1.1	**Area**	208 Sq km
1.2	**Latitude**	22^0 16' to 22^0 29'N
1.3	**Longitude**	82^0 34' to 82^0 47'E
1.4	**Villages**	Korba Municipal Corporation (67 wards) and 12 villages
1.5	**Total population**	365,253
1.6	**Male**	189,772
1.7	**Female**	175,481
1.8	**Growth Rate**	19.25 (10 Year)
1.9	**Climate**	Tropical
1.10	**Average Rainfall**	1310 mm
1.11	**Geomorphology**	Structural plains, Flood plain and Pediment/Pediplain
1.12	**Drainage**	Hasdeo and its tributaries
1.13	**Soil type**	Mostly of loamy and sandy type
1.14	**Geology**	Geology of the study area mainly consist of Chhotanagpur Gneissic Complex and Gondwana Supergroup. Chhotanagpur Gneissic Complex and metasedimetary of Bilaspur-Raigarh_Surguja belt is of Archean to Proterozoic age consists of granite gneiss and granitoids, containing enclaves of metasedimentary and meta - igneous suites comprising schists, quartzites, amphibolites and dolomitic marbles. The Gondwana Super Group is represented by Talchir and Barakar formations. The base of Talchir Formation is typified by tilite with green shale, clay and siltstone constituting a dominant proportion of the lithic fill. The Barakar Group covers the major part of are which is composed of medium to coarse grained arkosic sandstone, a few pebble beds, conglomerate and shales with coal seams.
2	**PRIORITY TYPE**	Industrial Clusters and Mining Areas
3	**PREVIOUS STUDIES**	
3.1	**Central Ground**	• AQUIFER MAPPING AND MANAGEMENT PLAN

	Water Board, NCCR Reports in context to Korba	KORBA BLOCK, KORBA DISTRICT, CHHATTISGARH (2018-19) – Under NAQUIM programme study has been taken up where water zones of Sandstone and Granite identified. 3-D maps for the Korba block has been prepared. Issues identified as low yield in part of the block and several contamination issues. Under supply side intervention 393.43 Sq Km area identified for artificial recharge to arrest the huge non-committed run-off and augment the ground water storage in Korba block. • REPORT ON AQUIFER MAPPING IN KATGHORA & KARTALA BLOCKS (KORBA DISTRICT) AND DHARAMJAIGARH, GHARGHODA & TAMNAR BLOCKS (RAIGARH DISTRICT), CHHATTISGARH (2015-16) Under NAQUIM programme study has been taken up where 3-D maps for the Katghora block has been prepared. Impact of dewatering from coal mines is highlighted in the study. Under supply side intervention 58.56 Sq Km area identified for artificial recharge to arrest the huge non-committed run-off and augment the ground water storage in Katghora block. • GROUND WATER BROCHURE OF KORBA DISTRICT CHHATTISGARH 2022-23 Hydrogeological scenario along with activities of CGWB has been summarized in report. Groundwater contaminated villages identified. Report highlighted the issues of drilling difficulties in areas where geological unit is Sandstone. • INDUSTRIAL POLLUTION SYUDY OF KORBA INDUSTRIAL AREA 2010-12 The study revealed that in Korba city, heavy industrialization has result the ground water pollution. The present study revealed that the ground water is polluted by fluoride, nitrate, phosphate, in certain locations. Iron and manganese in ground water have their concentration well above the standard norms for the drinking water. Copper, zinc, chromium also preset in concentration below the permissible limit. The industrial effluent discharges by the industries containing high Fluoride and phosphate that may be contaminate the nearby ground water sources. Industries should be fullfill the criteria decided for industrial effluent disposal for the effluent. Nitrate pollution are exists up to shallow aquifer, it is due to poor sanitation condition prevailing

		around the well. The iron and manganese are observed beyond the permissible limit due to geological formation. Chromium also observed at one places is due to local pollution, otherwise no chromium and lead contamination is prevailing in the study area. The thermal power plant and other industries discharging their effluent in the surfaces water drainage and nearby shallow ground water in most of the area has deteriorated and turned pale to yellow colour of surface water. • INDUSTRIAL POLLUTION SYUDY OF KORBA INDUSTRIAL AREA 2016. The report reveals that water pollution is polluted by fluoride, nitrate, phosphate, in certain locations. Iron and manganese in ground water have their concentration well above the standard norms for the drinking water. Copper, zinc and chromium also present in water of study area but mostly below the permissible limit. The industrial effluent discharges by the industries containing high fluoride and phosphate that may be contaminate the nearby ground water sources. Industries should be fulfilling the criteria decided for industrial effluent disposal for the effluent. Nitrate pollution are exists up to shallow aquifer, it is due to poor sanitation condition prevailing around the well. The iron and manganese are observed beyond the permissible limit due to geological formation. Chromium also observed at few places is due to local pollution, otherwise no chromium and lead contamination is prevailing in the study area. The thermal power plant and other industries discharging their effluent in the surfaces water drainage and nearby shallow ground water in most of the area has deteriorated and turned pale to yellow colour of surface water. Not much variation is observed with time in most of the parameter however, some parameters are recorded slightly higher than the previous study. Overall ground water of the study area is suitable for the drinking, agriculture and industrial purpose.
3.3	**Resource Assessment**	Study area fall under Katghora and Korba block of Korba district. As per GWRE-2022 the stage of groundwater extraction for Katghora block is 82.38% and categorized as Semi Critical. The annual extractable groundwater resource is 58.25 MCM, whereas the total draft is 47.98 MCM.

		Industrial draft contribution is 40 % of total extraction. Although for Korba block stage of groundwater extraction, is 37.13 % and categorized as Safe. The annual extractable groundwater resource is 67.03 MCM, whereas the total extraction is 24.89 MCM.
3.4	**Published Paper**	• Dewangan, Rakesh & Kumar, Uddeshya & Srivastava, Dr Sudhir. (2020). Temporal Variation in Water Quality around the Korba City of Chhattisgarh. 8. 684-688. • Dheeraj, V. P., C. S. Singh, Nawal Kishore and Ashwani Kumar Sonkar, 2023. Groundwater Quality Assessment in Korba Coalfield Region, India: An Integrated Approach of GIS and Heavy Metal Pollution Index (HPI) Model. iginal Research, Vol. 22, No. 1, Nature Environment and Pollution Technology • Sharma, Reetu & Patel, Khageshwar Songs & Lata, Lesia & Huber, Miłosz. (2017). Contamination of Pond Water and Sediment in Coal Burning Area. Journal of Environmental Protection. 8. 358-379. 10.4236/ jep. 2017. 83027. • Singh, A.K., N.P. Varma and G.C. Mondal. 2016. Hydrogeochemical investigation and quality assessment of mine water resources in the Korba coalfield, India. Arab. J. Geosci., 9(4). doi: 10.1007/S12517-015-2298-1 • Singh, R., A.S. Venkatesh, T.H. Syed, A.G.S. Reddy, M. Kumar, et al. 2017. Assessment of potentially toxic trace elements contamination in groundwater resources of the coal mining area of the Korba Coalfield, Central India. Environ. Earth Sci., 76(16). doi: 10.1007/S12665-017-6899-8 • Singha, S.S., Pasupuleti, S., Singha, S. et al. A GIS-based modified DRASTIC approach for geospatial modeling of groundwater vulnerability and pollution risk mapping in Korba district, Central India. Environ Earth Sci 78, 628 (2019). https://doi.org/10.1007/s12665-019-8640-2 • Singha, Soumya & Pasupuleti, Sowjanya & Villuri, Vasanta. (2017). An integrated approach for evaluation of groundwater quality in Korba district, Chhattisgarh using Geomatic techniques. Journal of Environmental Biology. 38. 865-872. 10.22438/jeb/38/5/MRN-600.

4	**OBJECTIVES OF THE PRESENT STUDY**	1. Demarcation of Contaminants Zones i) Zonation of the area ii) Aquifer identification for poor quality 2. Identification of Fresh GW sources for Drinking Water Supply 3. Drinking water source sustainability i) Recharge area identification & measures for sources sustainability ii) If required identification of alternate source for water supply 4. Tracing source of contamination 5. Suggesting regulatory measures for prevention of contamination
5	**EXISTING DATA**	
		Number
5.1	**Exploratory Well**	04
5.2	**Observation Well/ Peizometer**	01/02
5.3	**VES/TEM**	18
5.4	**NHS**	07
5.5	**Water Quality**	07
5.6	**Infiltration Test**	Nil
5.7	**Pumping Tests**	01
6	**AQUIFER WISE DATA GAP ANALYSIS**	
		No of Additional Structures Required
6.1	Sandstone (Gondwana Formation)	EW/OW/PZ - 2/1/4 VES/TEM - 12 upto 300m Water Level - 65 (Monitoring Wells DW/BW) Water Sample - 65 (130) Infiltration Test - 5 Pumping Tests/Slug Test - 1
6.2	Granite/ Gneiss (Chhotanagpur Gneissic Complex)	EW/OW/PZ - 1/1/3 VES/TEM - 7 upto 300m Water Level - 32 (Monitoring Wells DW/BW) Water Samples - 32 (64) Infiltration Test - 2 Pumping Tests/Slug Test - 1

7. DELIVERABLES

1. Map and suggested interventions with -
    1.1. Demarcation of Poor Quality affected area (As per drinking water specification)
    1.2. Demarcation of fresh water aquifers for drinking water supply
    1.3. Location for withdrawal of groundwater wells & their optimum discharge
    1.4. Recharge area demarcation and structure designs
    1.5. Sources of contamination, if any
    1.6. Location of alternate source water supply
2. Extent of meeting demand - supply gap
3. Regulation mechanism for prevention from contamination

8. COMPOSITION OF TEAM

Team Lead	Uddeshya Kumar	Scientist C (Hydrogeology)
Expert (Hydrogeology)-1	Suvam Prakash Dash	AHG (Hydrogeology)
Expert (Geophysics)	Suman Bharti	Scientist B (Geophysics)
Expert (Hydrochemistry)	Rakesh Dewangan	Scientist C (Hydrochemistry)

9. MONTH-WISE & OFFICER-WISE ACTIVITY PLAN

Sl No	Activity	Unit	Officers deployed	May,23	June,23	July,23	Aug,23	Sep,23	Oct,23	Nov,23	Dec,23	Jan,24	Feb,24	Mar,24
1	Base Map Preparation	Nos	Sh Uddeshya Kumar, Sc-C Sh Suvam P Dash, AHG											
2	Preparation of Inception Report	Nos	Sh Uddeshya Kumar, Sc-C Sh Rakesh Dewangan, Sc-C Sh Suman Bharti, Sc-B											
3	Exploration (construction of EW/OW/Pz, Pumping Test)	Nos	Sh Uddeshya Kumar, Sc-C Sh Suvam P Dash, AHG											
4	Pre Monsoon Field Survey (Hydrogeological, WQ Data)	Sq.km	Sh Uddeshya Kumar, Sc-C Sh Rakesh Dewangan, Sc-C Sh Suvam P Dash, AHG											
5	Geophysical Data Collection	Nos	Sh Suman Bharti, Sc-B											
6	Data entry in WIMS		All Officers											
7	Visit to local offices for data collection	Nos	Sh Uddeshya Kumar, Sc-C Sh Rakesh Dewangan, Sc-C Sh Suvam P Dash, AHG											
8	Progress reporting in MIS		All Officers											
9	Sample Surveys & User Feedback	Nos	Sh Uddeshya Kumar, Sc-C Sh Rakesh Dewangan, Sc-C Sh Suvam P Dash, AHG											
10	Data Analysis and Interpretation (Pre Monsoon Collected Data)	Sq.km	All Officers											
11	Identification of alternate sources of drinking water	Nos	Sh Uddeshya Kumar, Sc-C Sh Suvam P Dash, AHG											
12	Workshop and Mid Term Review by NLEC		Sh Uddeshya Kumar, Sc-C											
13	Post Monsoon Field Survey (Hydrogeological, WQ Data)	Sq.km	Sh Uddeshya Kumar, Sc-C Sh Rakesh Dewangan, Sc-C Sh Suvam P Dash, AHG											
14	Data Analysis and Interpretation (Post Monsoon Collected Data)	Sq.km	Sh Uddeshya Kumar, Sc-C Sh Rakesh Dewangan, Sc-C Sh Suvam P Dash, AHG											

Sl No	Activity	Unit	Officers deployed	May,23	June,23	July,23	Aug,23	Sep,23	Oct,23	Nov,23	Dec,23	Jan,24	Feb,24	Mar,24
15	Draft Report Preparation	Nos	All Officers											
16	Field truthing of Management Plan	Sq.km	All Officers											
17	Modification and Submission of Final Report	Nos	All Officers											
18	Preparation of Maps with Management Plan	Nos	All Officers											
19	Sharing the Report with CHQ, SGWCC and DM	Nos	Sh Uddeshya Kumar, Sc-C											