केंद्रीय भूमि जल बोर्ड

जल संसाधन, नदी विकास और गंगा संरक्षण

विभाग, जल शक्ति मंत्रालय

भारत सरकार

Central Ground Water Board

Department of Water Resources, River Development and Ganga Rejuvenation, Ministry of Jal Shakti

Government of India

AQUIFER MAPPING AND MANAGEMENT OF GROUND WATER RESOURCES

MAYURBHANJ DISTRICT, ODISHA

दक्षिण पूर्वी क्षेत्र, भुवनेश्वर

South Eastern Region, Bhubaneswar

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FOREWORD

Mayurbhanj district is situated in the north-eastern part of the state of Odisha. It is the largest district in the state having geographical area of 10,418 km^2. As per 2011 census, the district has a population of 25.20 lakhs of which 7.6% reside in urban areas. The projected population of the district in the year 2022 has been calculated as 28.92 lakhs. With the increase in population over the past years, the stage of ground water extraction has also increased from 29.52% in the year 2011 to 40.79% in 2022. Groundwater forms the major source of drinking and domestic needs in the district.

Mayurbhanj's geography is defined by the Simlipal National Park located in the centre of the district covering more than a fourth of the district's area. Except the eastern part, the entire district is underlain mainly by hard crystalline rocks and are devoid of any primary porosity. The hard crystalline rocks of the district form two distinct aquifer systems; the shallow aquifer formed by the weathered mantle where water is stored under phreatic condition and the deeper aquifer is formed by fracture zones, joints etc where water occurs in semi-confined condition. The eastern part of the district is underlain by thick alluvial sediments and forms good aquifers. Due to wide variation in hydrogeological set up in the district, the occurrence and distribution of aquifers are not uniform and so as their yielding properties.

The present report **"Aquifer Mapping and Management Plan of Mayurbhanj District"** is the output of the study taken up under the National Aquifer Mapping Programme of Central Ground Water Board in order to compile all the relevant information related to hydrogeological studies and to suggest a ground water management plan for the district. An attempt has been made to formulate ground water management plan of the district in this report with the help of all relevant information collected through field investigation and earlier hydro geological studies taken up in the district.

Sh. Bibhuti Bhusan Sahoo, Scientist-B (HG) and Sh. Munna Sutradhar, Assistant Hydrogeologist jointly have compiled and prepared the present report under the supervision of Dr. B K Sahoo, Scientist-E. Their sincere efforts in the compilation of this report will no doubt be very useful and beneficial for different groundwater user agencies, administrators, and planners in preparation for groundwater development plans and will be a handy tool in effective management of ground water resources in the district.

Bhubaneswar
31st March 2023

P K Mohapatra

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Introduction

Central Ground Water Board, South Eastern Region has carried out Aquifer Mapping and Management plan in the district of under National Aquifer Mapping and Management (NAQUIM) program in the AAP 2022-2023. Systematic mapping is very much effective in building up our knowledge on the geologic framework of aquifers, their hydrologic characteristics, and water levels in the aquifers with periodic fluctuations and the occurrence of natural and anthropogenic contaminants in the groundwater and how they affect the whole system. Aquifer mapping at the appropriate scale can help to prepare, implement and monitor the efficacy of various management interventions aimed at long-term sustainability of our precious ground water resources, which in turn, will help achieve drinking water security, improved irrigation facilities and sustainability in water resources development.

Objectives

National Aquifer Mapping Programme (NAQUIM) is the thrust area of CGWB activities in the 12th and 13th plan period, there has been lot of deliberations and concept note/ implementation strategies are being finalized by CGWB. In view of the challenging work ahead, involvement of State Ground Water Department being the implementing agency in the area of ground water development and management is of prime importance to achieve the objectives envisaged under NAQUIM. In the 12th five-year plan, it is proposed to cover thrust areas and requires scientific interventions through participatory approach of endusers.

Aquifer mapping is a multidisciplinary study wherein a combination of geological, geophysical, hydrological, hydrogeological, meteorological and hydro- chemical information is integrated to characterize the spatial and temporal variation of quantity and quality of the aquifer system 1:50,000 scale. This involves in depth studies of the Aquifer Disposition in the Mayurbhanj District (Administrative Block wise) in respect of availability, potential, quality & quantity, identification of problems and finding solutions which require immediate interventions.

The following points were the broad objectives for the same:

- To define the aquifer geometry with precise lateral and vertical demarcation.
- To define Ground water regime behavior in time and space.
- To study the hydraulic characteristics of both shallow and deeper aquifer.
- To study the Geochemistry of aquifer systems down to the depth of 200 m in hard rock areas and up to a depth of 300 m (or up to Bed Rock) in alluvial areas.
- To prepare Aquifer Maps indicating dispositions of aquifers along with their characterization.
- To formulate the Aquifer Management Plans for sustainable development and management of ground water resources.

Various on-going activities of Central Ground Water Board, such as ground water monitoring, ground water resource assessment, artificial recharge and ground water exploration in drought, water scarcity and vulnerable areas can also be also integrated in the aquifer mapping project.

Scope of the study

Various development activities over the years have adversely affected the ground water regime in many parts of the country. There is a need for scientific planning in development of ground water under different hydrogeological situations and to evolve effective management practices with involvement of community for better ground water governance. Though a vast amount of hydrological and hydrogeological data has been generated through scientific investigations by Central Ground Water Board and other Central/State agencies, these mostly pertain to administrative units and have addressed the issues of the whole aquifer systems in very few cases. In view of the emergent challenges in the ground water sector in the country, there is an urgent need for comprehensive and realistic information pertaining to various aspects of ground water resources available in different hydro-geological settings through a process of systematic data collection, compilation, data generation, analysis and synthesis.

Geologically, the major parts of the Mayurbhanj District are underlain by the Quaternary to Holocene (Recent) unconsolidated Alluvial formations, with the Pre-Cambrian to Proterozoic rock of the Granite Gneiss or its equivalent, serving as basements in most of the cases. The Precambrian crystalline and the intrusive are consolidated formations. devoid of primary porosity, but form aquifer when weathered and fractured. The Tertiary formations are unconsolidated with lateritic capping and form potential aquifers.

The Mayurbhanj district is mainly drained by the Budhabalanga, Kharkai, Jamira and several other tributaries originate from Similipal hills. All these rivers exhibit dendritic type of drainage pattern and are structurally controlled which indicates that this district has vast Groundwater and surface water resources. Proper hydrogeological knowledge is required for the sustainable development of groundwater and systematic management plan for the ground water utilizations.

Approach and methodology

The geological setups control the occurrence and movement of groundwater in the district. It is worthwhile to mention upfront, that aquifer mapping is not simply creation of aquifer maps. It is a process for visioning how India’s groundwater resources will be managed not just in the next 5-10 years, but for the next 50 years, primarily through the active participation of its citizens. Aquifer mapping will lead to strategic plans for ensuring sustainable, equitable and efficient use of India’s groundwater resources for many years to come. It will not only help understand aquifers but will use aquifers as units of measuring, monitoring and governing India’s groundwater resources. Major reforms in data management, groundwater governance including the legislative framework and drinking water security will derive benefits from aquifer mapping through the development of strategic groundwater management plans. Hence, aquifers will form the units on which decisions are taken and actions performed with regard to groundwater resources. The methodology proposed is an amalgamation of both top-down and bottoms-up approach which suggests the use of latest technology as well as the process of participatory data collection and management of ground water.

Central Ground Water Board has implemented the Pilot Project on Aquifer Mapping under the World Bank funded Hydrology Project (HP-II). CGWB carried out advanced geophysical investigations and their interpretation for the Pilot Project under HP-II for aquifer delineation and its characterization through National Geophysical Research Institute (NGRI), which is a premier research organization under CSIR (Ministry of Science and Technology, Govt. of India). This information, in turn, lead to an effective ground water management in a participatory approach involving various stake holders. The outcome established the efficacy of various geophysical techniques under different hydrogeological conditions and established a protocol for geophysical investigations when aquifer mapping shall be up-scaled for the entire country. The action plan adopted for Aquifer mapping is as given below:

Table 1 Approach & Methodology

Compilation of existing data(Central & State)

↓

Generation of different thematic layers

↓

Identification of Preliminary Aquifer Boundaries &Units (PABU) from existing data

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Identification of data gaps

↓

Prioritization of PABUs

↓

Data generation (water level, exploration, geophysical, hydrochemical, h ydro geological etc.)

↓

Robust Aquifer Maps with 3D disposition

↓

Ground Water Assessment

↓

Preparation of Aquifer ManagementPlan

↓

Development of Aquifer Information &Management System (AIMS)

The activities carried out for completion of the Aquifer Mapping and management plan can be envisaged as follows:

Data Compilation & Data Gap Analysis: Collection and synthesis of large volume of data is the foremost criteria during the specific studies carried out by Central Ground Water Board and various Government organizations with fresh generation of a new data to describe an aquifer system completely. The data were assembled, analyzed, examined, synthesized and interpreted from available sources. These sources were predominantly non computerized data, which was converted into computer-based GIS data sets. On the basis of available data, data gaps were identified.

Data Generation: There was also a strong need for generating additional data to fill the data gaps to achieve the task of aquifer mapping. This was achieved by multiple activities such as hydro-geochemical analysis, remote sensing, besides detailed hydrogeological surveys to delineate multi aquifer system; to bring out the efficacy of various geophysical techniques and a protocol for use of geophysical techniques for aquifer mapping in different hydrogeological environs.

Aquifer Map Preparation: After integration of all the collected data generated from various studies of hydrogeology, aquifers have been delineated and characterized in terms of quality and potential. Various maps have been prepared for the characterization of Aquifers, which can be termed as Aquifer maps providing spatial variation (lateral & vertical) in reference to aquifer extremities, quality, water level, potential and vulnerability (quality & quantity).

Aquifer Management Plan Formulation**:** Aquifer Maps and ground water regime scenario is utilized to identify a suitable strategy for sustainable development of the aquifer in the area.

Implementation of Aquifer management plan by Participatory ground water management:

a) Demystify the science of ground water hydrology through capacity building and community level participation in real time data collection planning and development.

b) Establishment of protocols for participatory ground water management through

i. Suggesting mechanism for collection of required data / parameters for seasonal assessment of ground water resources and their regular updating at local level involving the end users.
ii. Formulating appropriate strategies and methodology for strengthening local institutions and end users for ground water management and capacity building of stakeholders (staff/officials/PRIs/NGOs/CSOs etc.).
iii. Strengthen local institutions to address emerging ground water issues in respect of quantity and quality of ground water resources.
iv. Transform the perception of groundwater from private property to that of a “common good”, where individual farmers take decisions for collective good.

Study area

Mayurbhanj, an erstwhile princely state during the colonial regime, has an unenviable history. The name of the district traces its origin to Bhanj Dynasty, who ruled over this state in unbroken succession since about 9th Century A.D., the rulers were great patrons of Art, Culture, Education and Architecture. The progressive mindset of the erstwhile rulers can be known from the fact that as early as in the year 1905, the Mayurbhanj state railway started operating from Rupsa to Baripada. The successive kings of Mayurbhanj were a pioneering force in upliftment of Odisha under British Rule who had magnanimously donated huge sum of money and land for the establishment of higher education institutions in Odisha, notably among them is S.C.B. Medical College at Cuttack.

The district unfolds an enormous panorama of natural beauty and bounty which amongst others is the home to the Simlipal Biosphere Reserve, which became a source of international attention in the 1960s. Numerous landscapes & valleys, mountain peaks, vibrant waterfalls and thick coverage of forests offer a breathtaking view to the visitors. In the midst of surroundings evolved the beautiful *Chhou* dance form which integrates martial, tribal and classical elements, and has gained worldwide fame and recognition for its beauty and marvel of the art.

Presently, being the biggest district of Odisha geographically with a total area of 10,418 sq. kms, it is situated at the northern boundary of the state. It is bounded in the north-east by Jhargram district of West Bengal, Singhbhum district of Jharkhand in the north-west, Balasore district in the south-east and by Keonjhar in the south-west. As per the Forest Survey of India 2011, Mayurbhanj district has maximum dense forest area followed by Sundargarh and Kandhamal.

According to the Census 2011, it is the third-most-populous district of Odisha, after Ganjam and Cuttack, which also boasts of the largest tribal population. The total population of the district is 25,19,738, with a sex ratio of 1006 females per 1000 males. It constitutes 6% of total population of Odisha. The Scheduled Tribe and Scheduled Caste population constitute 58.72% & 7.33% of the total population respectively. The district has a population density of 242 inhabitants per square kilometer and literacy rate 63.17%.

Baripada, which was the capital of Mayurbhanj state since 15th century, is the present headquarters of the district. The district comprises of four sub-divisions namely Baripada, Rairangpur, Karanjia & Udala with 26 blocks with 382 Gram Panchayats and 3945 villages.

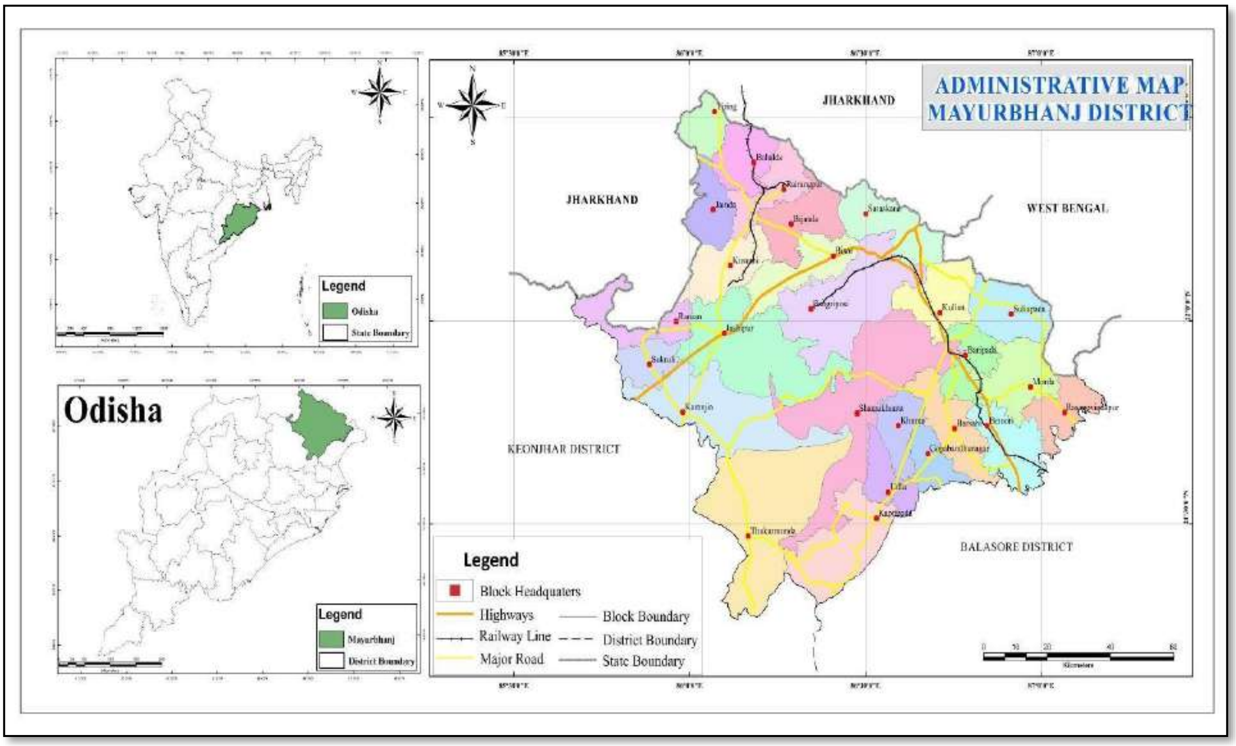


Figure 1.1 The Administrative Map, Mayurbhanj district.

Administrative Setup

The district is divided into 4 subdivisions, which in turn are further subdivided into 26 blocks Gram Panchayats comprising of 3950 villages in the rural front and on the urban side it comprises of 1 Municipal Corporation of Baripada and 3 Notified Area Councils.

Table 1.2 Administrative Setup of Mayurbhanj District

01.	Location	Mayurbhanj District
	a. Longitude	85^{O} 40 to 87^{O} 11 East
	b. Latitude	21^{O} 16 to 22^{O} 34 North
02.	Geographical Area	10418 Sq. Kms.
03.	Sub-divisions	4 nos.
04.	Tehsils	26 nos.
05.	C.D Blocks	26 nos.
06.	Towns (Including Census Towns)	4 nos.
07.	Municipalities	1 no.
08.	N. A. Cs.	3 nos.
09.	Police Stations.	32 nos.
10.	Gram panchayats	382 nos.
11.	Villages	3950 nos.
	a. Inhabited	3751 nos.
	b. Uninhabited	199 nos.
12.	Parliamentary Constituencies	1 no.
13.	Assembly Constituencies	9 nos.

Demographic Setup

As per the Census Data of 2011, the total population of the district is 2519738, the Male population is 1,256,213 and the female population is 1,263,525. This gives an overall sex ratio of 995 males per 1000 females. The decadal growth rate is pegged at 13.3 % with a population density of 242 persons per square kilometers.

Table 1.3 Demographic Setup of Mayurbhanj District

Year / Block /ULB	Geographical area	Number of households	No. of Villages	Population
1	**2**	**3**	**4**	5
2011	10418.0*	472123	3950	2519738
BLOCK				
Bahalda	266.62	21100	104	97807
Bangriposi	300.16	25259	227	118794
Baripada	193.02	16048	102	79698
Badsahi	312.15	35175	224	164947
Betnoti	298.31	34325	227	170841
Bijetola	256.62	14667	153	74121
Bisoi	330.48	17213	156	85548
GopabandhNagar	163.96	18414	132	85137
Jamda	206.63	13422	79	68512
Jashipor	443.12	23461	228	116083
Kaptipada	626.73	33362	155	174933
Karanjia	314.76	20389	156	105353
Khunta	222.23	17550	132	83964
Kuliana	299.77	23935	235	114805
Kusumi	312.99	20848	114	107201
Morada	284.01	25167	169	117304
Rairangpur	205.43	14610	109	69374
Raruan	212.53	15610	110	76047
Rasagovindapur	231.91	21472	177	109712
Samakhunta	192.24	19263	136	90507
Saraskana	311.84	24410	200	115398
Sukruli	174.05	13706	90	69288
Suliapada	278.74	24918	193	113973
Thakurmunda	427.51	22607	173	122315
Tiring	168.86	13118	80	65265
Udala	209.3	17720	89	86526
URBAN				
Baripada (M)	33.37	19314	-	
Karanjia (N.A.C.)	18.64	4191	-	
Rairangpur (N.A.C.)	14.38	4233	-	
Udala (N.A.C.)	7.89	2445	-	

Source. District Statistical Handbook 2015

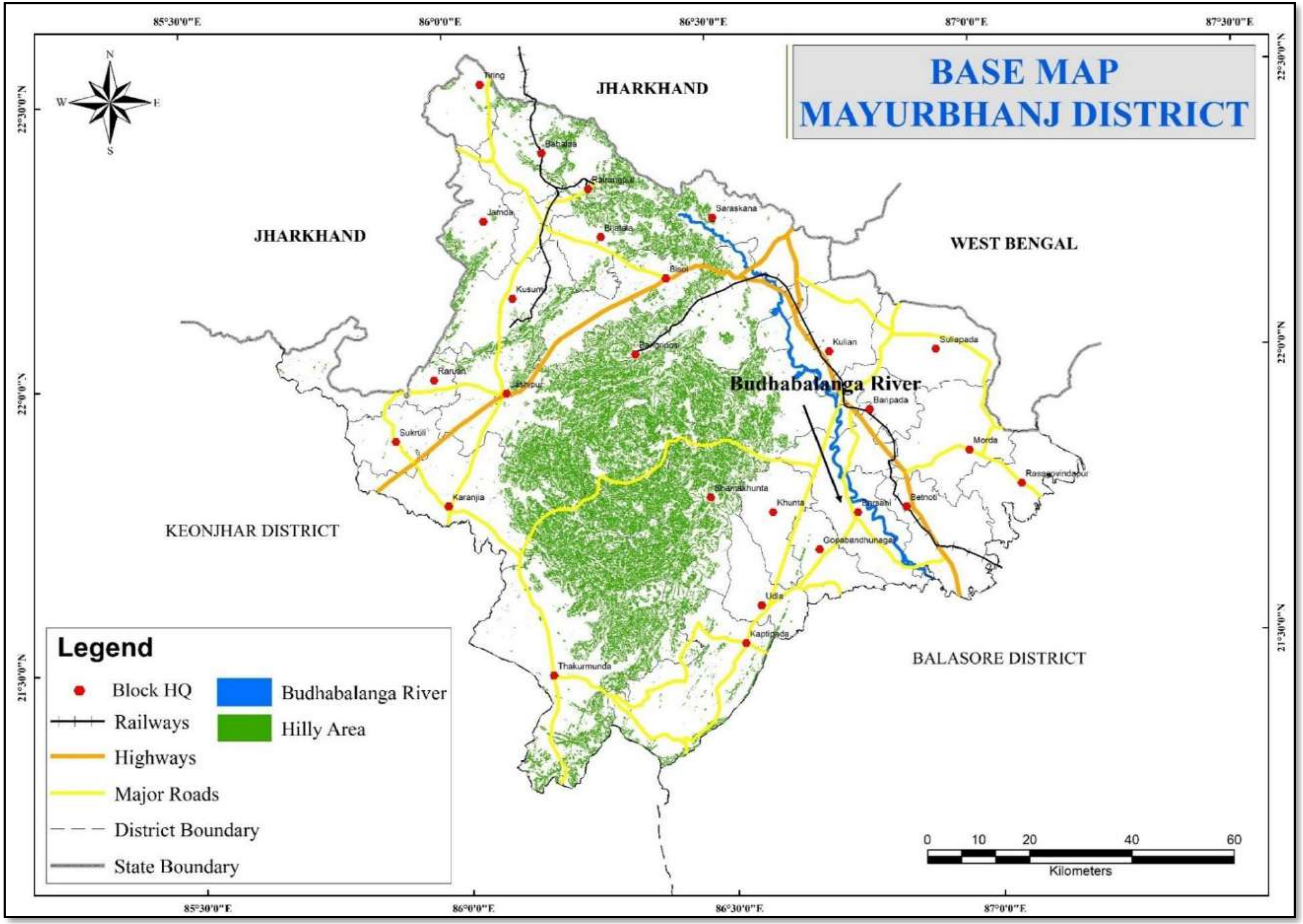


Figure 1.2 Base Map, Mayurbhanj district.

Data Adequacy and Data Gap Analysis

The available data of the Exploratory wells drilled by Central Ground Water Board, South Eastern Region, Bhubaneswar, Geophysical Survey carried out in the area, Ground water monitoring stations and ground water quality stations monitored by Central Ground Water Board were compiled and analyzed for adequacy of the same for the aquifer mapping studies. The data adequacy and data gap analysis were carried out for each of the quadrant of falling in the study area mainly in respect of following primary and essential data requirements:

- **Exploratory Wells**
- **Geophysical Surveys**
- **Ground Water Monitoring**
- **Ground Water Quality**

After taking into consideration, the available data of Ground Water Exploration, Geophysical survey, Ground Water Monitoring and Ground Water Quality, the data adequacy and data gap analysis was carried out.

Exploratory Wells

The information in respect of un-confined/Phreatic aquifer has been generated from the dug wells present in the area. Data from CGWB Exploratory wells (EW), OW and Piezometers are necessary for establishing aquifer geometry and determining aquifer parameters. The existing exploratory wells drilled in the area under Ground Water Exploration programme of CGWB are mapped and the adequacy of Exploration data is determined to demarcate the Aquifers. The adequacy of exploration data is given in Annexure-1 The data gap analysis indicate that, 50 additional wells are required to drilled in entire district.

Monitoring wells

Present status of ground water monitoring station is 99 NHNS wells which are existing which are monitored four times a year. From data gap analysis it is observed that 120 no. additional well required for monitoring the ground water regime of the phreatic aquifers.

Water Quality monitoring stations

99 nos of wells are there for monitoring the quality of ground water in different aquifers. From the data Gap analysis, it is found that 120 more wells are required to get a clear picture of hydro-chemical regime.

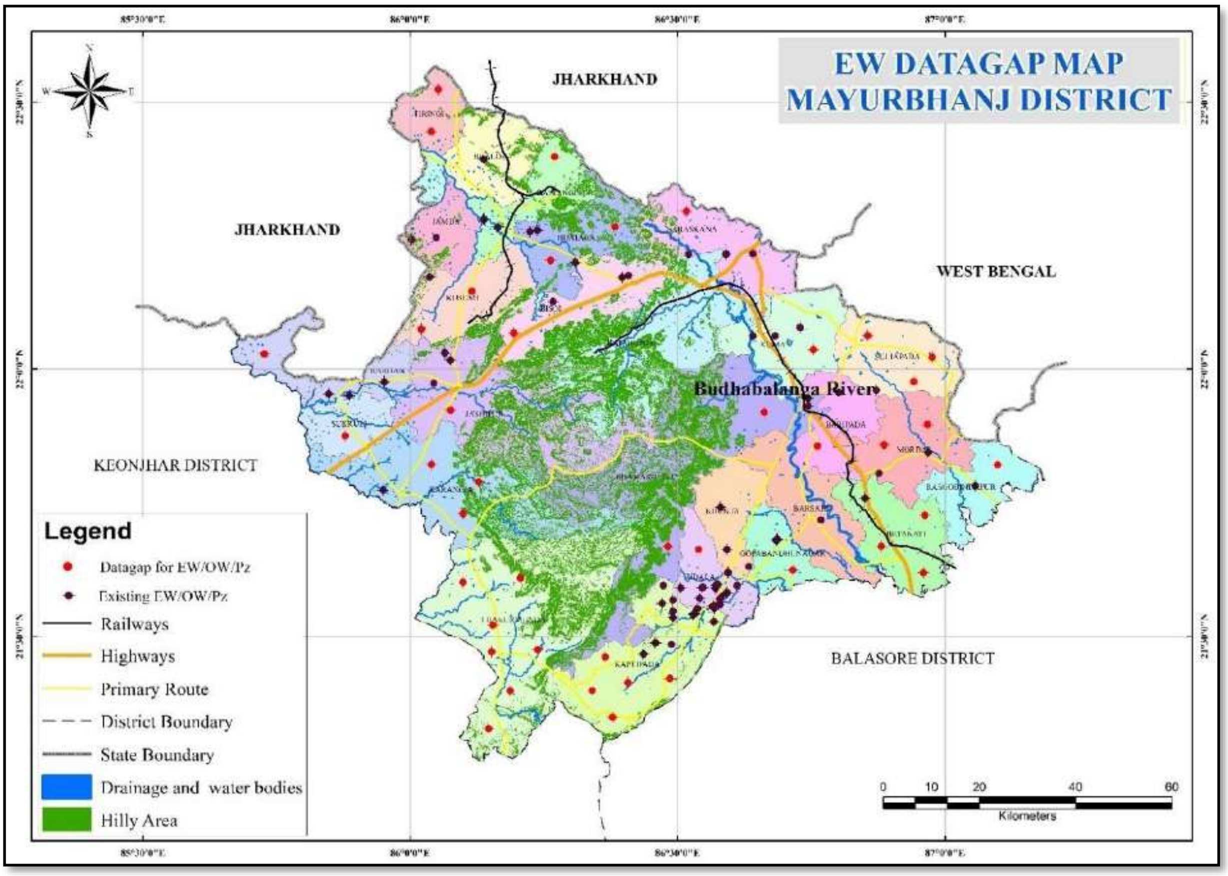


Figure 1.3 EW data gap map, Mayurbhanj District

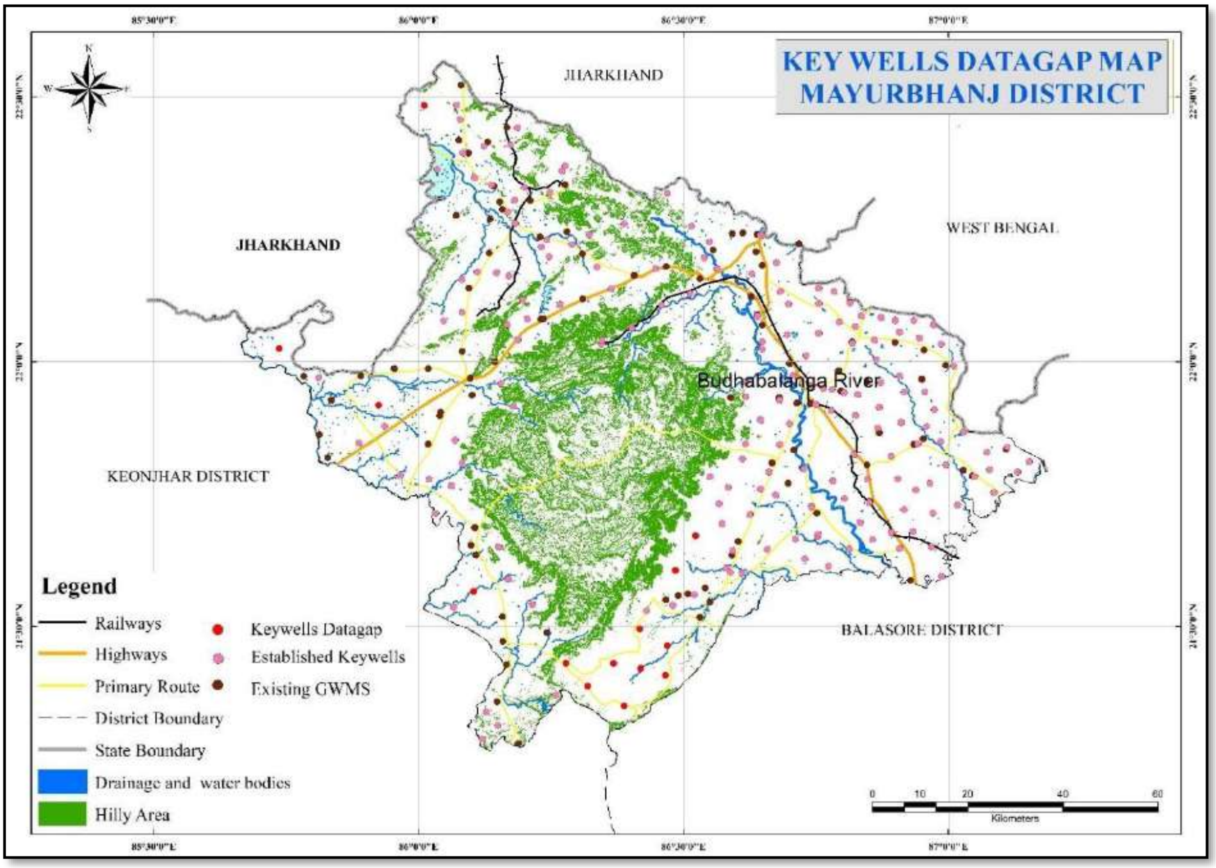


Figure 1.4 GWMS data gap map, Mayurbhanj District

Table 1.4 Data availability and Data gap analysis in Aquifer mapping study area

SN	Theme	Type	Data available	Data gap	Data generation	Total existing	Remarks
1	Borehole Lithology Data	EW/OW/Pz	107	31	03	110	Site proposed
2	Geophysical data	VES	70	-	144	214	
3	Groundwater level data	Dug well	99	14	174	273	
		Piezometer Aquifer-I	05	21	01	06	
4	Groundwater quality data	HP/Dug well-Aquifer-I	99		116	215	
		Piezometer Aquifer-I	-	-	-	-	
		Deep Tube well Aquifer-II	32	200	00	32	

Rainfall & Climate

Mayurbhanj district is characterized by tropical to sub-tropical climate with hot summer, high and well distributed rainfall during the monsoon and a cold winter. May is the hottest month with maximum temperature of 40.60C and January is the coldest month with minimum temperature of 5 0C. The annual rainfall of the district was recorded as 1580.0 mm in 2022, which is higher than the normal rainfall (1660.6 mm). The monsoon generally breaks during the month of June.

Rainfall is one of the most important factors, which determines the sowing time and other agricultural activities especially for rain fed farming. Every attempt is therefore made to study and analyze rainfall data in order to understand its distribution, pattern and characteristics. The analysis of 30 years (1992-2022) daily rainfall data of Mayurbhanj district has been done for determining the characteristics and distribution of rainfall. Seasonal and yearly analysis of the rainfall was also done for the Mayurbhanj district, with 100 numbers of rainy days. Monsoon rainfall contributes more than 75% of the average annual rainfall. The weekly rainfall was more than 20 mm from 18th to 41st SMW, however the percentage contribution is almost zero for 1st to 14th and 45th to 52nd Standard Meteorological week. (Ray et. al). The block – wise analysis of rainfall data from 1992 to 2022 (30 years) of the study area (block-wise) is given in Annexure-1. (Source. State relief commission Odisha.). An isohyet map (fig 1.7) is prepared to understand the spatial rainfall variation of the Mayurbhanj district.

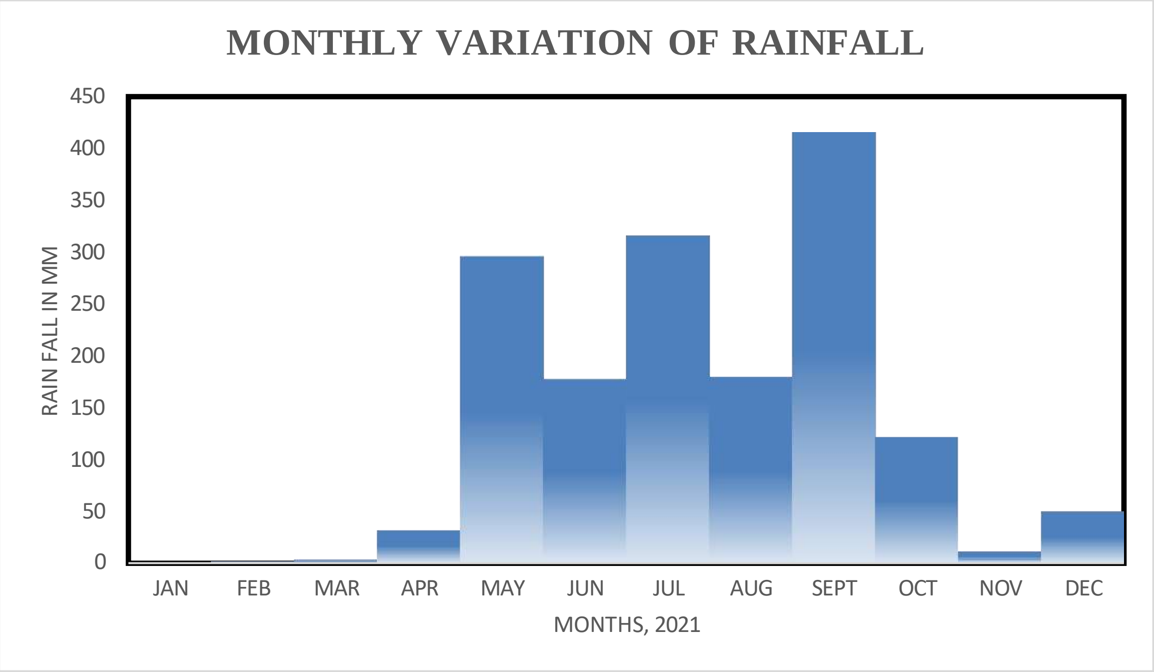


Figure 1.5 Monthly Rainfall variation of Mayurbhanj district.

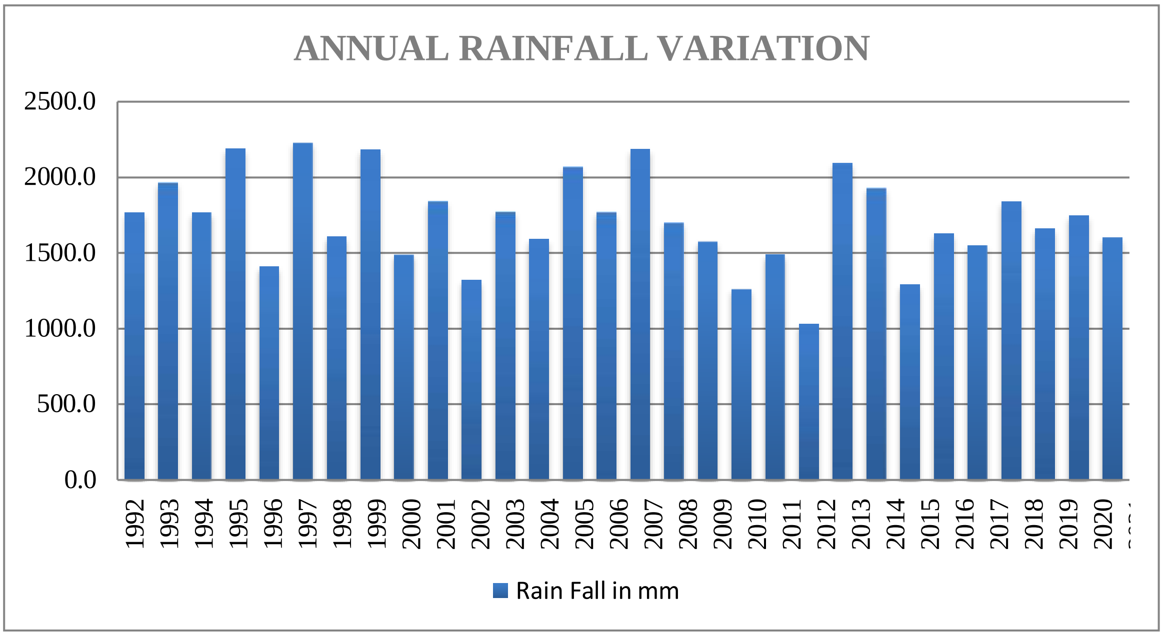


Figure 1.6 Annual Rainfall variation of Mayurbhanj district.

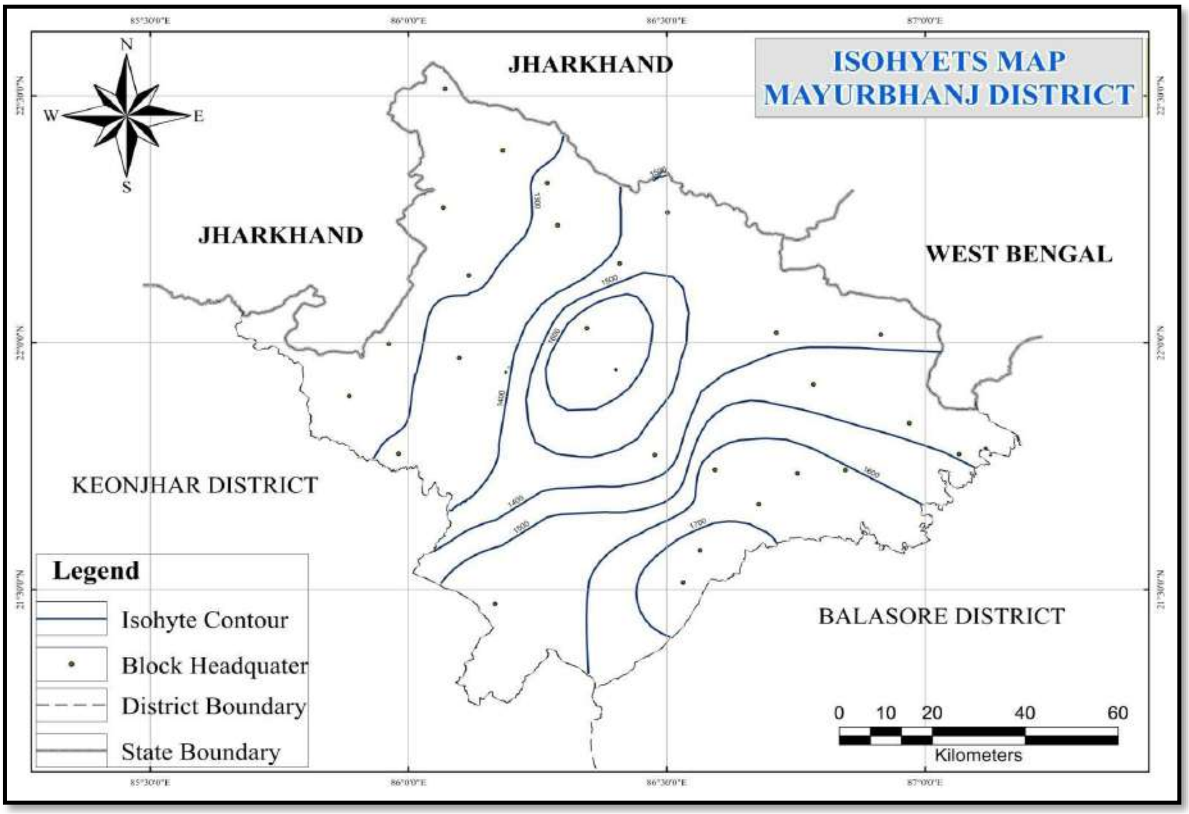


Figure 1.7 Isohyets map, Mayurbhanj district.

Temperature, Humidity and Wind

The Mayurbhanj district is coming under North Central Plateau agro-climatic zone of Odisha and characterized by tropical to sub-tropical climate with hot summer, high and well distributed rainfall during the monsoon and a cold winter. The summer season lasts from March to middle of June followed by rainy season from June to September and post monsoon period from October and November. May is the hottest month with maximum temperature of 47 ℃ and December is the coldest month with minimum temperature of 6 °C. The average annual rain fall in the district is 1500mm. The mean monthly potential evapotranspiration values range from 40mm in January to 347 mm in May.

Physiographic setup

The Mayurbhanj district shows conspicuous physiographic variations and mainly represented by high hills/ isolated hillocks/ domal granitic outcrops, vast undulating plains and alluvial tract. The central region of this district is marked with highest elevation which ranges from 800 to 1283 m from msl. At the center is occupied by Shimlipal hill inside the Shimlipal national park and tiger reserve and has elevation around 1,183 m from msl. From the center the rest of the district dips radially in all the directions.

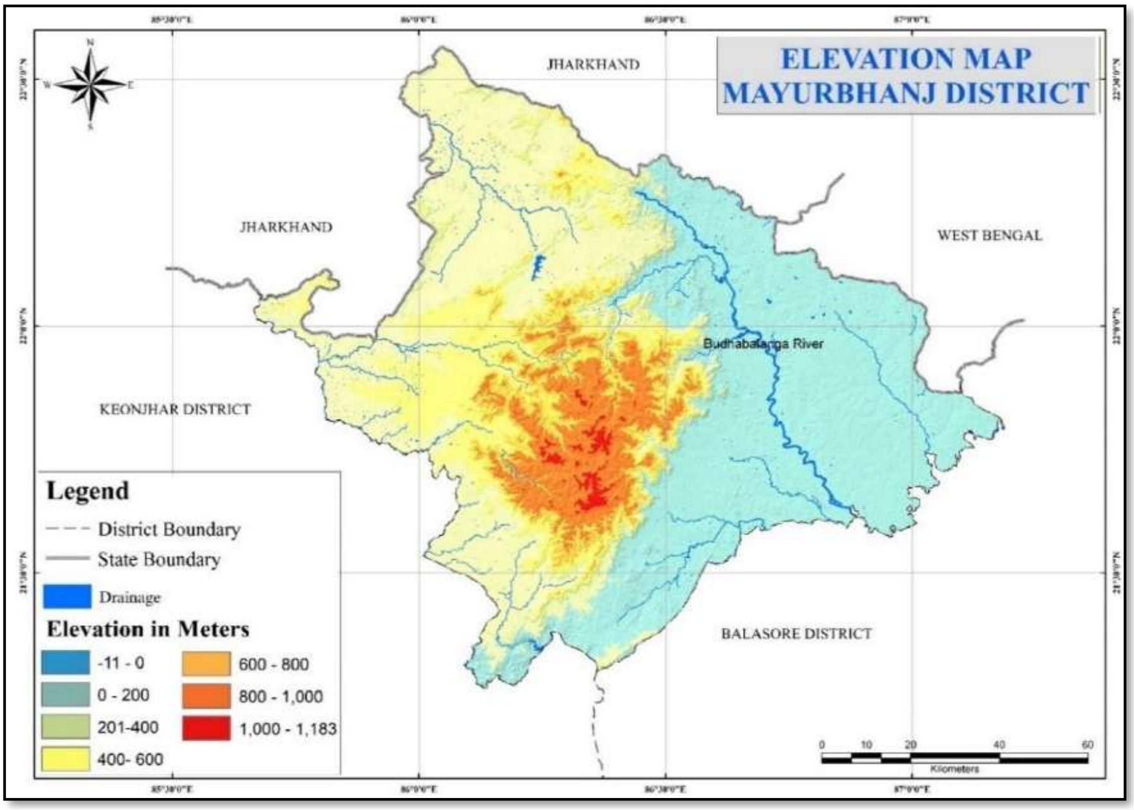


Figure 1. 8 Elevation Map, Mayurbhanj district

Geology

Precambrian metamorphic rocks cover major parts of the district. The Tertiary and quaternary formations are occurring in the eastern parts of the district covering about 21% of the area of the district.

Table 1.5 The generalized geological succession in the Mayurbhanj district

Quarternery	Alluvium and laterite
Tertiary	Clay, Ferruginous grits, sandstones, sand, gravel and limestones (Baripada Bed)
-------------------------- Unconformity--------------------------------	
Precambrian	Newer Dolerite and Singhbhun Granite Soda granite, Granophyre and Gabbro Anorthosite Dhanjori stage: Dalma volcanics and quartzite and Basal conglomerate Iron ore series: Carbonaceous phyllite, mica schist, quartzite, with BHQ. Amphibolite.
Precambrian rocks occupy an extensive stretch of the district.	

Source: Geological Survey of India.

The lithounit include amphibolite, quartzites, mica-schist, micaceous quartzite, volcanics, epidiorite gabbro anorthosites. Granite and granite gneiss. The quartzites are massive with compact joints. The Newer dolerites and Singhbhum granites are intrusive into the Archean group of rocks. Quartzites form small detached ridges, because they are highly resistant to subaerial weathering. The country rocks such as granite, granite gneiss. epidiorite, and gabbro-anorthosite suit of rocks are traversed by numerous dolerite dykes without any fixed trend. Laterites occupy the upland areas in discontinuous patches. The south eastern parts of the district falling in the toposheet 73 K/4, and NE-SW part of toposheet 73 K/8 are occupied by the alluvial tract. The characteristic feature of important litho-units is described below-

a. Volcanics

The volcanics belong to Dhanjori group of rocks. Variable in texture from fine to coarse grained and vesicular. The fine-grained varieties are compact and massive.

b. Gabbro-Anorthosites

The rocks are fine to coarse grained and highly foliated.

c. Quartzite

The Quartzite are highly massive with very compact Joints, sometimes micaceous, color varying from dirty white to greenish, Ferruginous Quartzites are also seen in the area.

d. Granite

These are medium to coarse grained, often fractured and well foliated.

e. Newer Dolerite:

These are developed prominently along NW-SE and NE-SW direction. They are mostly fine grained and intrusive into the older country rocks.

f. Hornblende-Schist

These are well foliated and schistose. Long prismatic needless of hornblende are aligned to the strike of the formation.

g. Tertiary Clays. Ferruginous grits and Gravels

Clay beds probably of tertiary age are found mostly in the plain areas south of Baripada. The typical exposures are seen along the Gangahar Nala section which is a tributary of Budabalnga river. Thick Tertiary sequence of shales, grits, limestone is encountered in the exploratory boreholes.

h. Laterite

Laterite are also seen throughout the highland areas, as capping over the country rocks thickness varying from 3-6 meter. These are mainly ferruginous.

i. Alluvium

It occurs as narrow strip along the Jamira and Budhabalanga river and over laterites. It includes sand, gravel and clay. Sand is usually medium to coarse; clay is yellow to grey and sticky. The thickness varies from 5 to 20m.

j. **Structure**

The regional strike of the foliation of the Precambrian formation is broadly along NNE-SSW direction, dipping steeply towards SSE. Based on the study of Landsat data it is inferred that a prominent lineament trending in NE-SW direction runs almost across the district. Other lineaments trend in E-W and NW-SE directions.

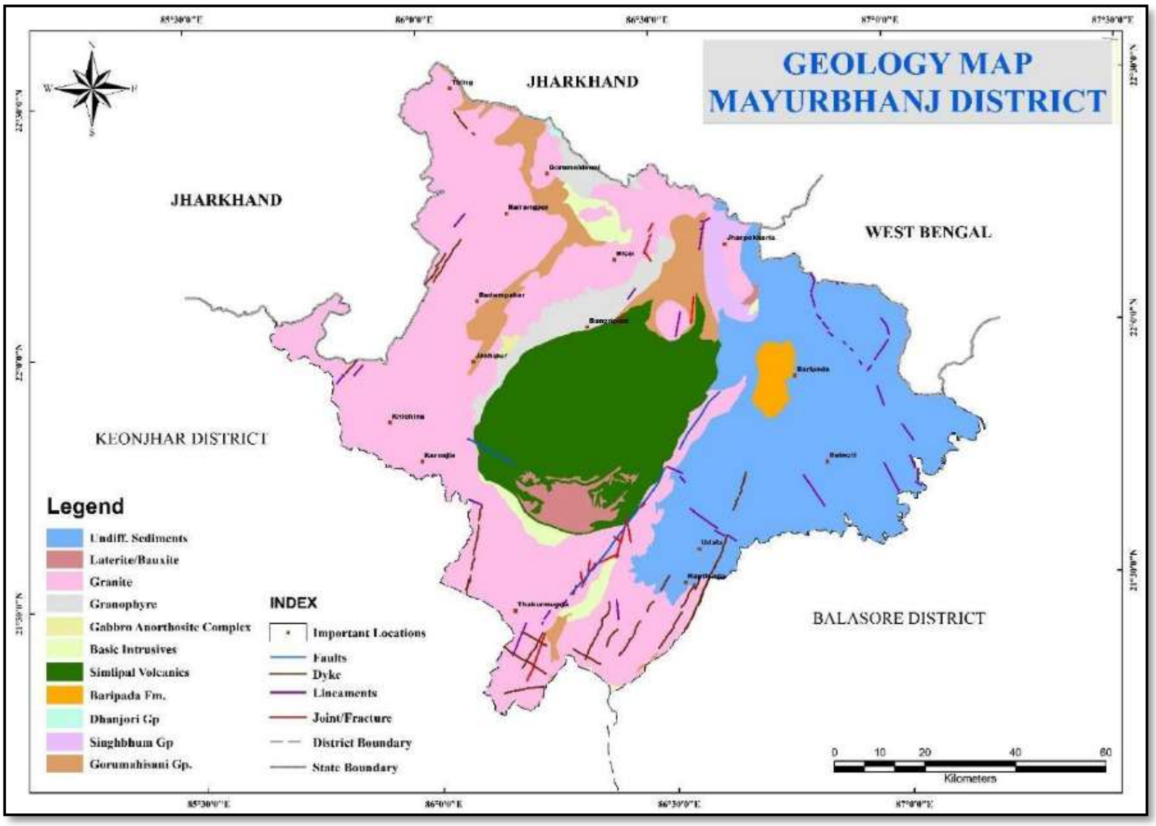


Figure 1.9 Geology Map, Mayurbhanj district

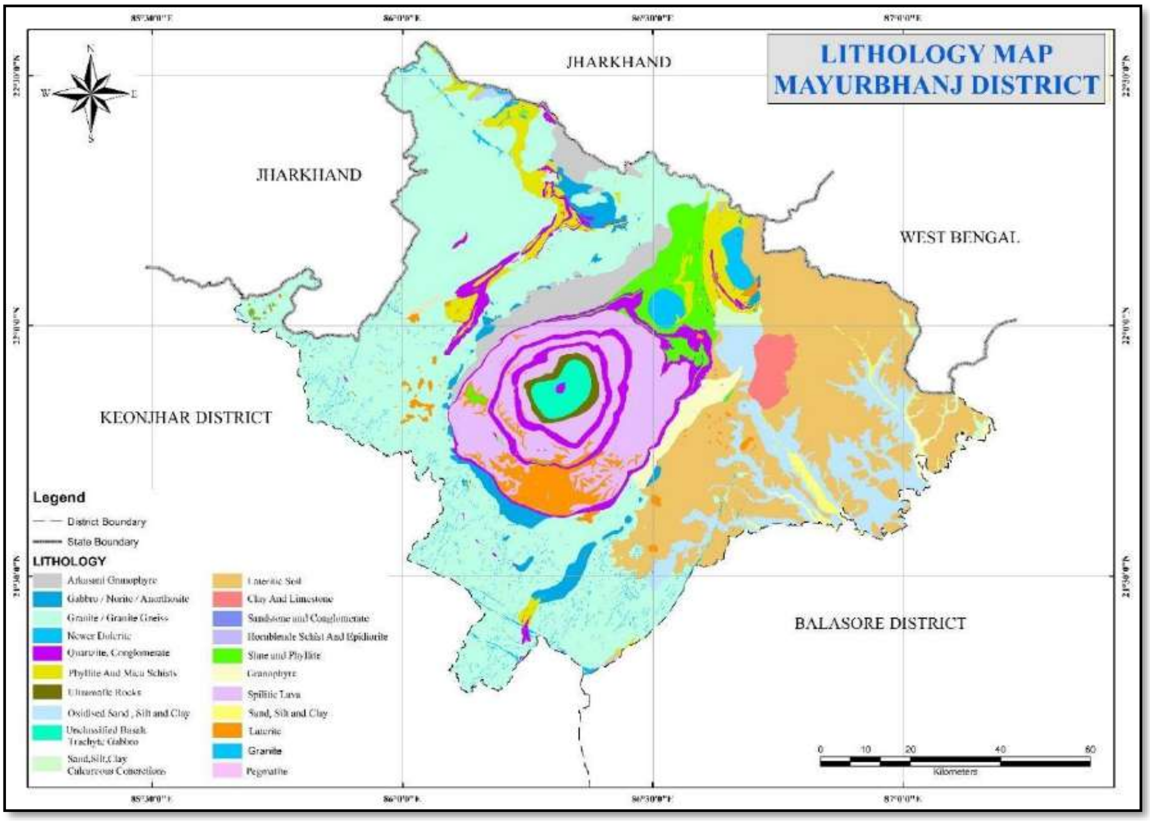


Figure 1.10 Lithology Map, Mayurbhanj district

Geomorphology

The district is characterized by three distinct physiographic units. These are 1) Central hilly tract, 2) Western hill range, 3) Eastern undulating plains. The Central hilly tract is occupied by the Shimlipal hill complex, with highest elevation of the district. The western hill ranges present a rugged hilly terrain studded with rocky mounds. The eastern undulating plain extending from the foot hills towards the east are characterized by gentle slope, and endowed with most of the fertile and cultivable lands. The geomorphic units of the district have been broadly identified as:

1. Lateritic upland
2. Alluvial plain
3. Flood plain
4. Structural Hills
5 Residual Hills
6. Intermontane valley
7. Denudational Hills
8. Linear Ridge
9. Shallow and deeply weathered Pediplain

<u>Laterite upland</u>

It occupies the eastern part of Baripada. The hard crust of laterite in the region is followed downward by litho margic clay and highly weathered bed rock. The general topography is characterized by gently undulating plain.

<u>Alluvial plain</u>

It occurs along a narrow stretch in the south-eastern and southern part of the district lying adjacent to the river Budabalanga.

<u>Flood Plain</u>

This hydromorphic unit has been mapped in the southern part and south eastern part of the district and in the northern part, of Bangriposi block. In this unit buried channel and migrated river courses form hydrologically significant units.

<u>Structural Hill</u>

This hydromorphic unit is formed mainly by the Quartzites in the and conglomerate Simlipal hill ranges and Iron ore group of rocks comprises phyllites, schist, BHQ and BHJ. This geomorphic unit occurs mainly in the western and central part of the district, and these are structurally controlled hills with complex folding, faulting and traversed by numerous joints and fractures facilitating infiltration and mostly acts as run-off zone. The Occurrence of spring is common in this hydromorphic unit.

<u>Residual Hills</u>

A group of massive hills of moderate areal extent and surrounded by plains all around occur in the central portion. These units also behave as a runoff zone.

<u>Intermontane Valleys</u>

These valleys are restricted mainly to the north western part and sporadically to the central part of the district and consist of phyllite and other Iron ore group of rocks. Groundwater potential is moderately good.

<u>Denudational Hills</u>

These hills are identified by their high relief. Granitic hills represent this geomorphic land form in the area. Rate of infiltration is very poor except along fractures/joints. These generally act as runoff zones.

Linear Ridges

This unit occurs extensively in the southern, western and north western part of the district, consist of basic dolerite dyke. These dykes act as barrier for groundwater Flow in different places. Fracture parallel to these dykes act as good conduit for groundwater movement.

Shallow and Deeply weathered Pediplain

These geomorphic units occur throughout the area except in the extreme eastern part of the district and consist of Singhbhum Granite. Occurrences of groundwater in this unit are moderate to good.

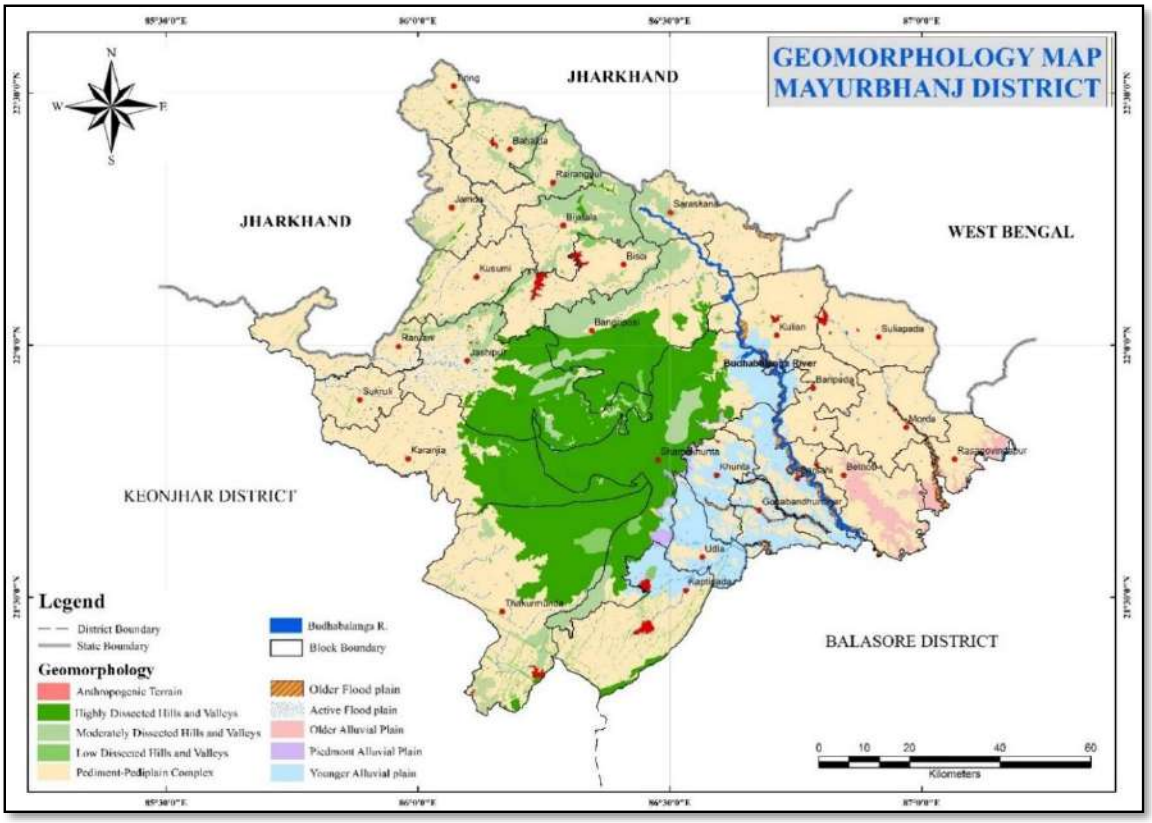


Figure 1.11 Geomorphology Map, Mayurbhanj district

Land use and land cover

The study area shows wide variation in the pattern of land utilization. Out of total geographical area of 1041800 hectares of land in Mayurbhanj district, about 68.7% of the land is available for cultivation and 26.9 % is categorized as other non-cultivated land. Further, forest area is around 387558 ha in the Mayurbhanj district. The following table shows the area of land put to different uses and their percentages to the total areas.

Table 1.6 Land use statistics in Mayurbhanj district, Odisha

Total geographical Area	: 1041800 ha
Area not available for cultivation	: 31,608 ha
Forest area	: 387558 ha
Other cultivable land excluding fallow land	: 27,235 ha
Fallow land	: 4,373 ha
Net area sown	: 419902 ha
Area sown more than once	: 142831 ha
Gross Crop Area	: 562733 ha
Waste Land	: 4071 ha
Cropping intensity	**: 134.0153**

Source: District Irrigation Plan (2016-21)

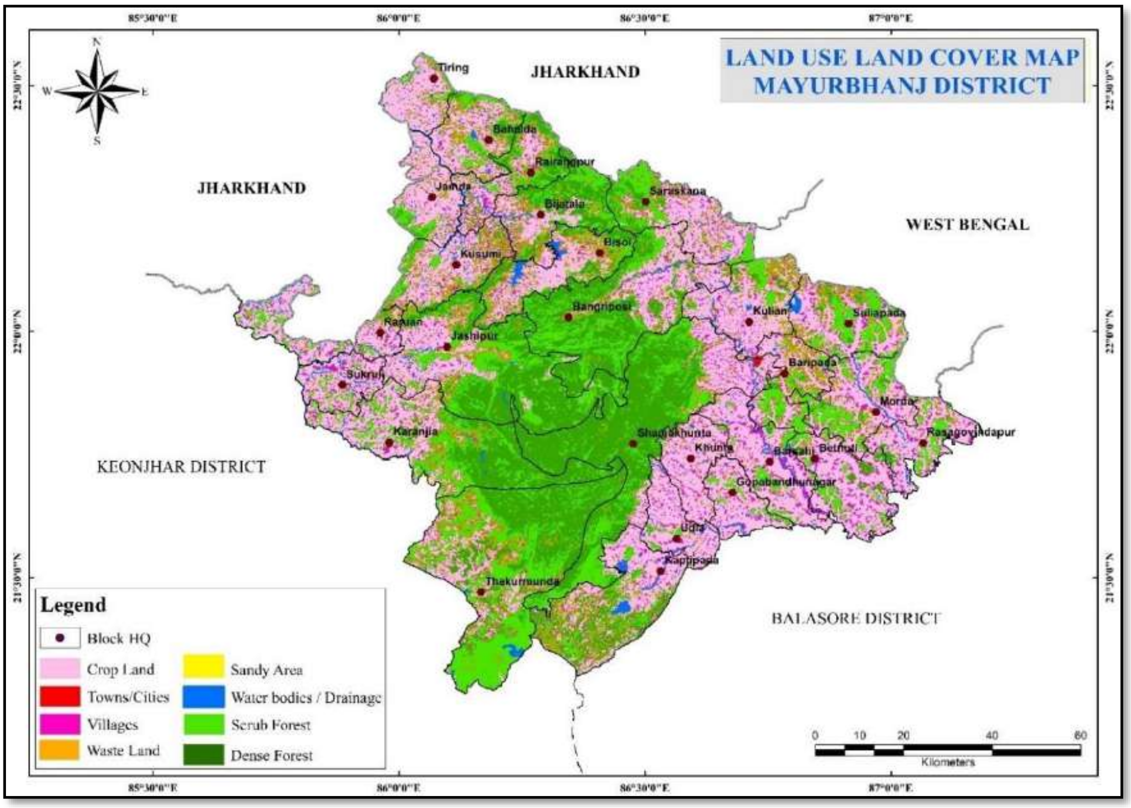


Figure 1.12 LULC Map, Mayurbhanj district

Soil

The soils of the district may be broadly grouped into two categories depending upon their occurrence, physical and chemical properties e.g., Alfisols. And Ultisols. The soils of the district are depicted in Fig.1.13.

1. Alfisols It is distributed throughout the district; these include older alluvial soil, red sandy soil, and red earth soil. These soils are generally deficient in P_2O_3 and N. pH varies between 6.5-7.3.
2. Ultisols: These soils include laterite, lateritic soil, red and yellow soil. These soils are poor in nitrogen phosphate, potassium and organic matter. The pH ranges from 4.5-6.0.

Soil erosion occurs when soil is removed through the action of wind and water at a great rate than it is formed. Concentrated high rainfall in monsoon period with sufficient surface gradient and uncovered crop fields are observed to be the major causes of land degradation in the area. As porous soil, they have poor moisture retention capacity and are subject to heavy runoff soil erosion.

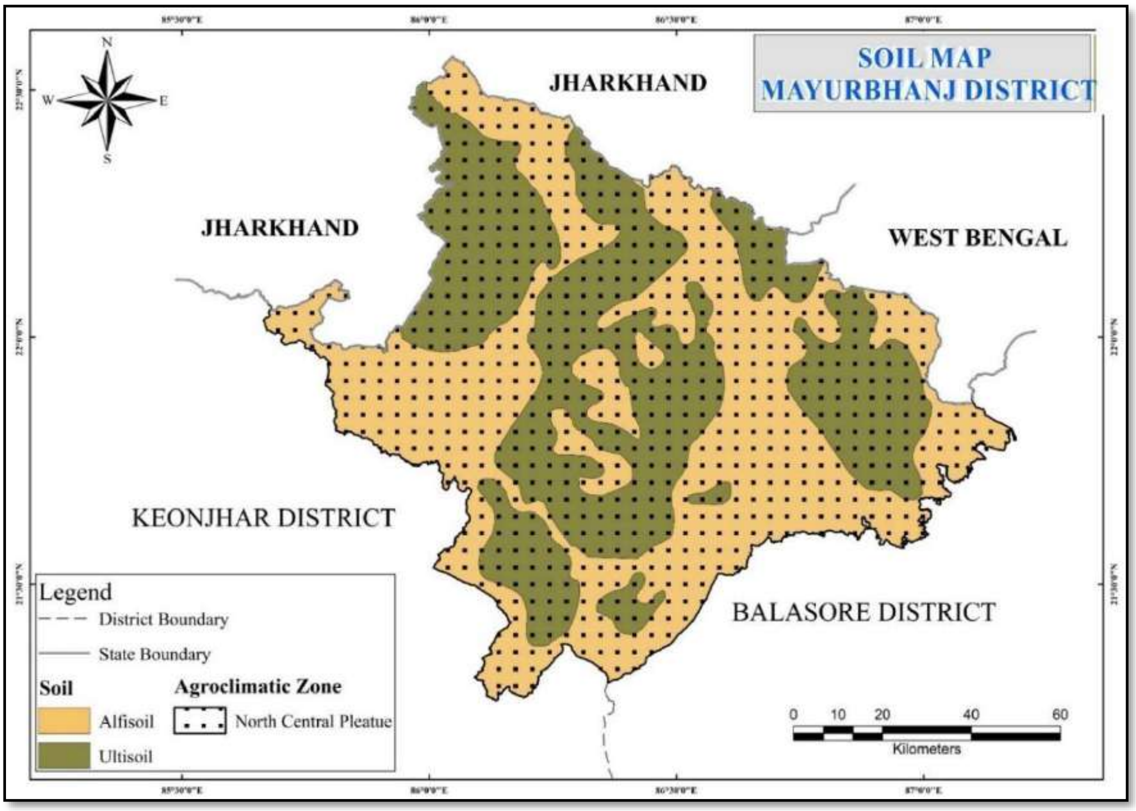


Figure 1.13 Soil Map, Mayurbhanj district

Drainage Characteristics

The district is drained by the Budabalanga, Kharkai, the Jamira and several other tributaries originate from Similipal Hills. All these rivers exhibit dendritic type of drainage pattern and are structurally controlled. The Budhabalanga originates from the Similipal range of hills of Mayurbhanj district and travels a total length of 198.75 km. before it finally empties into the Bay of Bengal. The river plunges through Barehipani Falls, the 2nd highest waterfall in India, located in Simlipal National Park. It then flows in a northerly direction up to the village Karanjiapal in Bangiriposi police-station. Thereafter, it turns to the north-east and flows along the railway track up to the village Jhankapahadi. There it changes its course to the south and meets the Katra nala. Then the river passes through Baripada. It later flows through Balasore district and into the Bay of Bengal. The river has strong erosive capacity because of its higher slope values and in the Similipal massif the average rainfall exceeds 150 cm. Thus, the Baripada plateau is highly eroded. The prominent tributaries of the Budhabalanga are Palapala, Sunei, Kalo, Sanjo, Deo, Gangahari and Katra.

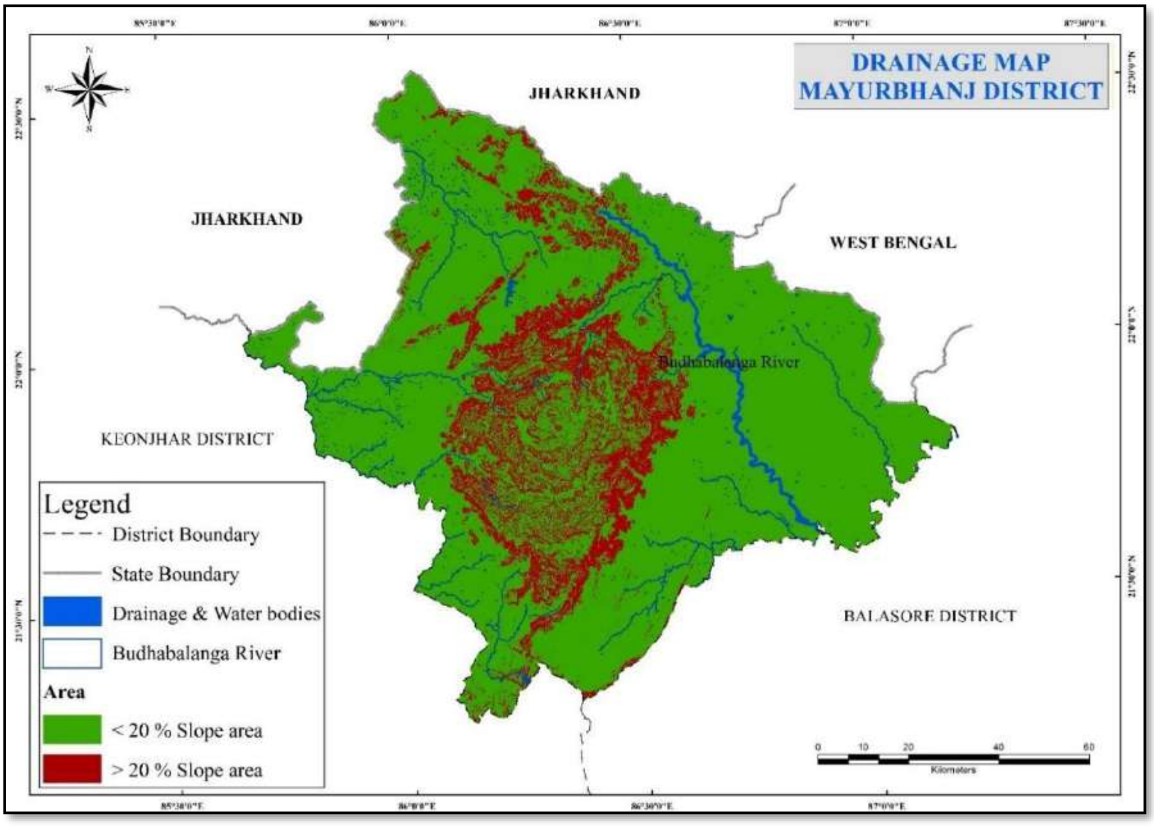


Figure 1.14 Drainage Map, Mayurbhanj district

Agriculture

The economy of Mayurbhanj District is mostly dependent on agriculture. The agro climatic zone and the favorable soil type induce the proper growth of agriculture in the District of Mayurbhanj. Paddy is the major cultivated crop, followed by pulses and oilseeds. While there has been decrease in the coverage of Kharif paddy in high lands, the area under pulses, oilseeds and other cereals has been showing an increasing trend due to diversification of cropping pattern in such land. Moreover, the land utilization pattern is quite accommodating for the genesis in the field of agriculture. The gross cropped area, net sown area and area sown more than once are 562733 ha, 419902 ha and 142831 ha respectively. The cropping intensity of the district is 74.80. Agriculture area details given in the table no 1.3 of LULC.

Irrigation

Area wise and crop wise irrigation status of Mayurbhanj district is given in table ii. Generally, the crops are well produced during the kharif season at Mayurbhanj district. In kharif season irrigated condition cereals cover 101444 ha whereas in the rainfed it covers 200016 ha. The coarse cereals cover a total of 230 ha in the district during kharif season. Besides that, the pulses (33439 ha), oil seeds (3382 ha), fibre (2465 ha) and vegetables (68205 ha) are also produced during kharif season. The pulses are produced during rabi season covers 39619 ha, oil seeds covers28506 ha and vegetables covers 41479 ha of the district. Generally, there are fewer crops found during summer season. The details of the irrigation details of Mayurbhanj district is given in annexure 10.

1.14. Hydrogeology

The Precambrian crystalline and the intrusive are consolidated formations, devoid of primary porosity, but form aquifers when weathered and fractured. The Tertiary formations are unconsolidated with lateritic capping and form potential aquifers. The recent alluvium is unconsolidated, highly porous, though of limited occurrence. The hydrogeology of district is depicted in fig. 3.18.

a. Water bearing properties of consolidated formation (Granite)

These are most predominant rock types occurring in the undulating plains of the district. Groundwater occurs under unconfined condition in the shallow weathered zone and circulates through fractures and joints. The thickness of the weathered zone varies from 3 to 35 m. Depth of the open wells in this formation varies from 5 to 14 meter below ground level. Depth to water level varies from 3.45-12.13 mbgl during pre-monsoon and 2.03-9.77 mbal during post-monsoon period. Seasonal fluctuation of water level ranges from 0.33-11.00 m. The depth of borewell in these formation ranges from 46-200 mater below ground level. In these borewells 3-4 water bearing fracture zones were encountered within the depth of 100m. The yield varies from 7 to 39 m^3/hr. for drawdowns of 10-25: The transmissivity value ranges from 4 to 58 m^2/day.

i. Mica-schist

These are occurring as patches in topographic low areas. Groundwater occurs under water table condition in the weathered zone and in the fractures and fissures below: The depth of the dugwells varies from 6-13 mbgl and depth to water level varies from 4-8 mbgl during pre-monsoon period and 3 to 8 mbgl during post monsoon period. The yield of the wells in this formation is good.

ii. Quartzites

These are generally massive and compact and not generally suitable for groundwater development, except when fractured and fissured. The depth of the open wells varies from 5-11.50 mbgl and depth to water level ranges from 3-6.50 mbgl and 2.57-5.18 mbgl during pre-monsoon and post-monsoon periods respectively. The seasonal water level fluctuation ranges from 0.33-4.30 m. The yield of wells tapping the formation is generally poor.

iii. Volcanics

These rocks are extensively weathered and the thickness of the weathered zone varies from 8 to 15 m. Groundwater occurs under unconfined condition in the weathered zone. Depth of the dug wells varies from 7 to 14 m. and depth to water level during pre-monsoon period varies from 4.20-5.80 mbgl and 2.3 to 2.70 mbgl during post-monsoon period.

b. Water bearing properties in Semi-consolidated formation

i. Tertiary formation

These formations consist of sand, Clay, sandstone, fossiliferous limestone and gravel. With the sand and gravel layer sandwiched between the clay layers are occurring under semi confined to confined condition form deeper potential aquifers. Depth of the open wells in this formation ranges from 4 to 15 mbgl. Depth to water level varies from 4.0-10 mbgl during pre-monsoon period and from 2 to 8 mbgl in post monsoon period.

ii. Laterite

Groundwater occurs under unconfined condition in this formation. The depth of the dug wells ranges from 3 to 22 mbgl and depth to water level ranges from 2.86 to 14m bgl during pre-monsoon period and 2.00-8.50 mbgl during post-monsoon period. The seasonal water level fluctuation ranges from 0.25- 13 m. The sp. capacity of the wells ranges from 0.82-1.94 lpm/m drawdown. The yield of dug wells and tube wells in the laterite ranges from 1 to 2 lps.

c. Unconsolidated formation

i. Alluvium

Sand and gravel layers form potential shallow aquifers. Groundwater occurs under unconfined conditions. The depth of the dug wells ranges from 6 to 12 mbgl and depth to water level ranges from 3 to 10 mbgl during pre-monsoon period and 1.96 to 8.24 mbgl during post-monsoon period. The seasonal water level fluctuation ranges from 0.7 to 3.5 m.

Data Collection and Generation

Data collection

Various data like rain fall data, hydrogeological data, exploration data are collected from previously existing data or newly generated or collected information in the AAP 2022-23. Previously available chemical data were collected but the gap is more as compared to the available data. So new wells are established to carryout sampling for the water quality analysis.

Hydrogeological data

The entire study area is covered by 99 regular monitoring stations. Water level data were collected 4 times a year in Premonsoon and Post-monsoon period. The data basically collected by CGWB SER in April, August, November and January every year to observe the changes in the water table of Mayurbhanj district.

Exploration data

Central ground water board, South Eastern Region, Bhubaneswar had undertaken exploration work in the district and drilling has been carried out in different AAP since 1979. Total 103 exploratory wells were drilled till date, out of 1which there are 72 EWs, 26 OWs and 5 Pzs. Some of the explorations wells to be constructed during this AAP.

Meteorological Data

Meteorological data is collected from SRC Odisha and accessed free data of IMD. Rainfall indicated the volume of water received which indirectly related to the water level changes in the aquifers and stored as resources. Rain fall data for last 30 years from 1988 to 2022 were given in the annexure 01.

Population and Aagriculture data

Population and groundwater dependency were collected from census 2011. All the data pertaining to agriculture were collected from District Irrigation Plan and Agriculture Contingency Plan of Mayurbhanj District for 2016-20 prepared by NABARD. The demographic details of Mayurbhanj district were given in the table 1.3. District statistical hand book of Mayurbhanj is also used to get some relevant data for different calculations.

Data Generation

Data gap analysis was done and maps were prepared. As shown in fig.1.3 & 1.4. Data generation is important to fill up the gaps apart from already existing structures in the district and this can be done after carefully observing the respective data gap maps.

Generation of water level data

A total of 165 nos. of key wells have been established around the district covering all the blocks of the district to fill up the data gap. twice in November as Post-monsoon and in April for the Pre-monsoon period. The details of the already existing GWMS with water level for Pre-monsoon and Post-monsoon period is given in the annexure 02.

Water Quality

To understand the chemical quality of groundwater in the study area and its suitability for domestic, drinking and agricultural utilization water quality analysis is needed for which previously existing quality data of CGWB were collected. Water samples were also collected from monitoring wells/ key wells for detailed analysis of basic parameters, iron and heavy metals etc. Along with all the previous existing GWMS new keywells were established and sample were collected for detailed study around the district. Total 215 water samples in the premonsoon and 32 samples in the postmonsoon have been collected from the prehetic aquifer to understand the source character and other required parameters necessary for the domestic and irrigation purpose. The details of the samples were given in the annexure 04 and 05.

Geophysical survey

Geo-electrical resistivity survey is a widely used geophysical method for subsurface studies; including groundwater exploration, environmental application and other engineering applications. The main benefit of this method is that it allows for performing the survey quite fast and in a cost-effective manner. Detection of different types of subsurface geology, water table, variation of resistivity with depths (distinguishing layered earth), detection of bedrocks depth, overburden thickness, etc. are the objectives of this survey.

A total of 70 VES were carried out in parts of Mayurbhanj district. The VES locations are shown in the map. (fig. 2.1). The existing Seventy-Seven (70) interpreted VES data location details and their interpretation were given in the annexure 03. The VES results were correlated with the local geology & Hydrogeology and compared with the lithologs of 66 bore holes drilled by CGWB in Mayurbhanj district.

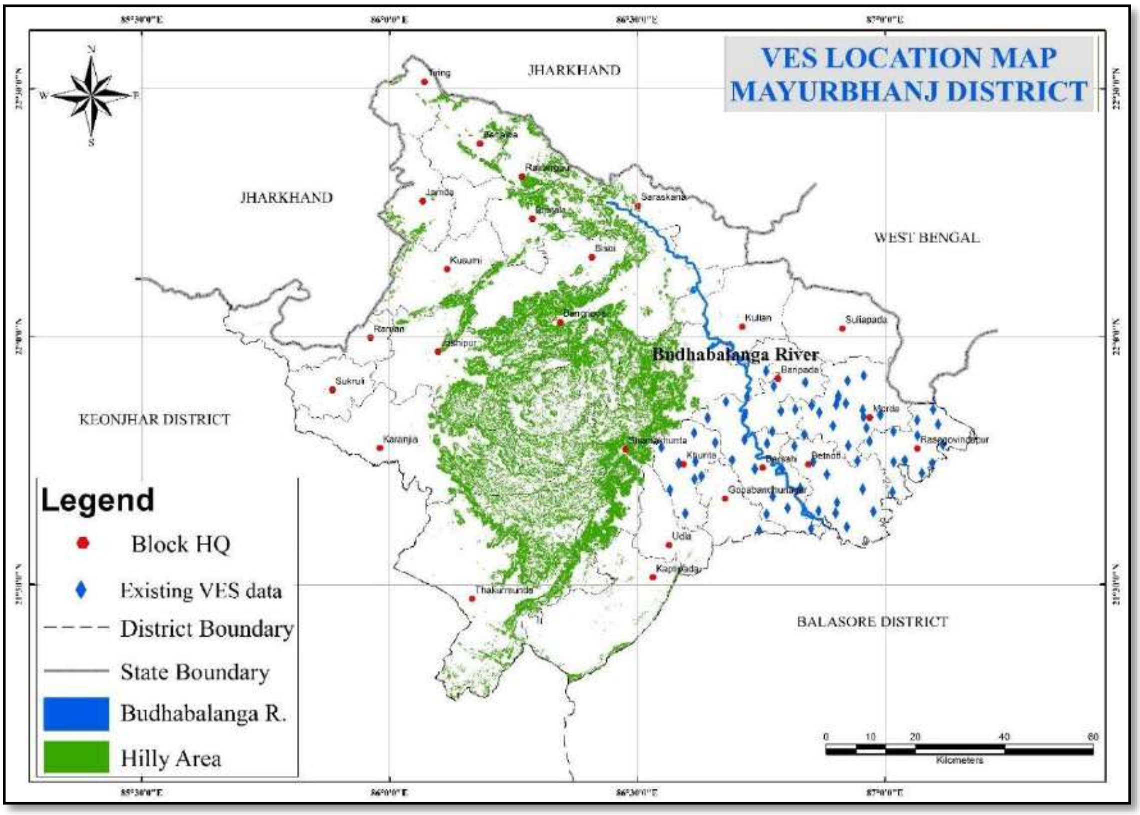


Figure 2.1 VES location Map of Mayurbhanj District.

Exploratory Drilling

In order to decipher the aquifer system of the area, CGWB has constructed Exploratory Wells (EW), Observation Wells (OW) under in-house departmental Ground Water Exploration and outsourcing programme. In the AAP 2022-23 only three wells are drilled (1 Ew, 1 Ow and 1 Pz). Thirty-three tentative sites are proposed for drilling in the Mayurbhanj district through outsourcing drilling.

Data Interpretation, Integration and Aquifer Mapping

Geophysical Exploration and Aquifer Characterization

Geo-electrical resistivity survey is a widely used geophysical method for subsurface studies; including groundwater exploration, environmental application and other engineering applications. The main benefit of this method is that it allows for performing the survey quite fast in a cost-effective manner. Detection of different types of subsurface geology, water table, variation of resistivity with depths (distinguishing layered earth), detection of bedrocks depth, overburden thickness, etc. are the objectives of this survey.

Geophysical survey incorporates the Vertical Electrical Sounding (VES) and Horizontal Profiling activities. The Vertical Electrical Sounding (VES) is currently being very popular with groundwater investigations due to its simplicity. The interpretation of electrical resistivity data is the process of deriving the values of true resistivity's (ρ) and thicknesses (t) of various subsurface strata from the values of recorded resistance (R) or apparent resistivity (ρa) at electrode separations (a). There are a number of interpretation techniques for evaluating (ρ) and (t) of each of the stratum as proposed by many investigators. These can be grouped as analytical, numerical, empirical, and graphical; with several procedures within each category. The computer software, IP2 WIN was used to analyse the filtered and processed field data. The software inverts the field data, calculates the appropriate model in term of resistivity, and provides output in the form of resistivity layers.

This inversion data is used to draw up the lithological and geological information. The resistivity of any given layer depends upon rock type, grain size, degree of void spaces and amount of water present, degree of weathering, mineral constituents etc.

Objective of the Study

The study aims to combine the Vertical Electrical Sounding (VES) with the borehole lithology data that governs and regulates subsurface hydrogeological settings. In this regard total of 144 VES were designed to be surveyed in the study area using the Schlumberger method in hard rock formation. The study also aims to delineate the aquifer group model based on the geoelectric layer parameters inputs.

Geophysical Materials and Methods

The resistivity technique involves calculating the resistivity of geo-electrical subsurface materials by transmitting the direct electric current in the subsurface and recording the potential difference developed by the infused current. The Vertical Electrical Sounding (VES) data collected by employing the Schlumberger configuration are plotted as a graph of the apparent resistivity (ρ) against the half-electrode spacing AB/2. An approximation for the depth of the interface suggested equal to (2/3) two-thirds of the spacing of the electrode at the point of inflection (Vingoe 1972). In this context, the VES survey was accomplished using the linear four-electrodes Schlumberger configuration at 144(in this AAP 2022-23 Year) location stations have been employed to decipher the aquifer disposition, the location of VES shown on the map (**Fig.3.1**). The study aims to figure out the aquifer disposition the resistivity and thickness in terms of layer parameters are translated into corresponding hydrogeological parameters.

The spacing of current electrodes ranges from 200 m to 400 m (AB), and 0.5 m to 20 m (MN) were used for potential electrodes. The separation of the half-current electrodes was AB/2= 2, 3, 4, 6, 8, 10, 12, 15, 20, 25, 30, 40,50, 60, 70, 80, 90, 100, 120, 140, 160, 180, and 200m, the potential electrode separation was MN/2 = 0.5,2, 5,10 and 20 m. The expression for Schlumberger configuration apparent resistivity is:

$$\rho_a = K \frac{\Delta V}{I}$$

$$K = \frac{\pi\left(\frac{s^2 - a^2}{4}\right)}{a}$$

Where, V = Voltage Recorded,

I = DC Current Injected

K = Geometric factor

S =AB/2= The linear distance between current electrodes

a = MN/2=Distance between the potential electrodes

The locations of the VES data point and spread-out were designed depending on the feasible of space. The field resistivity survey was accomplished using ANVIC make CRM 20 instrument. The apparent resistivity measurement was plotted against the half-current electrode (AB/2) separation on the log-log graph. The VES curves obtained from the field were interpreted using a partial curve matching technique (Orellana and Mooney 1966). The layer parameters obtained from curve matching have been used as initial model. The initial layer model used as input in the IPI2win software to generate a final resistivity layer parameter model. Each layer's resistivity and thickness are delineated for available layers with the least Root Mean Square (R.M.S.) error between the calculated resistivity and field values. The inversion analyses for the sounding curves have been accomplished with an average of 5% fitting error.

The resistivity of geological formations may vary significantly based on the type of formation, degree of weathering, fracturing and connectivity of fractures of the formation. The resistivity layer parameters enable quantifying subsurface layers' thickness and resistivity and roughly estimating groundwater quality (i.e., salt content). Although, resistivity is the most varying geophysical parameter and is not unique even for the same material. The resistivity of water also affects resistivity and may range from 0.2 Ω m to over 100.0 Ω m based on dissolved solids and their ionic concentration (Palacky 1987).

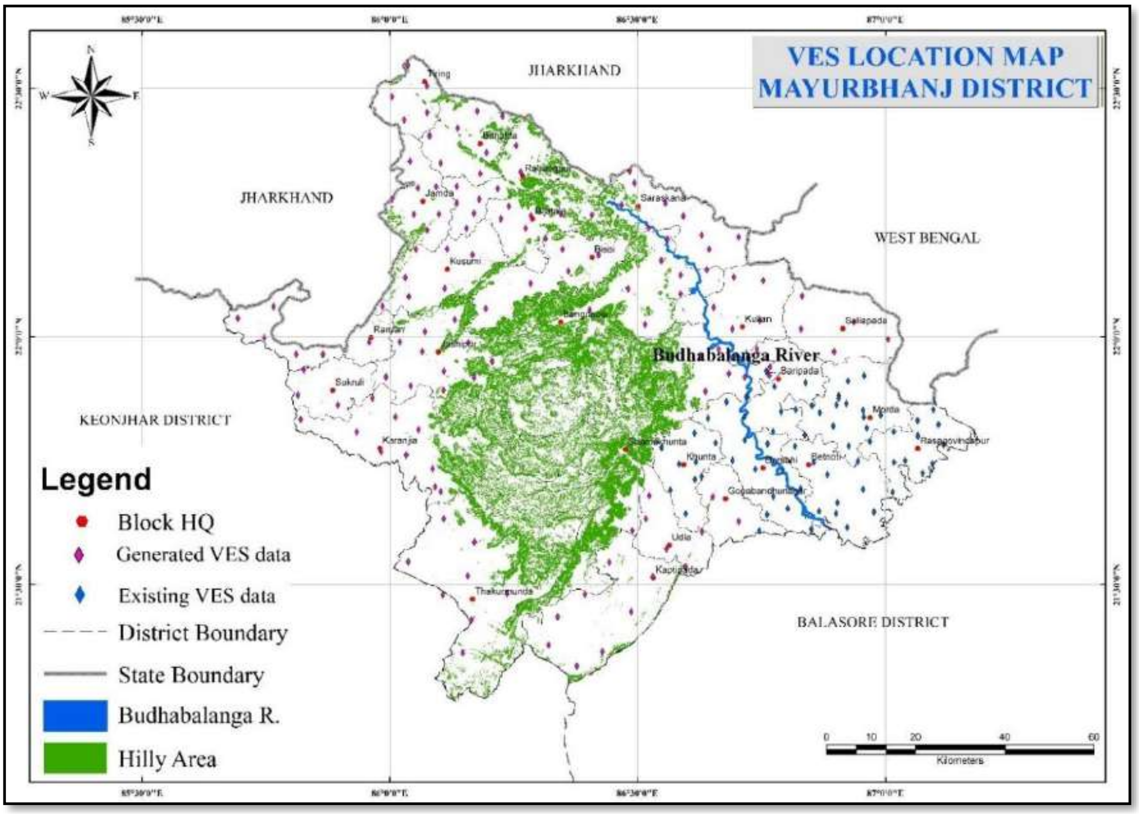


Figure 3.1 VES location map, Mayurbhanj District

However, the limitation can be expected when resistivity methods are used if the ground heterogeneities and the anisotropy is present (Matias 2002; Khalil 2010). Thus, optimizing layer parameter models for non-predictable biased interpretation is essential to correlate the results of VES with the known lithology obtained from nearby borehole lithology. A total of 56 borehole lithology correlated with interpreted VES data. The correlated resistivity results and borehole lithology were utilized to fix the resistivity range for lithological units obtained from the survey and conceptualize litho-geoelectric sections.

The borehole lithology calibrates the resistivity model per the local geological set-up. The resistivity data correlated with borehole lithology data have identified the subsurface vertical and lateral variations in hydrogeology, which are essential to understanding groundwater chemistry (quality) and rough quantity (Park et al. 2007).

VES Data Interpretation

In the Mayurbhanj district, previously total 70 VES data were present and 144 VES were carried out during this AAP 2022-23 which are given in the annexure 04 and 05 respectively. A map (**fig.3.1**) was prepared showing the overall VES carried out in the district so far. All the 144 VES were interpreted in terms of layer parameters. The field curves were obtained as H, HK, KQ, KH, HKH and QH type. The long spread VES and Borehole logs spatially distributed were utilized for interpretation. The interpreted results are also given in the annexure 04 and 05.

VES analysis delineates that the true resistivity of the top Soil/Dry soil layer ranges from 7.74 to 1633 Ω.m. This top layer varies in depth from 0.924 to 5.11 m. Next, the 2nd layer has Clay/ Compact Clay having a resistivity range of 5 to 20 Ω.m Occasionally extend to 1633 Ω.m. The thickness of this layer varies from 0.735 to 8.36 m. But in alluvial area like Eastern part of the district (Like Morada block, Betanati Block, Rasgovindpur Block, Barasahi and parts of Khunta block) it may extend more than 100m .In Some area Sand layer is present as 2nd & 4th layer whose resistivity varies from 20 to 75 Ω.m and thickness of this layer varies from 4 to 47m.The mostly third and occasionally 2nd & 4th layer is Highly Weathered to Weathered Formation having a resistivity of 25 to 250 Ω.m, bearing good quality groundwater also. The depth of this layer varies from 3 to 83m. Wide range of the resistivities may be due to the variations in the degree of Weathering, nature of the formation, etc. Mostly the 3rd or 4th geoelectric layer, occasionally the 2nd one with resistivities ranging from 250 to 800 Ohm m, occasionally exceeding to more than 800 Ohm m has been inferred as formation with fractures (Fractured granite). Wide range of the resistivities may be due to the variations in the degree of fracturing, nature of the formation, etc. The thickness of the geoelectric layer inferred formation with fractures varies between 11 and 93 m.
Mostly the 4th or 5th geoelectric layer, occasionally, the 2nd or 3th one with resistivities ranging above 1K Ohm m, has been inferred as Granite Formation. The depth to bottom of this layer is, in general, varying from 4.84 to 200 m.
On the basis of geoelectrical layer parameters and the fractured zone analysis a few sites are recommended for borehole drilling or Shallow borehole or Dug well.

Table 3.1 Resistivity range of available lithology in Mayurbhanj district.

Sl. No.	Lithology	Resistivity Range
1	Top Soil/Dry Soil	15 to 250 Ω.m.
2	Clay/Compact Clay	5 to 20 Ω.m
3	Sand	20 to 75 Ω.m
4	Highly Weathered / Weathered Formation	25 to 250 Ω.m
5	Fractured granite	250 to 1K Ω.m
6	Granite	Above 1K Ω.m

2-D Sections and 3-D panel diagrams were prepared to show the variation in lithology by using the interpreted geophysical (VES) data.

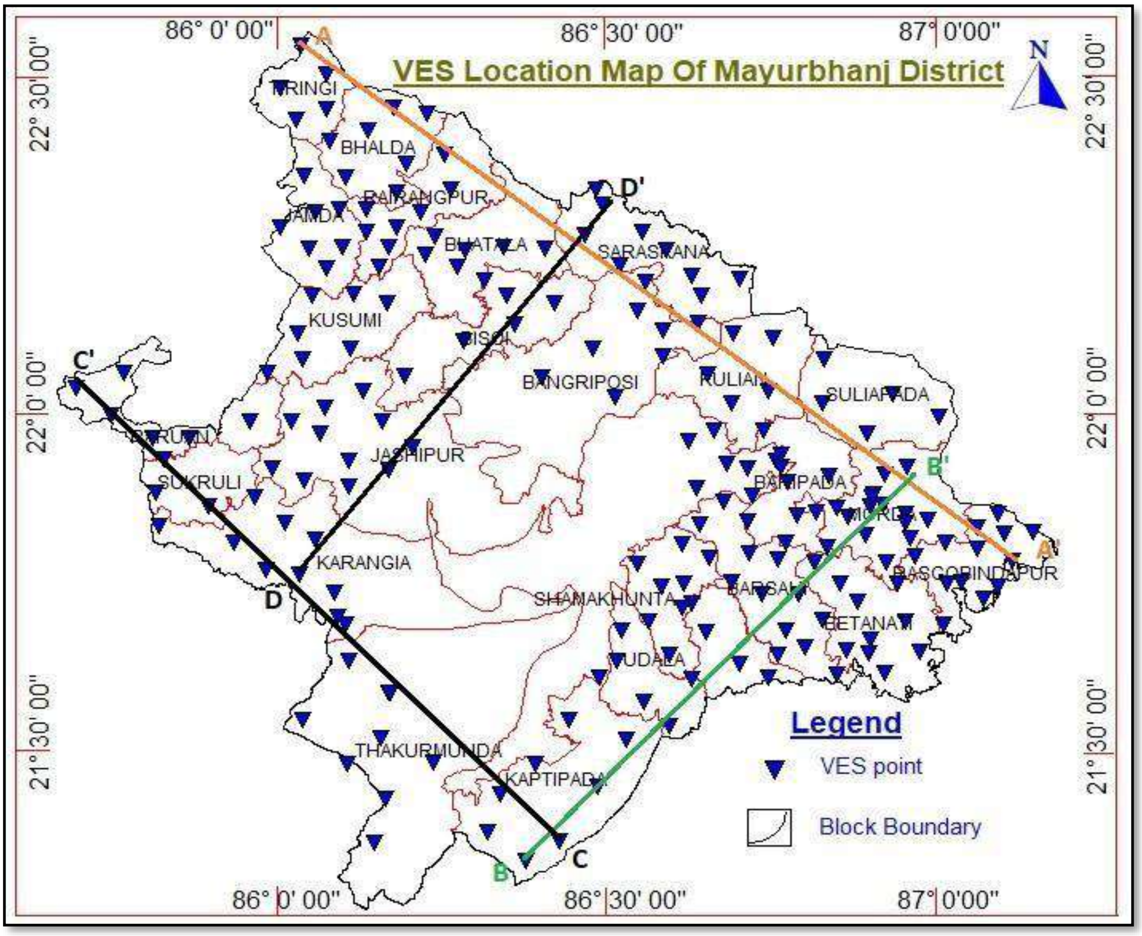


Figure 3.2 Locations of VES points for Sections, Mayurbhanj district

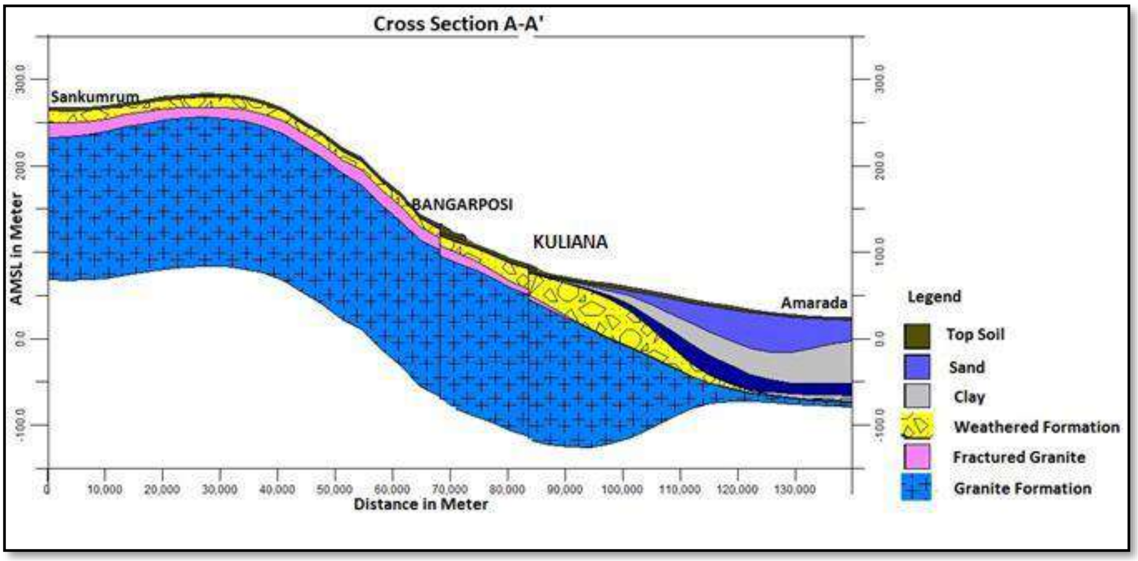


Figure 3.3 Section along A-A' from VES data, Mayurbhanj district

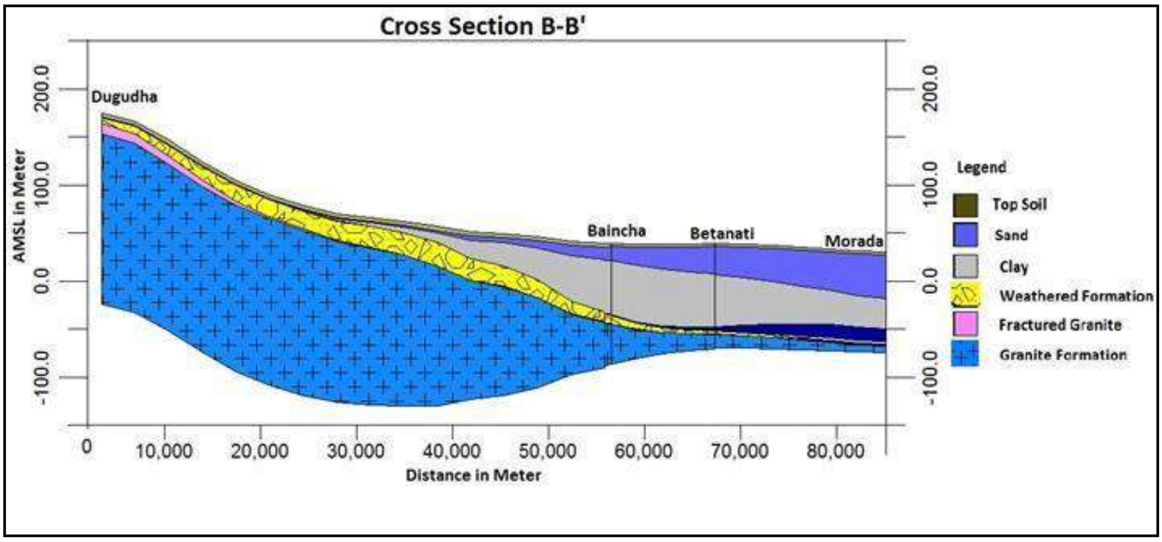


Figure 3.4 Section along B-B’ from VES data, Mayurbhanj district

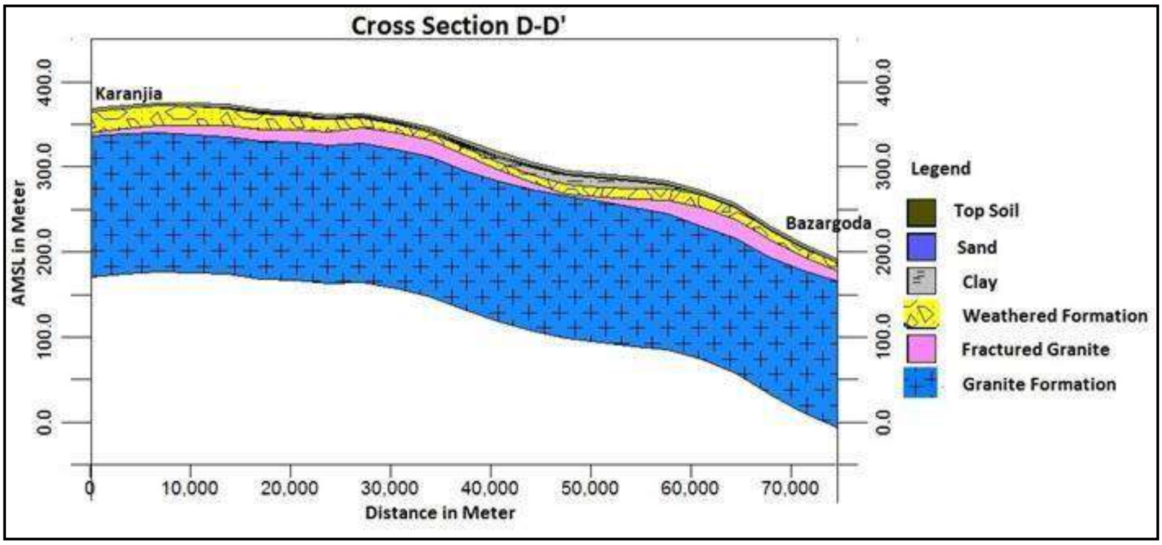


Figure 3.5 Section along B-B’ from VES data, Mayurbhanj district

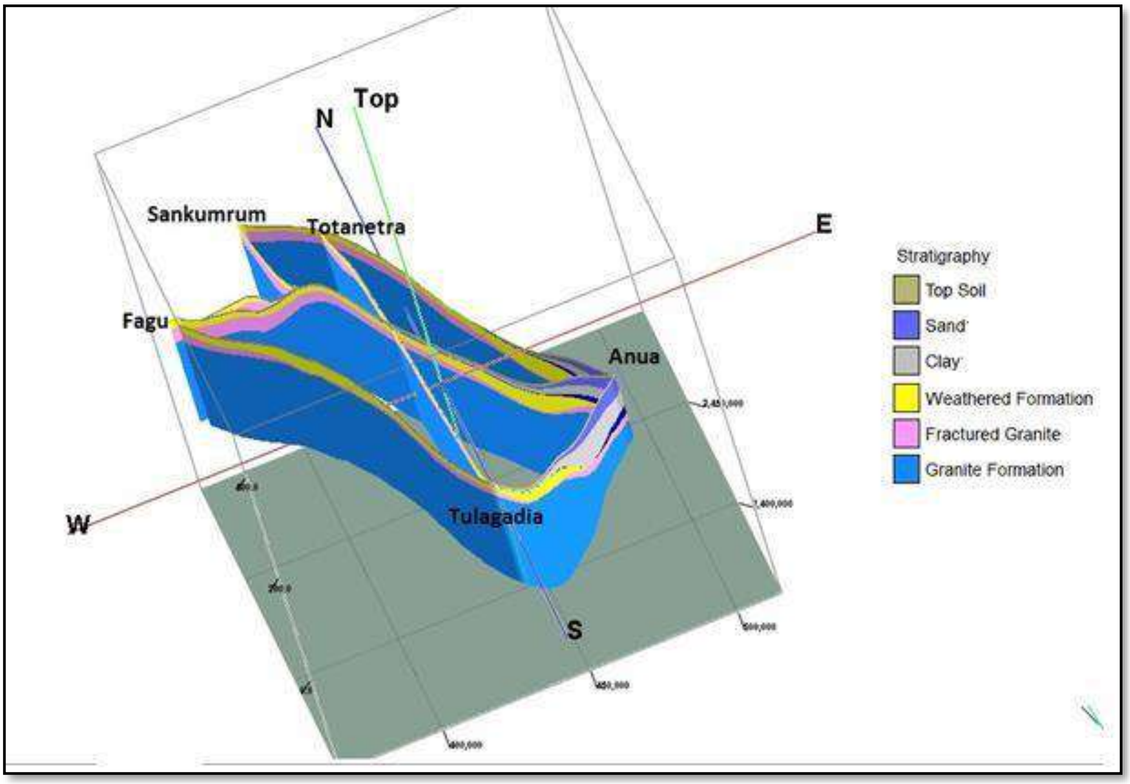


Figure 3.6 Panel diagram from VES data, Mayurbhanj district

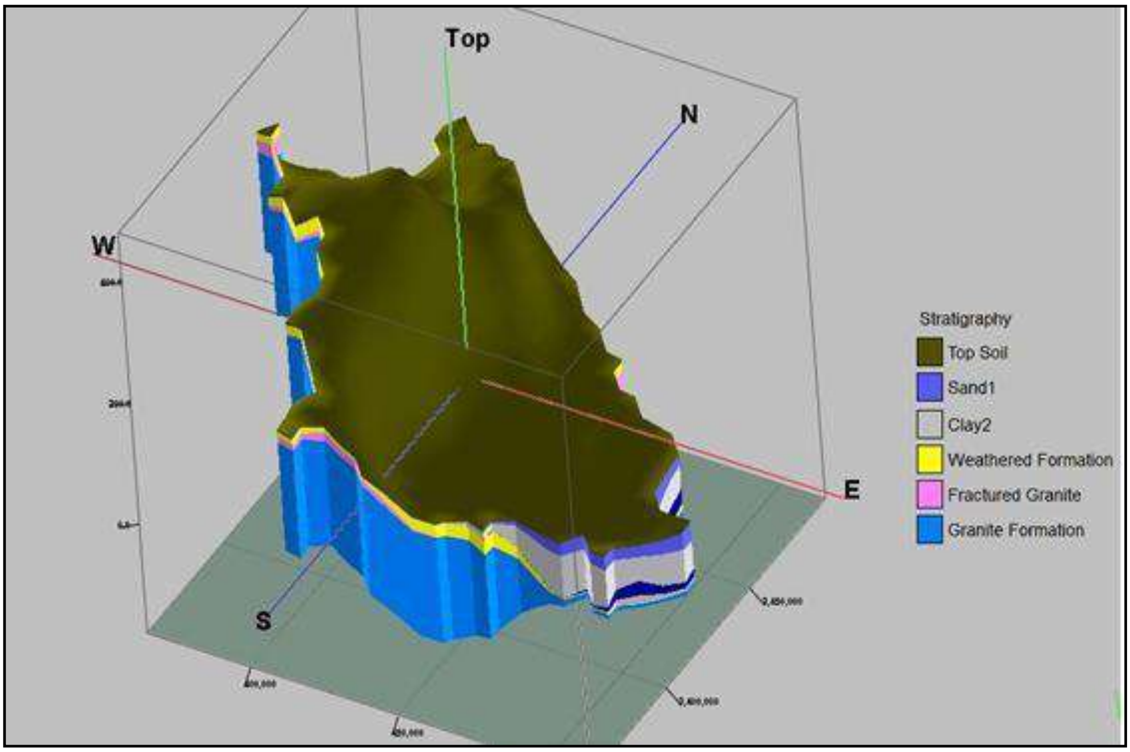


Figure 3.7 Panel diagram from VES data, Mayurbhanj district

Aquifer Dispositions.

Exploratory drilling has been carried out at different time in the district with the objective to delineate deeper water bearing fractures in the consolidated formation and granular zones in alluvial formations. The subsurface geology of Mayurbhanj District is interpreted based on exploration data of CGWB. From the examination of lithology samples during drilling lithologs were prepared previously and during this AAP 2022-23 wells were drilled followed by preparation of lithologs. The distribution of drilled wells Ew/Ow/Pzs based on drilling depth are given in the table 3.2. and spatial distribution of the drilled wells are given in the exploration map (fig.1.3).

Geologically the district is comprised of Precambrian and Tertiary formations. It is observed that the western and central part of the district is mainly hard rock dominated. These Pre-Cambrian crystalline formations are hard, compact and does not have primary porosity and hence impermeable. Weathering, jointing and fracturing induces secondary porosity. Ground water occurs under phreatic/ unconfined condition in weathered residuum from which water moves downward through joints, fractures etc. The yield range in the hard formation ranges from 1 lps to 11 lps. The eastern portion of the district is deposited with thick alluvial formations like sand separated by thick bodies of clay towards the boundary. The maximum depth of well drilled up to 303 m bgl. Only two wells of this depth were drilled in Badasahi and Suliapada blocks in the alluvial formations. These wells are mainly clay dominant with significant thickness of sand layers making them high yield wells. Rest other exploratory wells in the alluvium are also good yielding wells and the range varies from 3 to 17 lps.

Based on the depths, aquifers are classified as shallow and deeper aquifers. Both shallow and deeper wells of the districts are delineated from drilling. The characteristics of the shallow and deep aquifers are listed below.

Shallow Aquifers:

Near surface aquifer in which ground water occurs under unconfined (phreatic) condition and is mainly tapped by dug wells for ground water extraction is generally identified as shallow aquifer.

Deeper Aquifers:

Aquifers, which occur below the phreatic zone and extends down to a greater depth, are termed as deeper aquifers. Ground water in deeper aquifers occurs under semi-confined to confined conditions. Deeper aquifers are tapped by tube/bore wells for ground water extraction.

CGWB has drilled wells both is tertiary alluvium and Precambrian consolidated formations. Rotary drilling is used for drilling in the alluvium whereas DTH drilling was suitable in the hard compact consolidated rocks. The drilled depth of CGWB's 110 exploratory well ranges from 22 to 303 m bgl. Distribution of well as per drilling depth indicates that 29 %wells are shallow wells wand rest 71 % are deep wells. (Table 3.2).

Table 3.2. Distribution of EW based on drilled depth, Mayurbhanj District

Depth	Within 50m	50- 100m	100-150	150-200	200-250	250-350	Total
No. of wells	2	30	33	31	6	8	110
% Of well	2	27	30	28	5	7	100
T range		4.76-193.4	7.1 -71.73	7.49 - 23.56			
S range		$8.54*10^{-6}$	$3.8*10^{-5}$				
Discharge	6.26 - 18.00	0.2-11	0.50 - 12.00	0.33-12.50	0.16-18.00	6.56-10.00	

Fracture Analysis

A study was carried out to analyse the frequency and depth of fractures in the district by examining 77 bore wells, including exploratory and observation wells, up to a depth of 150 meters below ground level (fig. 3.8). Only two wells have depth less than 50 meters below ground level, while the rest were drilled between 50-150 meters deep, with 60% drilled wells to a depth greater than 100 meters. During drilling, fractures were encountered with varying occurrence and recurrence. The majority of fractures were found in the depth range of 30-60 meters below ground level, with 28 wells encountering fractures within this range. As the depth of the boreholes increased, the number of fractures encountered decreased gradually, and the highest volume of water was obtained from the shallower zones in the wells.

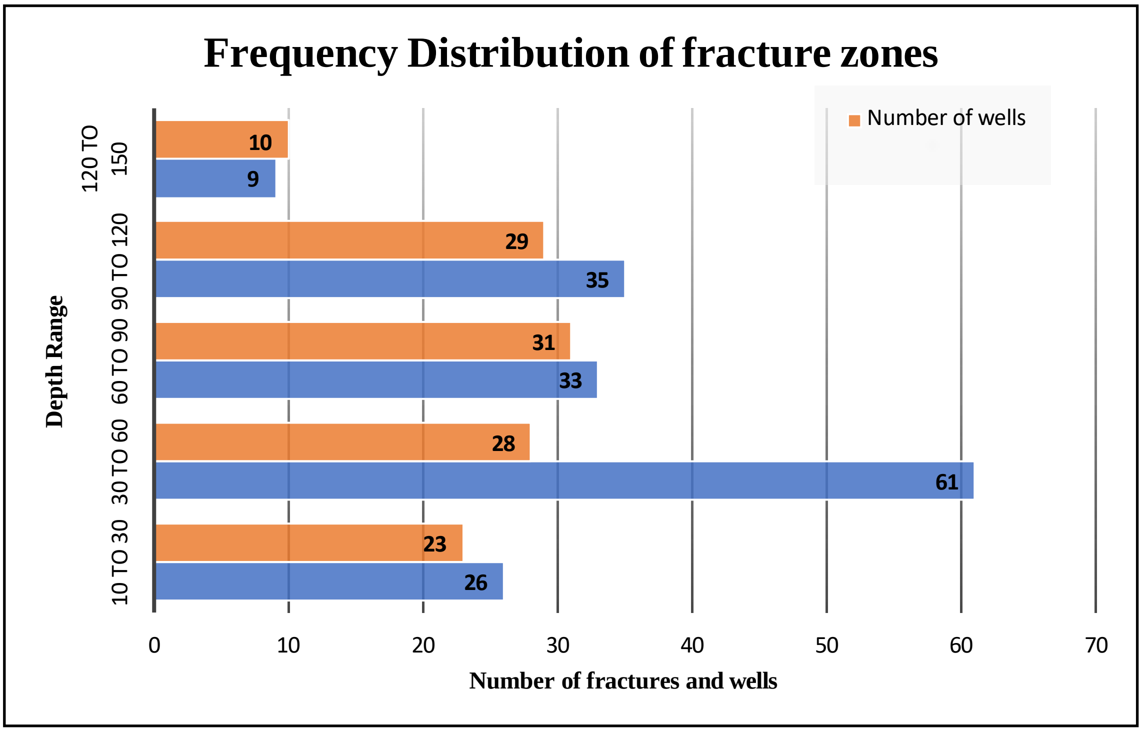


Figure 3.8 Frequency distribution of fracture zones, Mayurbhanj District.

The lithology information obtained from drilling and VES survey is utilized to analyse the 2D and 3D distribution of the aquifer. Based on the prepared sections it has been observed that the district contains three types of aquifers: weathered zone aquifer, fractured aquifer, and alluvial aquifers. The fracture zones have been analysed to broadly classify the district's aquifer systems into two: the 1st Aquifer System, consisting of the weathered zone aquifer at the top and found within 100 meters below ground level, and the 2nd Aquifer system, present between 100-200 meters below ground level. In the alluvial formations in the eastern parts of the district the unconsolidated (alluvial) mono aquifer is present with alternate layers of sand and clay. The aquifers have been classified into shallow and deep based on their geometry and depth of occurrence. The aquifer parameters of the shallow and deep aquifers were determined from the pumping test data obtained during the hydrogeological survey and exploratory drilling.

From the geological and hydrogeological study, it is confirmed that Mayurbhanj district is comprised of unconsolidated, semi consolidated and hard consolidated formations. Based on these seven principal aquifers have been identified which are varying spatially throughout the district with specific hydrogeological character. Some important hydrogeological parameters are given in the table 3.3.

Table 3.3. Details of the Principal aquifers with their hydrogeological properties

Sl. No	**Principal Aquifer**	**Area**	**Area** (%)	**Decadal Pre monsoon WL**		**Decadal Pre monsoon WL**		**T** (m^2/day)	**Yield** (m^3/day)	**Specific Yield** (%)
				Min	**Max**	**Min**	**Max**			
1	Alluvium	1422	13.65	6.36	8.87	2.7	6.55	2 to 5	400 to 1728	2 to 5
2	Laterite	2009	19.28	6.13	9.01	2.7	6.55	5 to 20	150 to 300	up to 3
3	Shale	48	0.46	6.49	7.09			2 to 3	172 to 850	1 to 5
4	Granite	221	2.12	6.13	8.87	3.1	6.55	6 to 30	90 to 500	1 to 5
5	Quartzite	446	4.28	5.88	9.01	3	6.55	2 to 14	2 to 300	1 to 2.5
6	BGC	4268	40.97	5	9.63	2.8	6.73	5 to 50	90 to 700	1 to 3
7	Intrusive	2004	19.24	5	9.01	3	6.55	1 to 10	40 to 400	up to 3

2D and 3D disposition of Aquifers

A. 2D dispositions of aquifer

Three sections were prepared to visualize the aquifer disposition throughout the district.

(i) A North- south section from Rairangpur to Mirgimundi in the consolidated formation of granite gneiss (Fig. 3.2).

(ii) A South - Northeast section from Sulagadia to Kujidih in the younger alluvial plains (Fig. 3.3).

(iii) A Northwest – Southeast section from Kujidih to Rasagovindapur in the younger alluvial plains (Fig. 3.4).

a. Section: Rairangpur to Mirigimundi (A – A')

A section has been prepared using the lithologs of four wells drilled in the consolidated granite to granite gneiss formation located in the western part of Mayurbhanj district. The section extends from Rairangpur in the north to Mirigimundi of Thakurmunda block in the south, with the depth of the wells ranging from 120.53 meters below ground level to 196.00 meters below ground level. The thickness of the weathered zone in the section varies from 10 to 25 meters. It is evident from the section that the majority of the subsurface lithology is composed of Precambrian age granite gneiss. The weathered zones are present in the shallow aquifer I, and the fracture zones are also limited to the shallow aquifer I. The discharge from the wells drilled in this area ranges from 1 to 11 litres per second, and the discharge of the wells used to create the section is shown in the figure 3.2.

b. Section: Sulagadia to Kujidih (B – B')

A section has been drawn using wells drilled in both the alluvial tract and consolidated formations in the eastern part of Mayurbhanj district. The section extends from Sulagadia in the south to Kujidih of Suliapada block in the northeast, with the depth of the wells ranging from 172.30 meters below ground level to 303.00 meters below ground level. The thickness of the weathered zone in the section varies from 10 to 25 meters. It is evident from the section that the north-eastern part is mainly composed of alluvium, while the southern portion is dominated by hard consolidated formations. The wells drilled in this region show a discharge range of 3 to 18 litres per second, with the yield of the alluvial aquifer being higher than that of the consolidated aquifers.

c. Section: Kujidih to Rasagovindapur (C – C')

This section of the Mayurbhanj district, located in the eastern region, is comprised of wells in an alluvial tract that extends from Kujidih in the northwest to Rasagovindapur in the southeast. The depth of the wells varies between 251.20 mbgl to 303.00 mbgl, indicating that the entire area is dominated by alluvium beneath the surface up to a depth of 300 m. The wells in this section demonstrate a discharge range of 6.56 lps to 10 lps. As one travels from the eastern side to the central part of the district, the thickness of the cumulative granular zone varies from 20 to 40 m. Significant thickness of laterite capping is observed in this region. The permeable sandy layers in the alluvial aquifers are dominated by clay layers. Although the water is potable chemically, there are some pockets where iron contamination is present in the district. The Budhabalanga River, which flows through this portion of the district, serves as the primary source of water for the available aquifers.

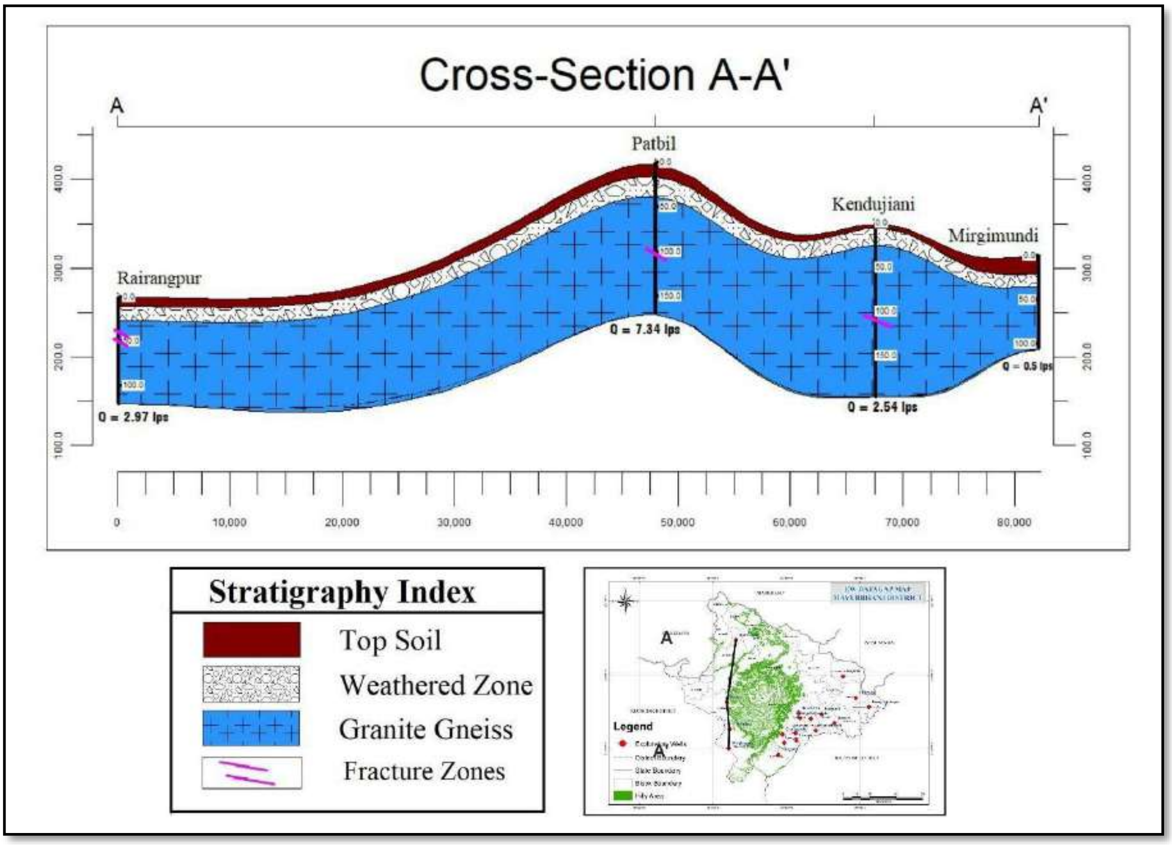


Figure 3.9 2D disposition along North-South (A-A') direction

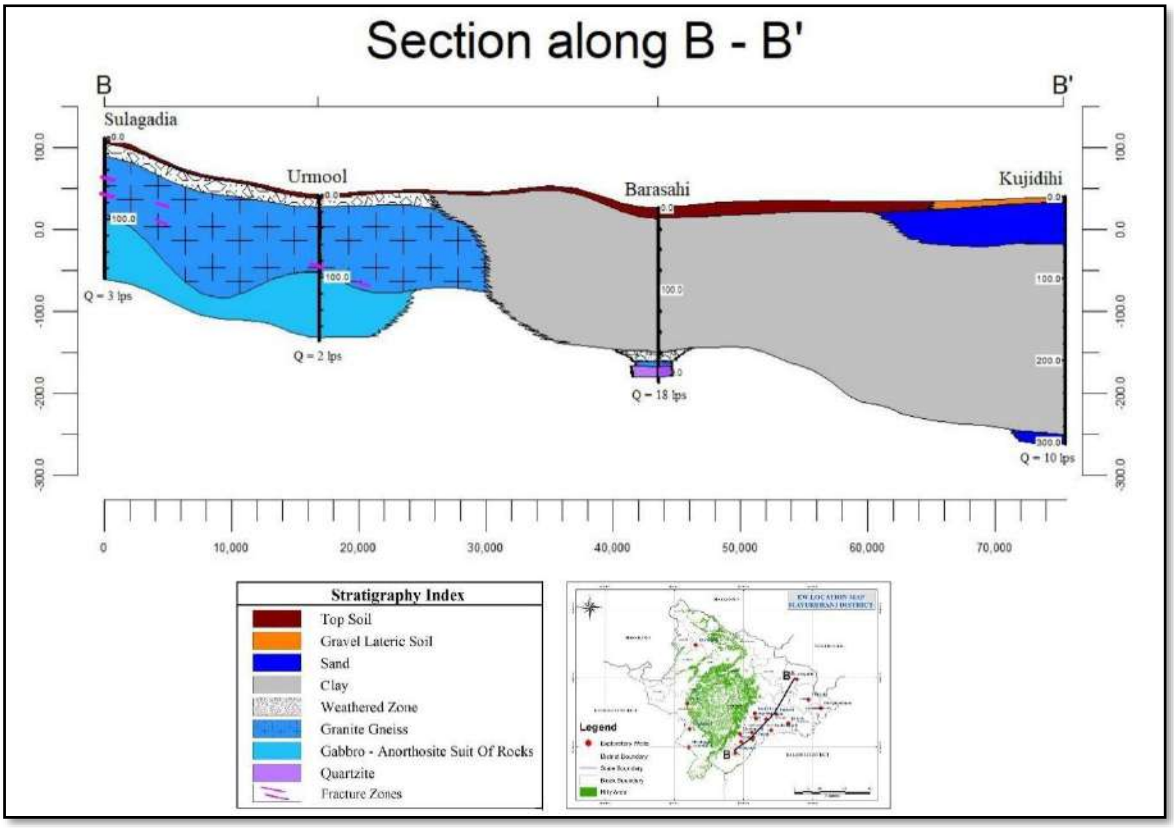


Figure 3. 10 2D disposition along South to North-east direction.

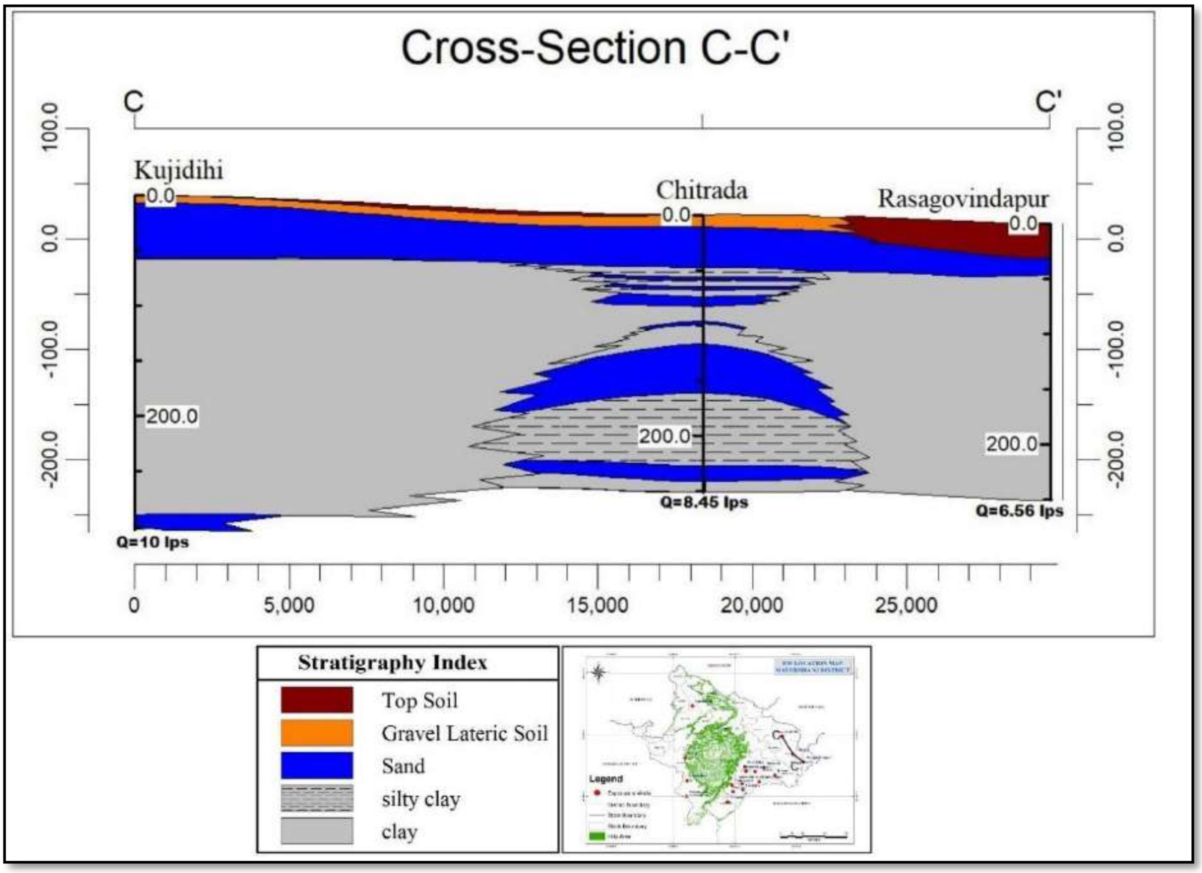


Figure 3.11 2D disposition along Northwest-Southeast direction.

B. 3D disposition of aquifer

The aquifer disposition of the area of Mayurbhanj District in the 3D block diagram clearly depict 2 aquifer systems. One in the Precambrian consolidated formations located at the western and other in the layered aquifer system in the area. In the north western and southern portion of the district where as the eastern portion in deposited with tertiary sediments with thick layer of clay. Significant thickness of sands in the alluvium is the main cause of high yielding wells. The basement of this alluvial tract is supported by granite or granite gneissic suits of rocks which are intruded by the Basic and Ultrabasic intrusive in the central part of the district. This basement layer dips towards east and north easterly to give rise to a significantly huge and thick pile of sediments of more than 300 metres in the eastern and north eastern part of the district. There is also a lateritic capping over both the weathered residuum as well as over the Older Quaternary sediments towards the easter and north-eastern flank of the district.

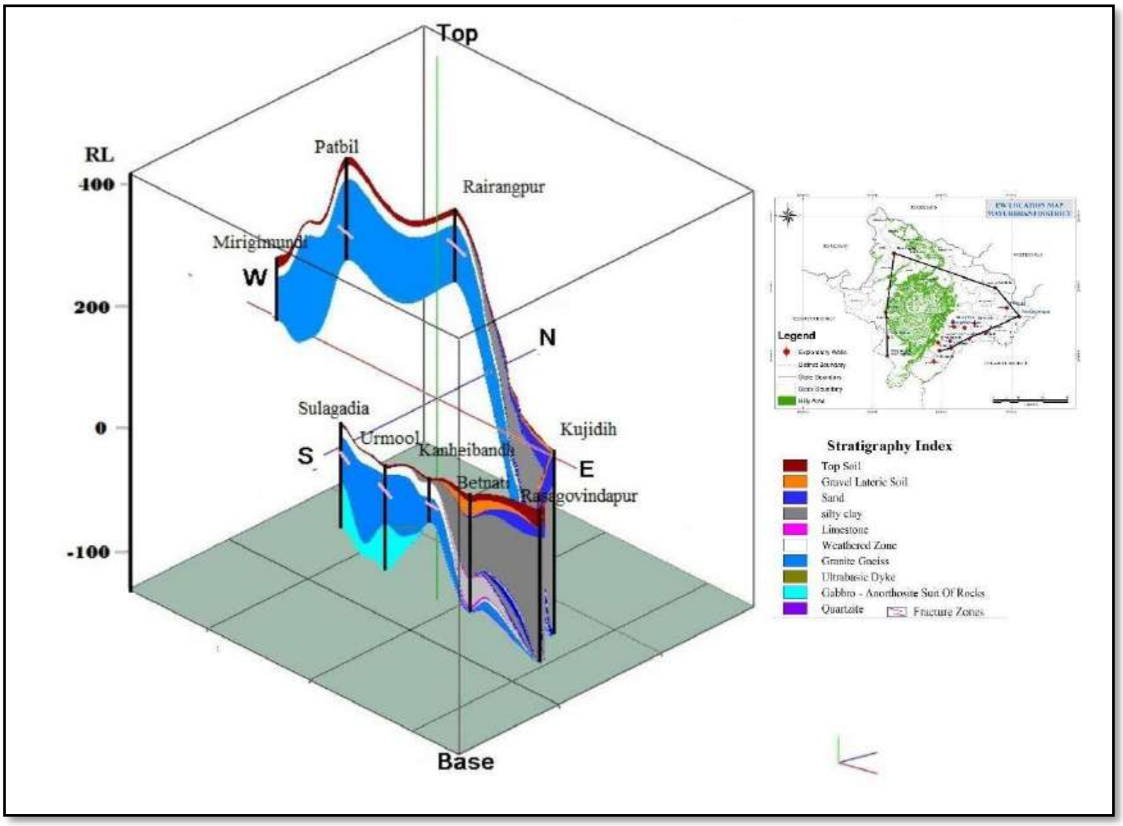


Figure 3.12 3D Fence diagram of aquifers, Mayurbhanj District

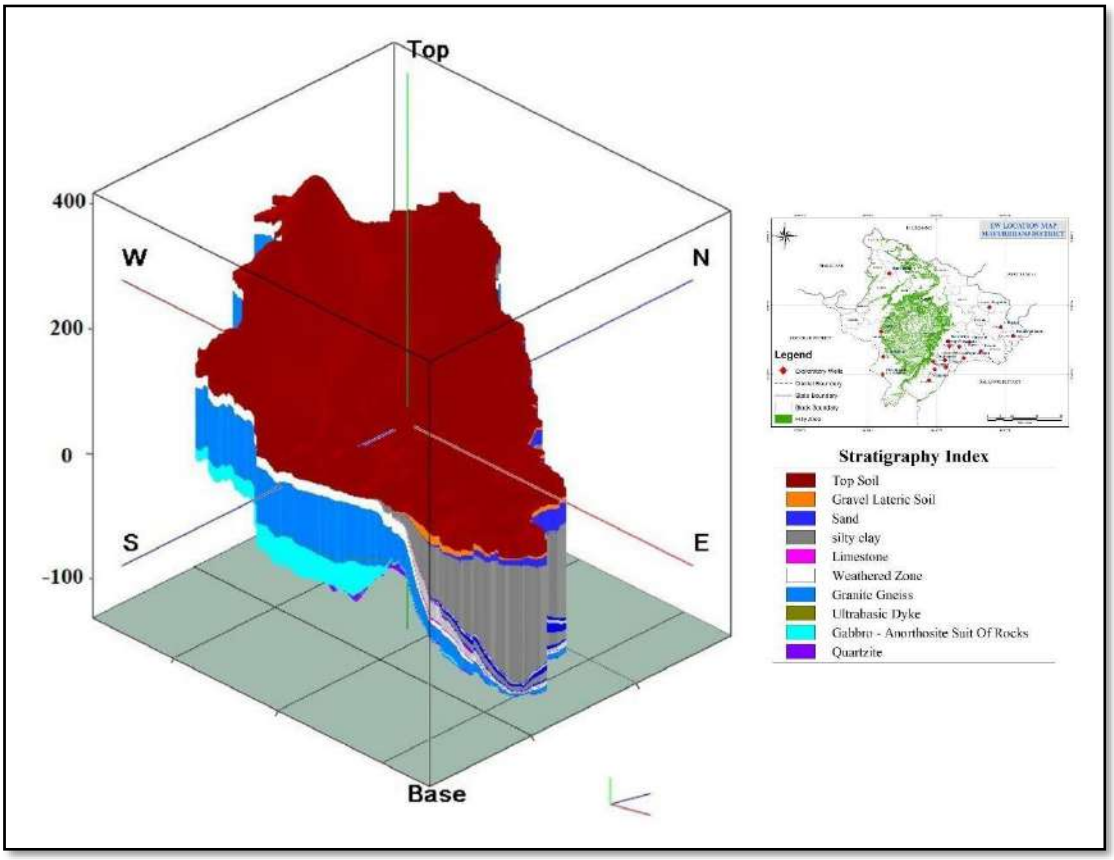


Figure 3.13 3D Fence diagram of aquifers, Mayurbhanj District

Ground Water level

The varied geological and structural set up primarily controls the hydrogeological condition of the district. The geological formations of the district have diverse lithological composition and structure. Hence the hydrogeological condition too shows wide variations. The potential groundwater reservoir in the district is mainly located in the phreatic zone, which has been identified through hydrogeological surveys and groundwater exploration activities. The depths to water levels (DTWs) in aquifers are influenced by various factors such as topography, lithology, rainfall, land use, drainage characteristics, and proximity to drainage channels, as well as water-bearing and water-yielding properties of rocks. Keys wells are also established and previously existing GWMS are used for monitoring the pre-monsoon and post-monsoon water level to know the fluctuation and flow direction of groundwater. To evaluate the changes in the groundwater regime and assess the overall groundwater resources, CGWB has set up 99 nos. of groundwater monitoring stations (NHS) in the district. During NAQUIM study 164 nos. of key wells were established covering most of the blocks of the district. During AAP 2022-23, water level of the GWMS were measured twice in a groundwater year. The key wells were established in March 2022 and the water levels of the key wells were monitored during November 2022 for 239 dug wells and 263 dug wells in March 2022. Water level data of the district were summarized in Table 3.4. and 3.5. Based on the monitoring data pertaining to the year 2022, the DTWs contour zonation maps for pre- and post-monsoon periods and the annual water level fluctuation map were prepared and presented in figure 3.14, 3.15 and 3.16 respectively. Water table contours for the phreatic aquifer were also prepared, which are produced in fig. 3.17 by using the water level with respect to the msl.

Table 3. 3. Pre-monsoon depth-to-water level distribution around Mayurbhanj district.

Depth in m	Within 0-3	3 to 6	6 to 9	9 to 12	12 to 16	Total
No. of wells	28	92	73	55	15	263
Percentage of Wells (%)	10.65	34.98	27.76	20.91	5.7	100

Table 3.4. Post-monsoon depth-to-water level distribution around Mayurbhanj district

Depth in m	Within 0-3	3 to 6	6 to 9	9 to 12	12 to 16	Total
No. of wells	156	65	17	0	1	239
Wells (%)	65.27	27.2	7.11	0	0.42	100

Pre-monsoon

The DTWs levels during the pre-monsoon period varied between the minimum of 0.47 m below ground level (mbgl) at Chadgipari (Jashipur block) and the maximum of 17.02 mbgl at Chadgipari (Saraskana block). The percentage details of wells with different ranges of water level are presented in the table 3.4. From the map (fig. 3.14). It is clear that the western portion of the district is under water level range from 3 to 6m whereas the eastern portion the area has relatively lower water level that is more than 6m in the pre-monsoon season. The average water level during pre-monsoon period is of 6.86m bgl.

Post-monsoon

The DTWs levels during the post-monsoon period varied between the minimum of ground level (0 mbgl) at Jamboni (Thakurmunda block) and the maximum of 8.84 mbgl at Astia (Baripada block). The percentage details of wells with different ranges of water level are presented in the table 3.5. From the map (fig. 3.15) it is clear that most of the wells in post-monsoon period show water level between 0 to 3 m bgl. The average DTW was estimated at 2.84 m bgl only in contrast to the 6.86 m bgl during the pre-monsoon period. The maximum water level is under 6m for the district of Mayurbhanj except few wells as showed in the map (fig. 3.15).

Water level fluctuation

The water level fluctuations between the pre- and post-monsoon in water level measurements varied between the minimum -0.54 m (water level decline) at Chadgipari (Jashipur block) to the maximum of 13.1 m at Balichaturi (Kuliana block) (Fig. 3.16). The average fluctuation stood at 3.82 m. From the fluctuation study the rain fall and recharge component can be analysed. Higher the fluctuation lesser is the rainfall and same as lesser is the recharge. Water level fluctuation is very much useful during the resource estimation of the study area.

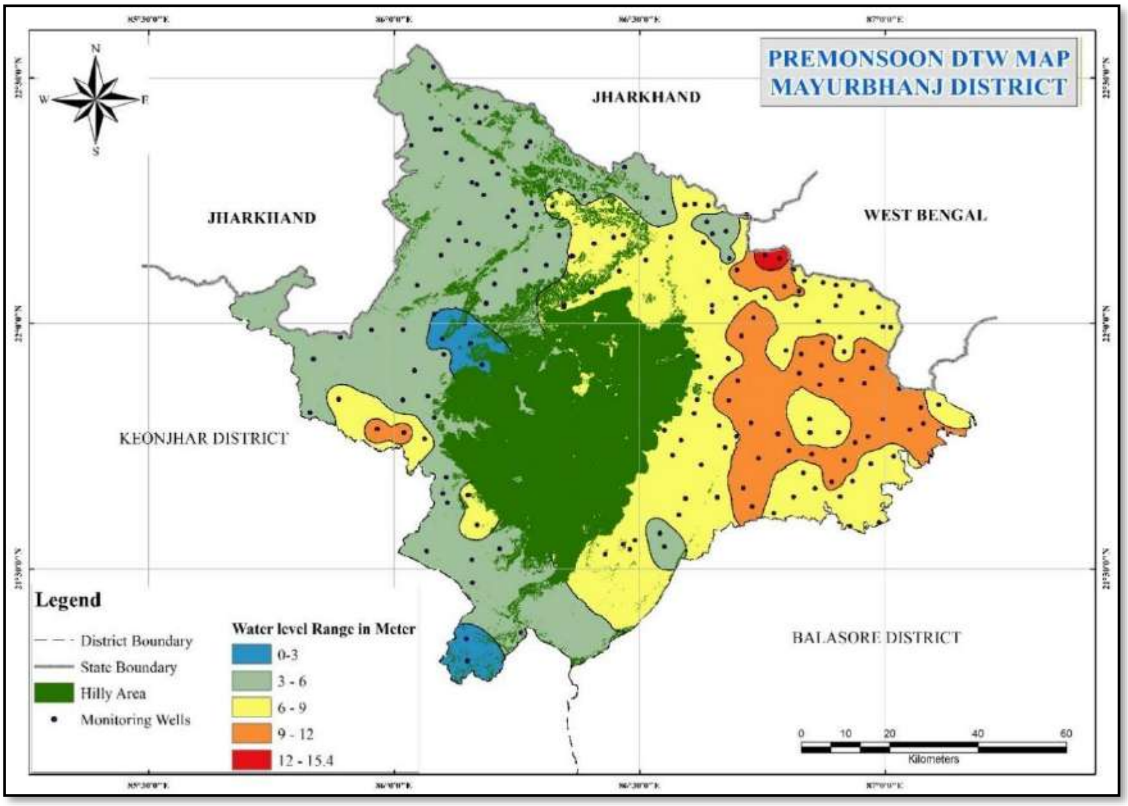


Figure 3.14 Pre-monsoon DTW level contour Mayurbhanj District, Odisha

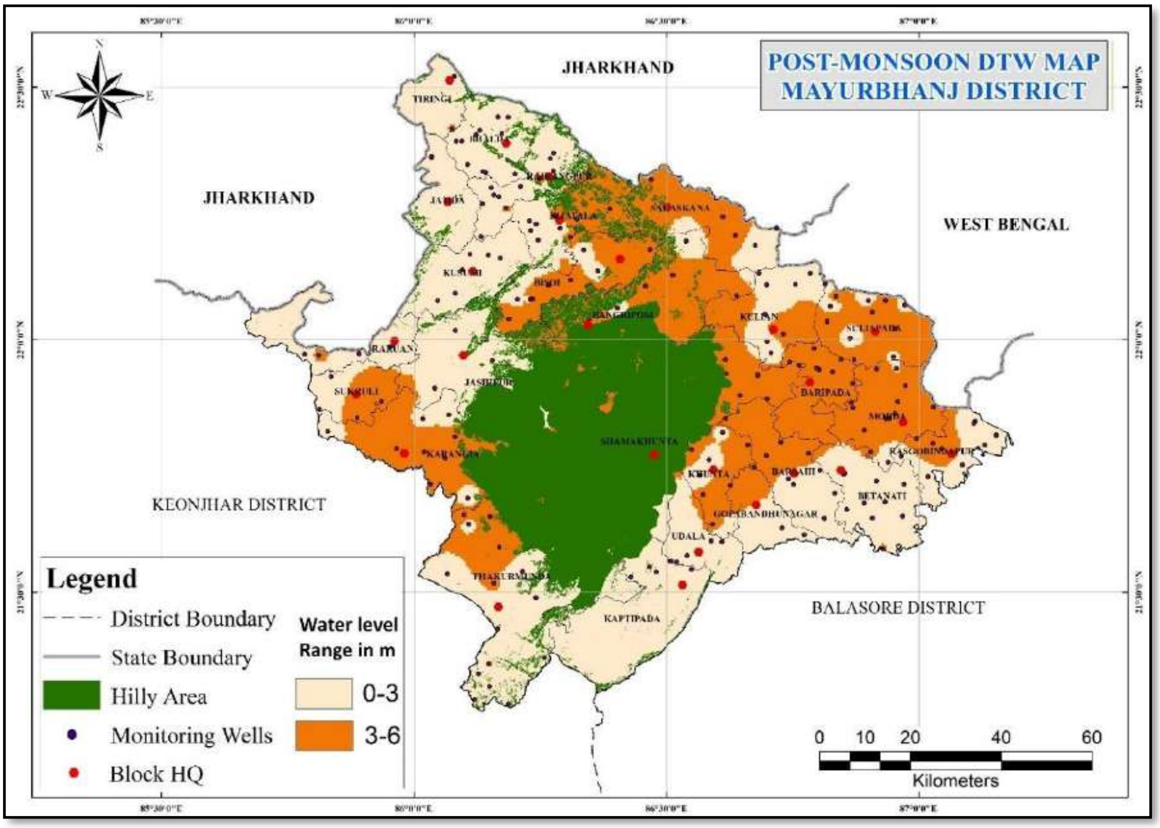


Figure 3.15 Post-monsoon DTW level contour Mayurbhanj District, Odisha

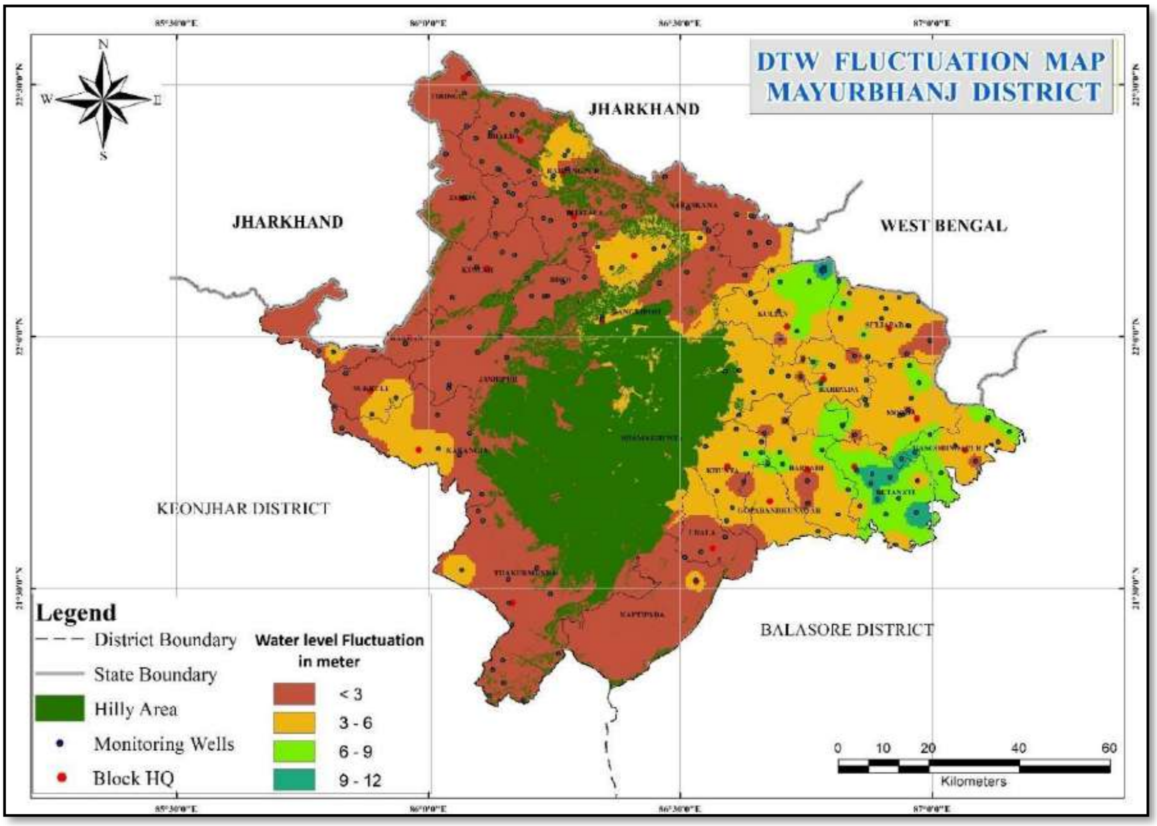


Figure 3.16 Annual DTW fluctuation map, Mayurbhanj District, Odisha

Ground Water Movement

The water table contour of phreatic aquifer has been prepared based on water level data with respect to elevation of ground water monitoring stations from mean sea level (Fig. 3.9). The contour map shows that water table contour of Mayurbhanj district varies from 6.65 to 456.6m m above mean sea level. In general groundwater movement is toward east and west as the central part of the district is occupied by the Simlipal hills and reserve forest which is the highest elevated area in the district. These hills create a major water divide for the rivers or springs flowing to wards eastern and western side separately in the district.

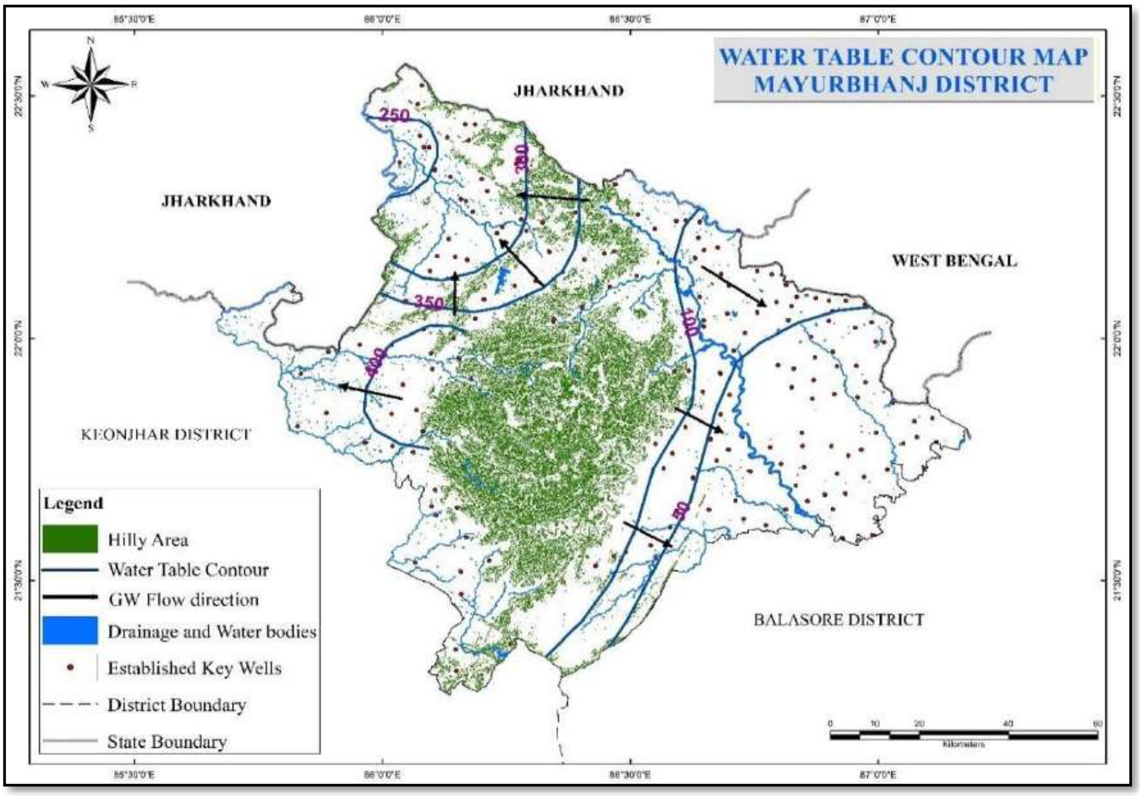


Figure 3.17 Water table contour of Mayurbhanj District, Odisha.

Water level trend analysis

For analysis of long-term behavior of ground water level, data from Ground Water Monitoring Stations (GWMS) are utilized. Historical depth-to-water level data (in m bgl) are plotted as individual hydrographs showing the trend of water level over the years shown in figure 3.10 and Table 3.4. The hydrographs of 45 ground water monitoring stations were analysed for the period from 2006 to 2016. The variation in water level trends may be due to variation in natural recharge from rainfall and withdrawal of groundwater for all users like irrigation, domestic and industrial uses.

Table 3. 5 Trend of water levels in GWMS Wells, Mayurbhanj district.

Sl No.	Block	Well name	No. of years	Water Level Trend	
				Pre-monsoon	Post- monsoon
1	Bahalda	Gambharia	33	Fall	Fall
2	Bahalda	Bahalda road(kona)	33	Rise	Fall
3	Bangiriposi	Jharpokhari	35	Rise	Rise
4	Bangiriposi	Jamsola	33	Rise	Rise
5	Bangiriposi	Saraskona	35	Rise	Fall
6	Barsahi	Badasahi	37	Rise	Fall
7	Barsahi	Baidipur	31	Rise	Rise
8	Barsahi	Belam	35	Fall	Fall
9	Baripada	baripada	45	Fall	Rise
10	Betanati	Hatjori	34	Rise	Rise
11	Betanati	Krishnachandrap	36	Rise	Rise
12	Bijatola	Gorumahisani	32	Fall	Fall
13	Bisoi	Manda	45	Rise	Rise
14	Bisoi	Bisoi	42	Rise	Rise
15	Gopabandhunagar	Similiband	35	Fall	Fall
16	Gopabandhunagar	Khunta	37	Rise	Rise
17	Jamda	Jamda	31	Rise	Rise
18	Jashipur	Matigarh	34	Rise	Rise
19	Kaptipada	Udala	34	Rise	Rise
20	Kaptipada	poradiha	35	Rise	Fall
21	Karanjia	Kendumundi	38	Rise	Fall
22	Karanjia	Tato	37	Rise	Rise
23	Khunta	Brundabanchan	36	Fall	Fall
24	Khunta	Dukura	47	Rise	Rise
25	Koliana	Kuliana	42	Rise	Rise
26	kusumi	Naujara	33	Fall	Fall
27	Muruda	Chitrada	38	Rise	Rise
28	Muruda	Nechuapada	36	Rise	Rise
29	Rairangpur	Niranjan	33	Rise	Fall
30	Raruan	Khiching	42	Rise	Rise
31	Rasagobindapur	Amarda	31	Rise	Rise
32	Rasagobindapur	Rashgovindapur	34	Rise	Rise
33	Samakhunta	Shamakhunta	36	Rise	Fall
34	Samakhunta	Pithabata	35	Rise	Rise
35	Saraskana	Bangriposi	53	Fall	Fall
36	Sukruli	Raruan	16	Rise	Rise
37	Suliapada	Kostha	35	Fall	Fall
38	Suliapada	Bagra	34	Fall	Fall
39	Suliapada	Sullyapada	34	Rise	Rise
40	Thakurmunda	Satkosia	38	Rise	Rise

41	Thakurmunda	Thakurmunda	42	Rise	Rise
42	Thakurmunda	Kendujani	36	Rise	Rise
43	Thakurmunda	Asanbani	13	Rise	Fall
44	Tiringi	Nischintapur	33	Rise	Fall
45	Tiringi	Tiring	35	Fall	Fall

From the hydrographs (annexure 09) the annual rising limb indicate the natural recharge of groundwater regime due to monsoon rainfall, as it is the only source of water recharge. However, the groundwater draft continuously increases as indicated by the recessionary limb as shown in the below figures. The groundwater resources are under continuous stress in some blocks due to minimum recharge as a result of low rainfall. It has also been observed that there were few years when the recharge exceeded draft but in the next successive year, the draft again exceeds recharge.

The data collected and newly generated data were scientifically analysed and different conclusions have been drawn for different aspects. By summarizing all the hydrogeological details, a map has been prepared to understand the characters of available aquifers in Mayurbhanj district. All the lithology showing available principal aquifers are presented in the map along with their average yield range. Water table contours are there to show the groundwater flow direction.

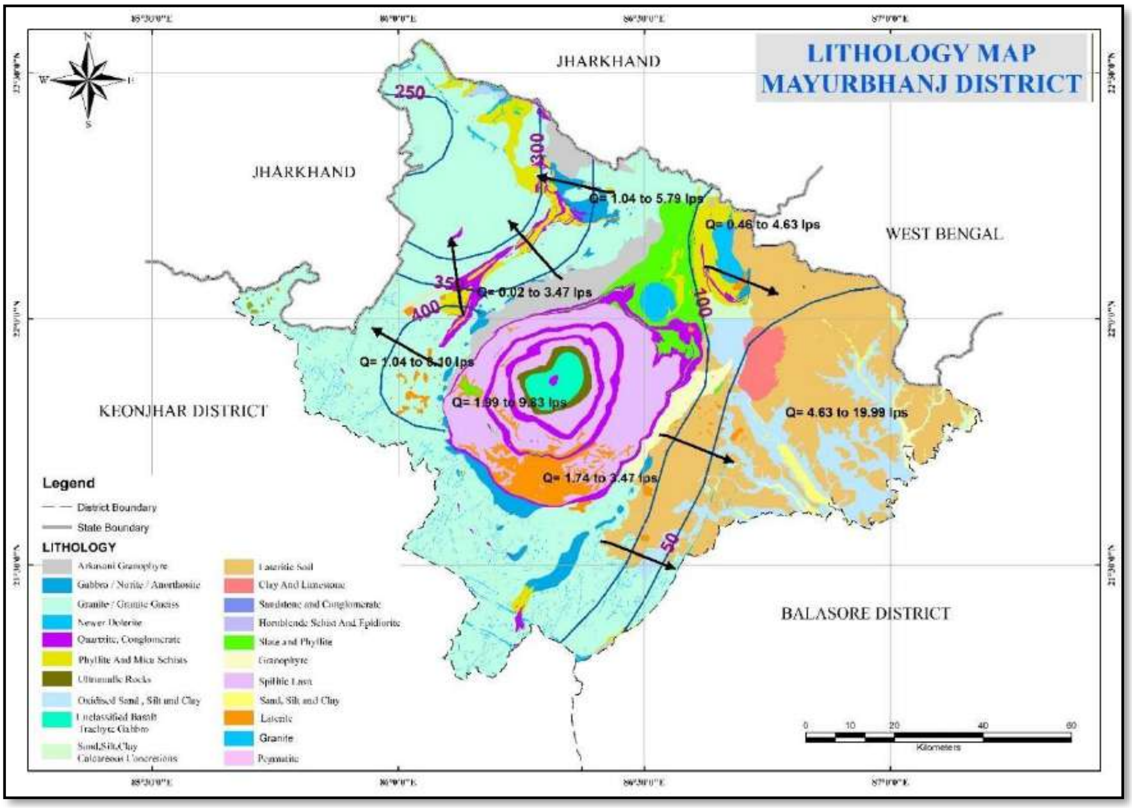


Figure 3.18 Hydrogeology map Mayurbhanj District

Ground water quality

To study the ground water quality of Mayurbhanj district chemical analysis of collected ground water samples were carried out in the NABL accredited regional chemical laboratory of Central Ground Water Board, South Eastern Region, Bhubaneswar. From the entire district 215 samples have been collected in the Pre-monsoon of which 206 from dug well, 9 from hand pump. The chemical analysis data during Pre-monsoon season is given in the annexure 04. Summary of the analyzed data are given below in the table 4.1 and 4.2.

Table 4.1. Summarized chemical quality of water samples collected during Pre-monsoon.

Sl. No.	Chemical constituents and other parameters	Unit	Maximum	Minimum
1	pH		8.45	6.13
2	EC	**(μs/cm) 25°C**	2080	35
4	TDS	**mg/l**	986	21
5	CO_3^{-2}		0	0
6	HCO_3^{-1}		569.9	18.1
7	TA (as $CaCO_3$)		467.16	14.8
8	Cl^-		337	2
9	SO_4^{-2}		140	0
10	NO_3^{-1}		51	0
11	F^-		1.4	0.03
12	Ca^{+2}		148	4
13	Mg^{+2}		67	1
14	TH (as $CaCO_3$)		644	20
15	Na		185	1
16	K		81.6	0.04
18	U	**mg/l**	6.3	0

Table 4.2. TDS and pH range of water samples

Type of Structure	No. of Sample analysed	Conc. of TDS (mg/l)		pH value	
		≤ 500	>500	≤7	>7 to <8.5
Dug wells	206	197	9	19	187
Hand Pump	9	8	1	0	9

Ground water quality of Dug wells and hand pump

Phreatic aquifer is found between the depths of 20 – 60 m bgl and is tapped by dug wells and shallow hand pumps. The discharge ranges from 50 lpm to 150 lpm. Pre-monsoon sampling was carried out in May 2022 for determination of basic parameters and to demarcate areas with spurious quality of groundwater. A total of 215 samples were collected from dug wells and hand pumps during Pre-monsoon. The range is given in the table 4.1 and 4.2 respectively.

From the analyzed data it can be concluded that all the samples from dug wells during pre-monsoon have pH value ranges from 7 to 8.5. This show the nature of the groundwater in the dug wells and hand pumps are slightly alkaline which can be directly use for domestic and irrigation purpose. It is observed that all the necessary parameters analyzed are within the permissible limit.

Ground Water quality assessment

Various chemical diagrams like Piper diagram, Wilcox diagram are prepared by using the Aquachem software to assess the quality of ground water of Mayurbhanj district.

A. Piper Diagram

Piper trilinear diagram is an effective graphical procedure to segregate the analytical data to understand the sources of the dissolved constituent in water. In chemical equilibrium cations and anions are present in the water. All the analyzed samples were plotted in Piper trilinear diagram (fig. 4.1) to understand the type of water and chemical changes the ground water has undergone inside the aquifer. Most of the analyzed samples fall under the magnesium bicarbonate type, few samples fall under mixed type origin and only two samples in the Calcium chloride type and 6 samples in sodium chloride type. From the plot in the cation triangle, we can see most of the samples from pre monsoon period are falling under no dominant type and magnesium type. In the anion triangle all the pre-monsoon are falling under bicarbonate to no dominant type. By the extrapolation of cations and anions in to the diamond field represents the hydro-chemical facies of groundwater samples. The facies reflect the response of chemical processes operation within the lithologic framework and flow pattern. The following conclusions are drawn from the Piper diagram.

i. Samples falling under magnesium bicarbonate type facies indicates the groundwater is shallow and fresh in nature.
ii. Samples lie on Mixed type facies that represents deep groundwater influenced by ion exchange.
iii. Samples lie on sodium chloride type facies indicate they are either ancient, marine/fossil water or groundwater flow is stagnant/interrupted by some geological/anthropogenic barrier.

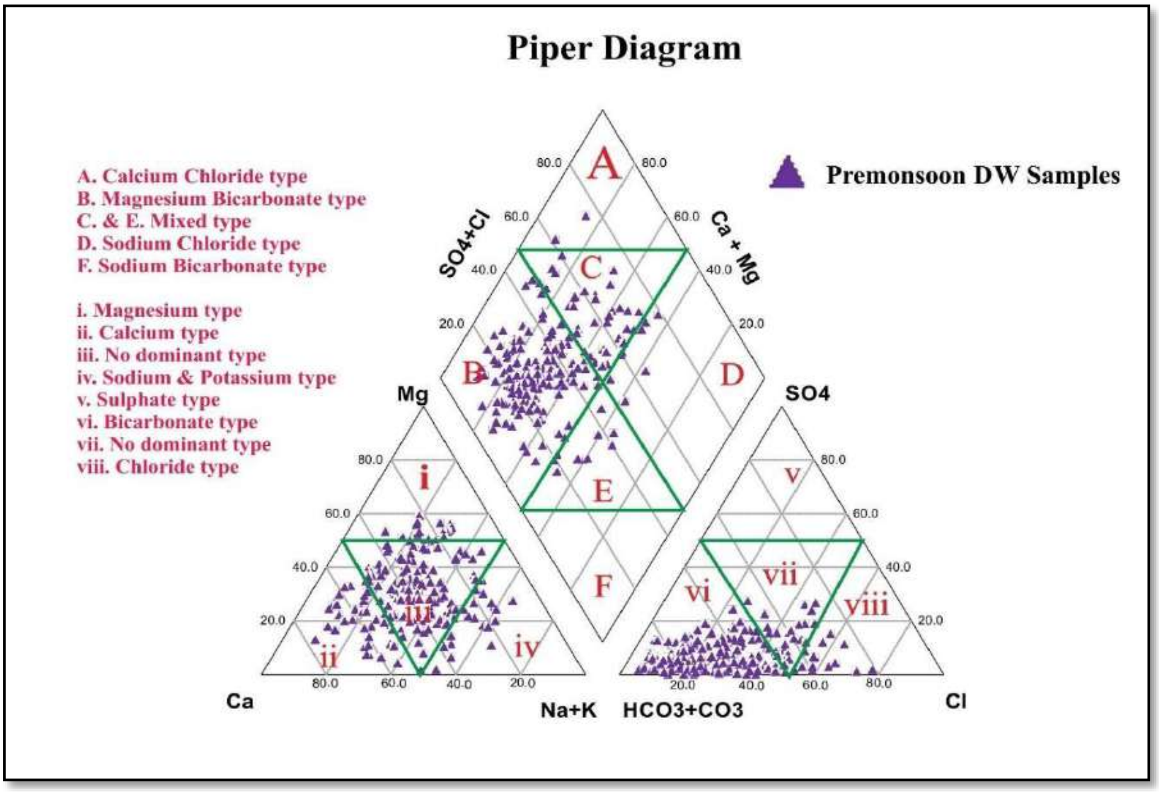


Figure 4.1. Piper trilinear diagram for DW samples, Mayurbhanj District

B. Wilcox diagram

According to Wilcox diagram (US Salinity Laboratory's diagram) in fig.4.2, salinity and alkalinity hazard class of water samples were determined. Plotting of all the analysed samples were done in the Wilcox diagram to understand the quality of water for irrigation purpose. The result shows that a majority of the ground water samples possess medium salinity with low sodium (C2-S1) field. Samples falling under (C3–S1) field shows that this water have electrical conductivity more than 750 µs/cm can be used for irrigation purpose after treatment. However, water samples falling in medium salinity and low sodium class (C2-S1) can be used for irrigation purpose. Only one or two wells shows high EC value in different blocks like Rairangpur, Bahalda, Betnati, Raruan which is negligible with respect to the overall district.

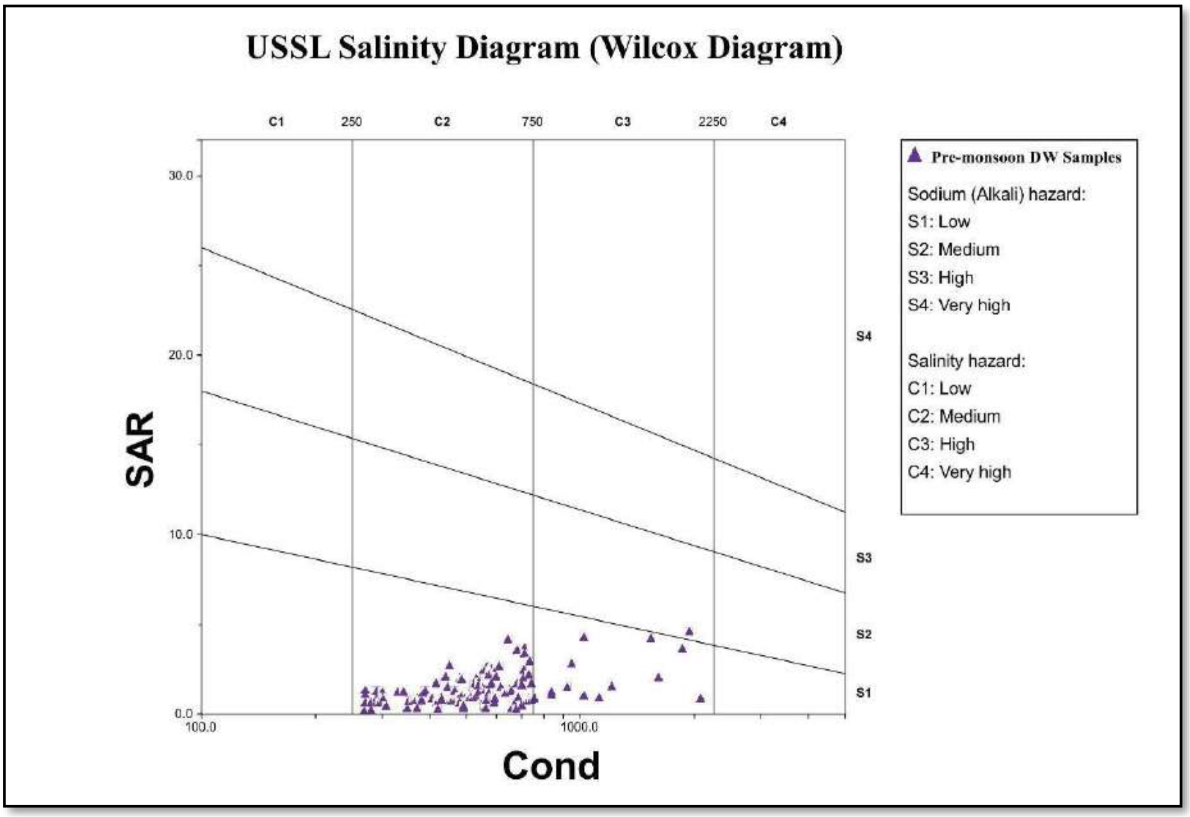


Figure 4.2. Wilcox Diagram, Wilcox, L.V. (1955)

Ground water quality assessment for irrigation

To study the groundwater quality for irrigation 215 samples in the pre-monsoon have been collected from the entire district. Various parameters like Alkalinity hazard or Sodium Absorption ratio (SAR), Magnesium Hazard (MH), Residual Sodium carbonate (RSC), Permeability Index (PI), Kelly ratio have been calculated from the analyzed chemical components.

A. Alkalinity Hazard (SAR)

Sodium Absorption ration is calculated to determine the alkalinity index for the classification of the groundwater. It is an irrigation water quality parameter used in the management of sodium-affected soils. It is an indicator of the suitability of water for use in irrigation, as determined from the concentrations of the main alkaline and earth alkaline cations present in the water. It is also a standard diagnostic parameter for the sodicity hazard of a soil, as determined from analysis of pore water extracted from the soil.

It is calculated by the following formula:

$$SAR = Na / \sqrt{(Ca+Mg)/2}$$

In the pre-monsoon season the SAR value ranges from 0.48 meq/L to 9.79 meq/L. From the plot (Fig. 4.3) given below we can see all the samples from pre-monsoon fall below 10meq/l which means the ground water is in the excellent quality for irrigation.

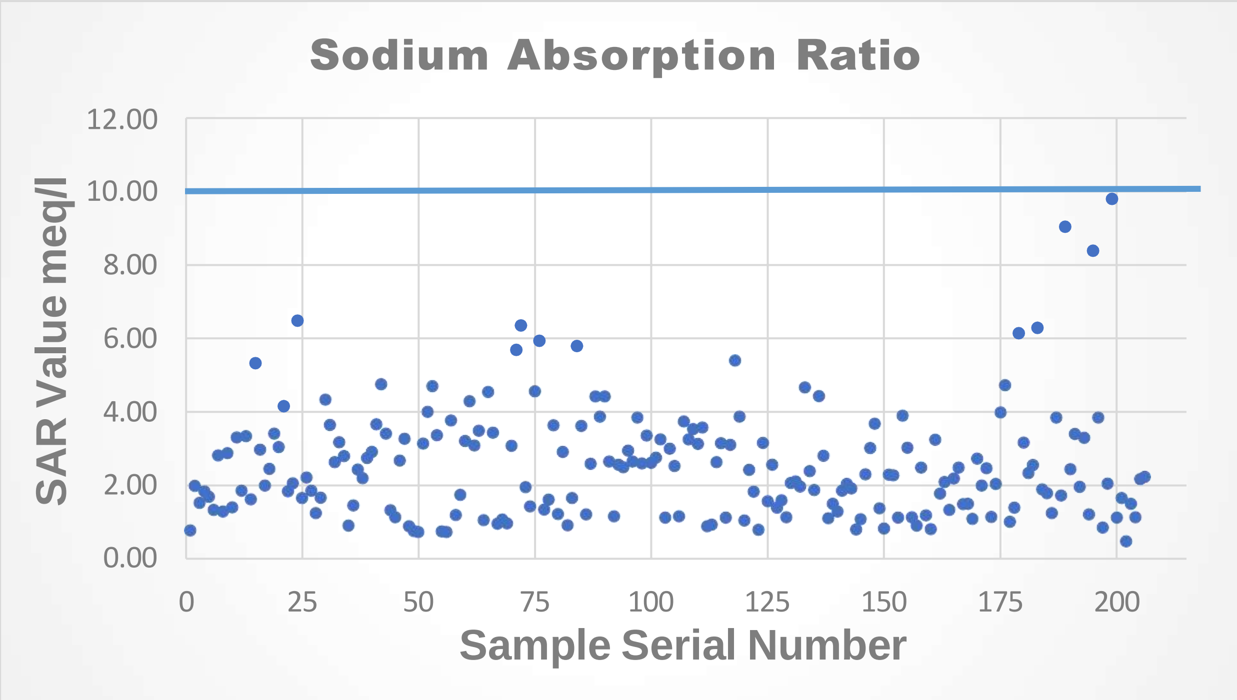


Figure 4.3. Sodium Absorption Ratio Diagram

B. Salinity Hazard

Electric conductivity values represent the saline conditions of the groundwater. Above plotted Wilcox diagram (Fig. 4.2) clearly indicates that the EC values of the collected samples are within 750µS/cm i.e with in the field of C2. Majority of samples are within the C2 field which makes them good in terms of quality water for irrigation and Samples falling in C3 filed can be used after treatment for irrigation, (Wilcox, L.V. 1955).

C. Residual Sodium carbonate

RSC index of irrigation water or soil used to indicate the alkalinity hazard for soil. It is given with respect to hazardous effects of Bicarbonate ion concentration on soil.

Calculated by the formula (where all constituents are in mg/l)

$$RSC = (HCO3^{1-} + CO3^{2-}) - (Ca^{2+} + Mg^{2+})$$

In the plot (fig. 4.4) the RSC value of the samples ranges from -2.56 to 2.64 maximum. The diagram clearly indicates that out of 215 samples 17 samples of different blocks like Rairangpur, Bahalda, Betnati, Raruan, Baripada, Thakurmunda are falling above 1.25meq/l which makes them unsuitable for irrigation. Rest of the 198 samples shows RSC value less than 1.25 meq/l which are very suitable for irrigation directly.

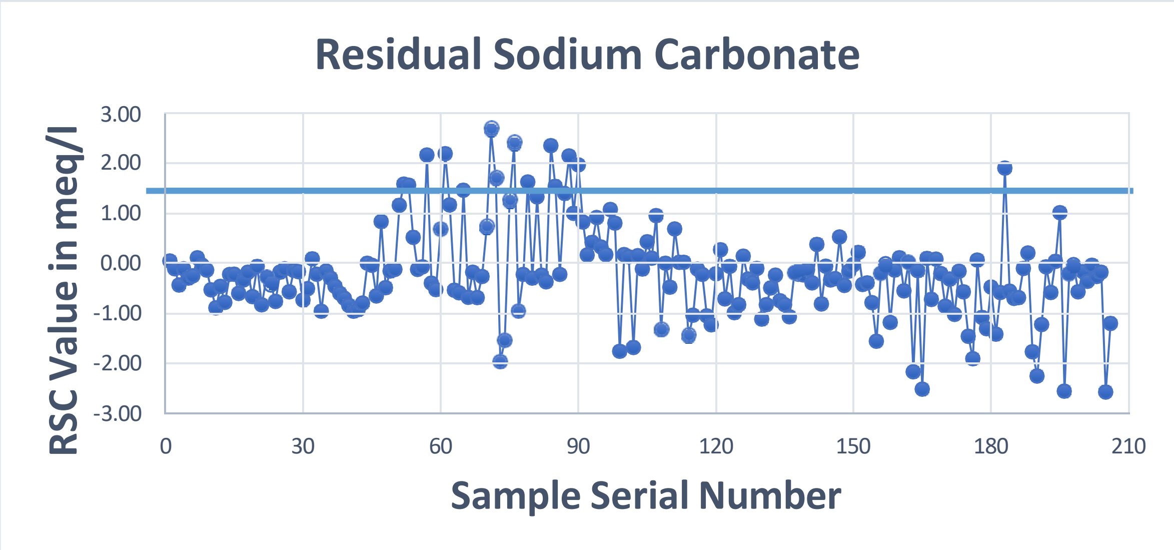


Figure 4.4. Residual Sodium Carbonate diagram

D. Kelly Ratio

This ratio is calculated from considering sodium ion concentration against calcium and magnesium ion concentration. It is an important parameter in determining the quality of irrigation water. KR value less than 1meq/L is considered to be excellent for irrigation purpose. From the diagram (Fig. 4.5) it is clearly indicated that the KR value of all the samples from pre-monsoon are under 1 meq/L which makes suitable for irrigation.

Kelly Ratio is given by the formula:

$$\mathbf{KR} = \frac{\mathbf{Na^{+2}}}{\mathbf{Ca^{+2} + Mg^{+2}}}$$

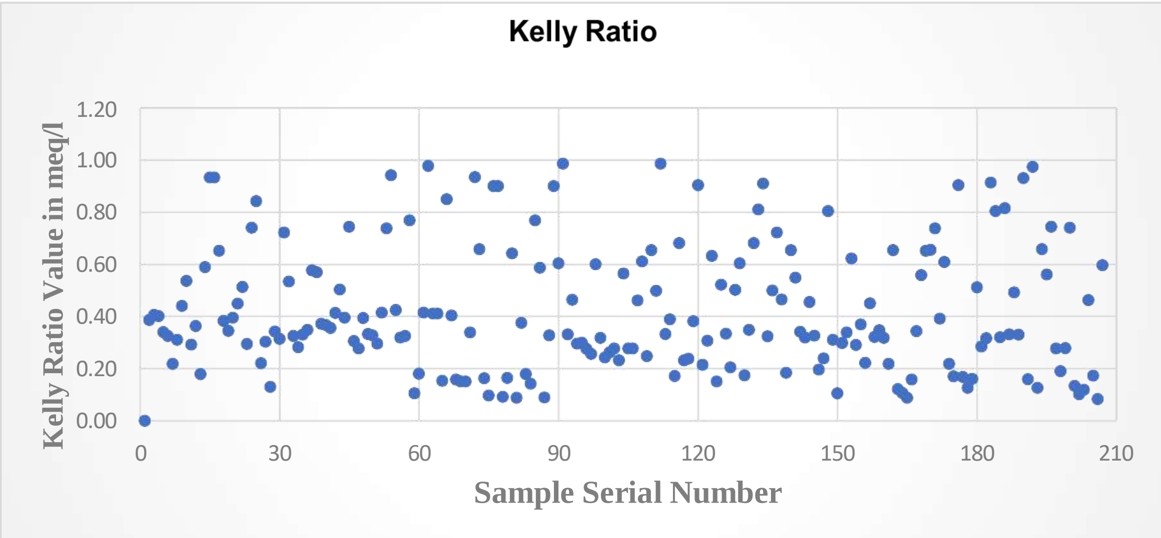


Figure 4.5. Kelly ratio Diagram

From all the calculated parameters from the analyzed data it is clearly indicated that all the samples Mayurbhanj district are suitable for the irrigation purposes. A tabular summary is given below for all the parameters and their classification for irrigation suitability.

Table 4.3. Classification of ground water for irrigation suitability

Parameters	Range	Classification	Pre monsoon (Number samples)
Total Dissolved Solid (TDS) (mg/L)	<1000	Non-saline	215
	1000-3000	Slightly saline	NA
	3000-10000	Moderately saline	NA
	>10000	Very saline	NA
Salinity Hazard (EC) (µS/cm)	<250	Excellent	63
	250-750	Good	137
	750-2000	Permissible	14
	2000-3000	Doubtful	1
	>3000	Unsuitable	NA
Alkalinity Hazard (SAR)	<10	Excellent	206
	Oct-18	Good	NA
	18-26	Doubtful	NA
	>26	Unsuitable	NA
Kelly's Index (KI)	<1	Suitable	206
	>1	Unsuitable	NA
Residual Sodium Carbonate (RSC)	<1.25	Suitable	190
	1.25-2.5	Marginally suitable	15
	>2.5	Unsuitable	1

Electrical Conductivity

The water samples from shallow aquifers shows EC values ranges from 35 µS/cm to 2080 µS/cm. Only 15 samples show EC value more than 750 µS/cm. All the 15 samples are evenly distributed in different blocks like Thakurmunda, Raruan, rairangpur, Jashipur, Tiring, Betnati, Bangriposi, Jamda, Kuliana etc. A map has been prepared to show the distribution of EC allover district (fig. 4.6).

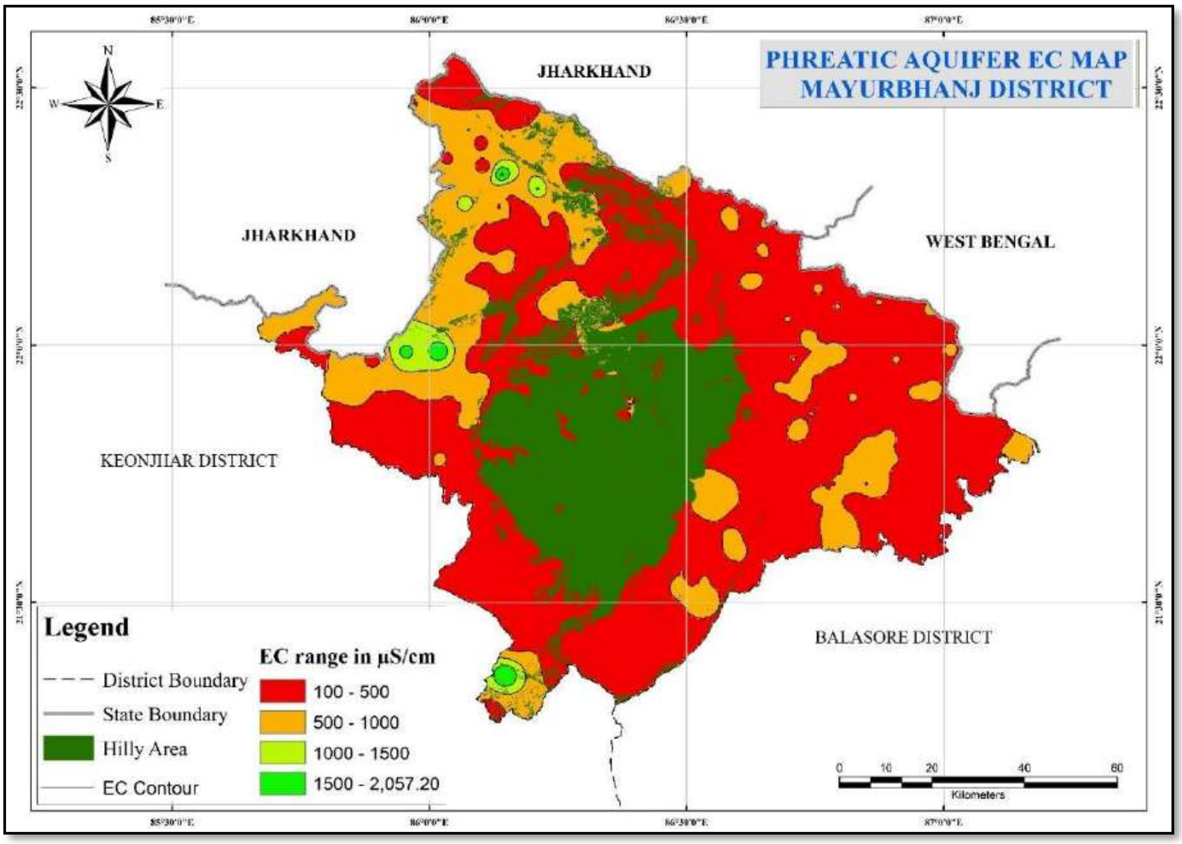


Figure 4.6. Shallow aquifer Electrical Conductivity Map, Mayurbhanj district.

Ground water Resources

In order to develop, sustainably manage, and efficiently use groundwater resources, it is essential to obtain precise measurements of the available groundwater resources. This involves identifying and quantifying various factors that affect groundwater recharge and discharge, as well as determining potential areas for groundwater development. The main sources of groundwater recharge are rainfall, seepage from canals, return flow from applied irrigation, and seepage from tanks and ponds. Groundwater is mainly found under water table conditions in the weathered residuum and fracture zone, which primarily depends on the thickness of the weathered residuum. The weathered and saturated fractured zones serve as the primary groundwater repositories in the district. The dynamic groundwater resource is estimated by analyzing the seasonal fluctuation of water levels in the shallow weathered zone and the near-surface fractured zone connected to it hydraulically. Data collected from various government agencies, such as CGWB, SE region, state govt. agencies, Government of Odisha have been utilized to determine the dynamic groundwater resource of Mayurbhanj district, which includes information of rainfall, water level fluctuation, specific yield, and groundwater abstraction structures for various utilities and irrigation. The annual groundwater draft of a groundwater abstraction structure is computed by multiplying the average discharge with the annual working hours of the structure. The rechargeable area of Mayurbhanj district with slope ≤20% is identified by downloading 30m resolution DEM of Shuttle Radar Topography Mission (SRTM) from http://earthexplorer.com. The rechargeable area is found to be 834016 ha. Here block wise resource calculation is presented. The computation of ground water resources available in the district has been done using GEC 2015 methodology.

Data and assumptions used in the assessment:

Following data and assumptions are used in the assessment.

1. Rainfall recharge has been computed by both RIF and WLF methods. Rainfall infiltration factor of 22% for valley fill as per norms is taken for calculation. In WLF method, specific yield has been taken as 0.16 for valley fill deposit following the norms recommended by GEC'2015. The rainfall of Mayurbhanj district is 1808.08 mm.
2. Water level data has been considered for 2021-25. Water level fluctuation based on data of April (Pre monsoon) and November (Post monsoon) has been considered. The average pre- and post-monsoon water level of Mayurbhanj district is 7.09 mbgl and 3.25 mbgl. The average water level fluctuation is 3.85 m.
3. The population figures were collected from Census, 2011 and projected to 2022. The per capita domestic requirement is considered as 70 lpcd for rural and 135 lpdc for urban area.
4. Recharge from other sources includes recharge from minor surface and ground water irrigation.

Recharge:

The aquifers of the study area are recharged by rainfall. The area experiences south-east monsoon. Monsoon rainfall contributes approximately 86 percent of total rainfall (May, June, July, August, September) while share of post and pre monsoon rainfall are approximately 14 percent each. Previous records show that the rainfall occurs almost in every month of a year. The month November to December has the minimum number of rainy days in any year and the period May to September has maximum number of rainy days. The monsoon recharge of the 834016 ha of recharge worthy area is 88377.77 ham while non-monsoon recharge is 21545.78 ham. Recharge from other sources is 43906.1 ham. Total ground water recharge is 153829.65 ham.

Extraction:

The agriculture in the area is partly rainfed and mostly irrigated. 86.18 % of the total extracted ground water is used for irrigation purpose. i.e., 50215.09 ham. Total industrial extraction is 223.21 ham. So, ground water is extracted for domestic use is 7828.73. Total groundwater extraction of Mayurbhanj district is 58267.04 ham

Allocation of resources up to 2025:

The net ground water resource is allocated for domestic use 8297.08 ham. Net available resource for future use is 84112.71ham. Stage of groundwater development: Groundwater is mainly utilized for irrigation purposes followed by domestic purpose. The stage of groundwater extraction in the district is 40.79 %.

Table 4.1. Net groundwater availability, existing draft and stage of development for the year 2022.

Recharge worthy area (Ha)	Total annual GW recharge (Ham)	Environmental flow (Ham)	Annual extractable GW resource (Ham) (2-3)	Existing gross GW extraction for all uses (Ham)	Stage of GW extraction [(5/4) *100%]
1	2	3	4	5	6
834016	153829.65	10,981.55	142848.09	58267.04	40.79%

Extraction from different

sources Groundwater in the

district is utilized for

(a) Irrigation

(b) Domestic purposes

(c) Industrial purpose.

86.18% of extracted groundwater is used for meeting the irrigation demand. Groundwater is extracted by installing shallow tube wells. As per district irrigation plan 2016-21 of Mayurbhanj district, there are 598 nos. of tube wells (govt.), 4120 nos. of bore wells (Govt.+ Pvt) in the district utilized for irrigation. A total of 47838 ha of Irrigation potential has been functioning area under irrigation. (Source. District Irrigation Plan. 2016, Mayurbhanj District.). The shallow tube wells tapping aquifers within 100 m depth are capable of yielding 86.4 to 900 m3/day at average drawdown of 12 m. Medium to heavy duty tube wells constructed down to 100 – 250 m depth are yielding 175 to 1700 m3/day. In domestic sector, dug wells and hand pumps are main source of groundwater extraction. Public health Engineering Dept. supplies water using groundwater and also by surface water. Generally, the groundwater extracted from shallow aquifer.

Potential resource:

Shallow water table areas: Potential resource due to shallow water table areas were estimated from aquifer area where depth-to-water level was within 5mbgl. The major part of the area of the district is 5 mbgl of depth-to-water level, ie., out of 8340.16 sq km of recharge worthy area only 246.40 sq km area ha depth to water level below 5 m. The potential resource of unconfined aquifer is 1691745.35 ham.

Total potential resource of Mayurbhanj district is 84112.71 ham.

Table 5.2 Assessment wise Dynamic Ground Water resources (2022), Mayurbhanj district

Sl. No	Assessment Unit Name	Total Area of Assessment Unit (Ha)	Recharge Worthy Area (Ha)	Total Annual Ground Water (Ham) Recharge	Total Natural Discharges (Ham)	Annual Extractable Ground Water Resource (Ham)	Total Extraction (Ham)	Annual GW Allocation for Domestic Use up to 2025 (Ham)	Net Ground Water Availability for future use (Ham)	Stage of Ground Water Extraction (%)	Categorization (Over-Exploited/Critical/Semi critical/Safe/Saline)
1	BADASAHI	34584	34567	7947.88	447.63	7500.25	4968.55	442.05	2511.59	66.25	safe
2	BAHALDA	26796	24919	5123.37	297.17	4826.2	2035.06	266.57	2777.17	42.17	safe
3	BANGIRIPOSI	75935	37975	6599.64	339.18	6260.46	3006.02	321.25	3237.73	48.02	safe
4	BARIPADA	23874	23874	5344.38	312.5	5031.88	2638.36	935.81	2335.49	52.43	safe
5	BETNOTI	33798	33798	7823.4	468.14	7355.26	4574.11	486.87	2749.24	62.19	safe
6	BIJATALA	33527	23763	5275.11	404.12	4870.99	1150.66	174.6	3715.74	23.62	safe
7	BISOI	33922	26021	3407.39	184.91	3222.48	1115.72	225.44	2096.5	34.62	safe
8	GOPABANDHU NAGAR	17722	17722	3805.01	190.25	3614.76	1952.84	233.73	1649.55	54.02	safe
9	JAMDA	23173	22229	3035.43	160.25	2875.18	1044.8	166.84	1826.09	36.34	safe
10	JASHIPUR	85225	49383	7304.71	376.57	6928.14	1811.74	300.62	5107.67	26.15	safe
11	KAPTIPADA	53365	49136	10909.49	1090.96	9818.53	2840.07	487.87	6944.47	28.93	safe
12	KARANJIA	76554	58744	7814.24	405.11	7409.13	1697.53	403.47	5694.86	22.91	safe
13	KHUNTA	22119	21231	5720.24	401.27	5318.96	2075.78	213.42	3236.34	39.03	safe
14	KULIANA	33429	33408	6428.91	642.9	5786.01	2676.84	315.86	3091.85	46.26	safe
15	KUSUMI	31323	28530	5636.94	382.31	5254.63	1360.53	287.55	3879.26	25.89	safe
16	MORODA	34219	34219	6594.07	659.41	5934.66	3049.19	307.79	2873.1	51.38	safe
17	RAIRANGPUR	26491	20048	5209.53	415.65	4793.88	1607.19	340.73	3131.91	33.53	safe
18	RARUAN	25360	25285	3317.71	165.88	3151.83	1468.02	203.51	1673.84	46.58	safe
19	RASGOVINDPUR	24327	24327	6326.94	632.7	5694.24	3813.37	306.93	1862.39	66.97	safe
20	SAMAKHUNTA	104649	46234	11054.35	741.78	10312.57	1856.86	229.22	8444.89	18.01	safe
21	SARASKANA	36939	34695	3700.9	185.04	3515.86	1641.34	309.2	1859.18	46.68	safe
22	SUKRULI	18382	18382	2555.71	127.79	2427.92	1595.17	194.07	820.63	65.70	safe
23	SULIAPADA	33324	33324	5887.57	588.76	5298.81	2568.32	306.03	2717.43	48.47	safe
24	THAKURMUNDA	106074	75559	10218.4	1021.85	9196.55	1924.62	336.41	7250.62	20.93	safe
25	TIRING	17175	16761	2808.63	140.43	2668.2	1402.81	186.89	1252.48	52.58	safe
26	UDALA	20286	19882	3979.7	198.99	3780.71	2391.54	314.35	1372.69	63.26	safe
	Total	1052572	834016	153829.65	10981.55	142848.09	58267.04	8297.08	84112.71	1122.92	0

From the table 4.2 it can be understood that stage of ground water development is minimum in Shamakhunta Block and maximum in Rasagovindapur Block. But all the blocks are coming under safe category. Diagrammatic representation of block wise resource details are given in the ground water resource map fig. (4.1).

Static resource

Here also the administrative block has been considered as the assessment unit. Hilly areas having slope more than 20% are exempted from the total area to get the area suitable for recharge. The average thickness of saturated unconfined aquifer below ground level as obtained from dug wells / bore wells in the district has been considered as the bottom of aquifer I is taken as 100m.

The Pre-monsoon (month of April) water level from monitoring wells of CGWB in Mayurbhanj district has been considered as the maximum depth below ground level up to which the zone of water level fluctuation occurs. Since Odisha receives pre-monsoon showers, which commences in May, resulting in rise in water levels in the phreatic zones, the deepest water levels are recorded during the month of April. Specific yield value of 0.2 is considered for the district.

Finally, the Static Ground Water Resource is computed from the data as obtained:

$$Y = A * (Z_1 - Z_2) * Sy$$

Where, Y = Static ground water resources,

A = Area of ground water assessment unit

Z_1 = Bottom of unconfined aquifer below ground level

Z_2 = Pre-monsoon water level

Sy = Specific yield of the unconfined aquifer

Static groundwater resources (Table 4.3) have been calculated of Aquifer-I considering effective aquifer thickness of only 5%, as fracture zones are very thin and heterogeneously distributed throughout 100-meter depth (i.e., the bottom of aquifer-1).

Table 5.3 Assessment wise Static Ground Water resources in 2022, of Mayurbhanj district, Odisha

Sl. No	Assessment Unit Name	Total Area of Assessment Unit (Ha)	Recharge Worthy Area (Ha)	In-Storage Unconfined Ground Water Resources(ham)
1	BADASAHI	34584	34567	14845.83
2	BAHALDA	26796	24919	69136.56
3	BANGIRIPOSI	75935	37975	106438.18
4	BARIPADA	23874	23874	16937.65
5	BETNOTI	33798	33798	25421.5
6	BIJATALA	33527	23763	66717.24
7	BISOI	33922	26021	48232.52
8	GOPABANDHU NAGAR	17722	17722	17769.41
9	JAMDA	23173	22229	51870.82
10	JASHIPUR	85225	49383	137013.03
11	KAPTIPADA	53365	49136	114460.35
12	KARANJIA	76554	58744	136306.27
13	KHUNTA	22119	21231	59294.89
14	KULIANA	33429	33408	21642.37
15	KUSUMI	31323	28530	80467.44
16	MORODA	34219	34219	33635.56
17	RAIRANGPUR	26491	20048	37287.27
18	RARUAN	25360	25285	46780.96
19	RASGOVINDPUR	24327	24327	15697.73
20	SAMAKHUNTA	104649	46234	85069.64
21	SARASKANA	36939	34695	63813.99
22	SUKRULI	18382	18382	34242.54
23	SULIAPADA	33324	33324	32412.63
24	THAKURMUNDA	106074	75559	140130.43
25	TIRING	17175	16761	46982.68
26	UDALA	20286	19882	46289.77
	Total	1052572	834016	1548897.26

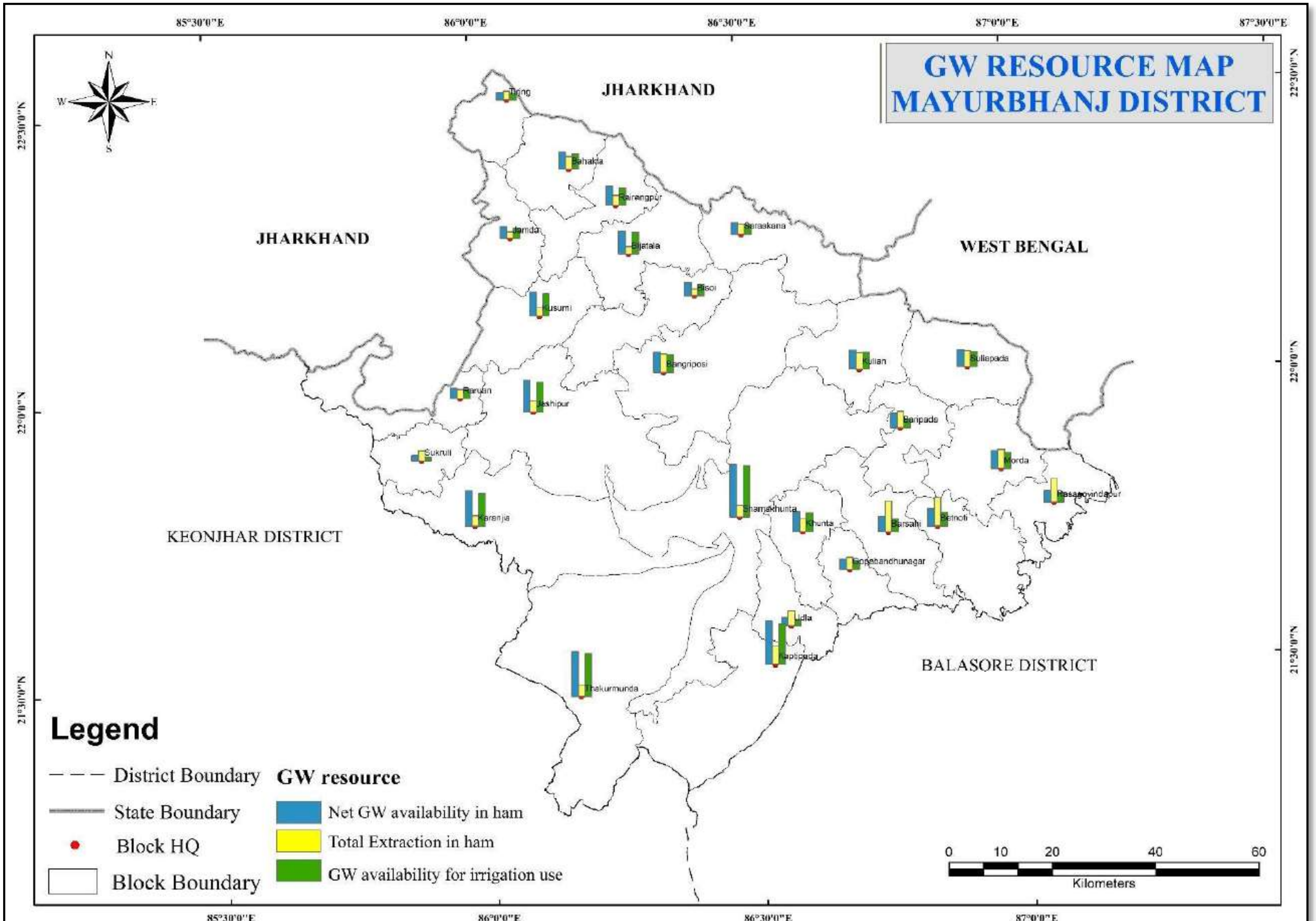


Figure 5.1 Groundwater Resource Map, Mayurbhanj District

Groundwater Related Issues

Identification of issues

Ground water is affected by the occurrences of geogenic and anthropogenic contaminants resulting in changes of water quality parameters. Contamination of several major aquifers leading to numerous local, regional problems. Some times over exploitation of ground water for different uses lead to water stressed conditions and may lead to a critical stage in future. Some times due to low stage of extraction leads to water logging situation. Water logging is often accompanied by soil salinity as water logged soils prevent leaching of the salts imported by the irrigation water**.** Mayurbhanj district is mainly suffered by Low stage of groundwater extractions in some blocks and a very small portion of the district is showing declining water trend for last 10 years.

Low stage of groundwater extraction

The main groundwater issues identified in the area are low stage of groundwater extraction and declining of ground water in some portion of different blocks. Stage of groundwater extraction in the district is just 40.79 % (table 4.2) leaving vast scope for further groundwater development. More than 20 blocks of the districts have ground water extraction stage less than 55% which can be enhance to 60% for further use in irrigation. Compared to vast dynamic groundwater resource of Mayurbhanj district, groundwater extraction for domestic, irrigation and industrial purposes is low in some blocks of Mayurbhanj district. Even after good surface water irrigation projects are under function in few blocks of the Mayurbhanj district vast tract of agricultural land remains fallow after harvesting of paddy only due to lack of irrigation facility in other blocks.

Area vulnerable to declining water level

From decadal post-monsoon water level trend and post monsoon mean water map (fig.6.2) it is observed that an area of 246.80 sq km in part of 10 blocks like Bangriposi, Baripada, Morda, Khunta, Rasagovindapur, Suliapada, Gopabandhunagar, Shamakhunta, Barasahi, Betnoti showing

ground water level falling trend as well as mean water level is more than 5 mbgl.

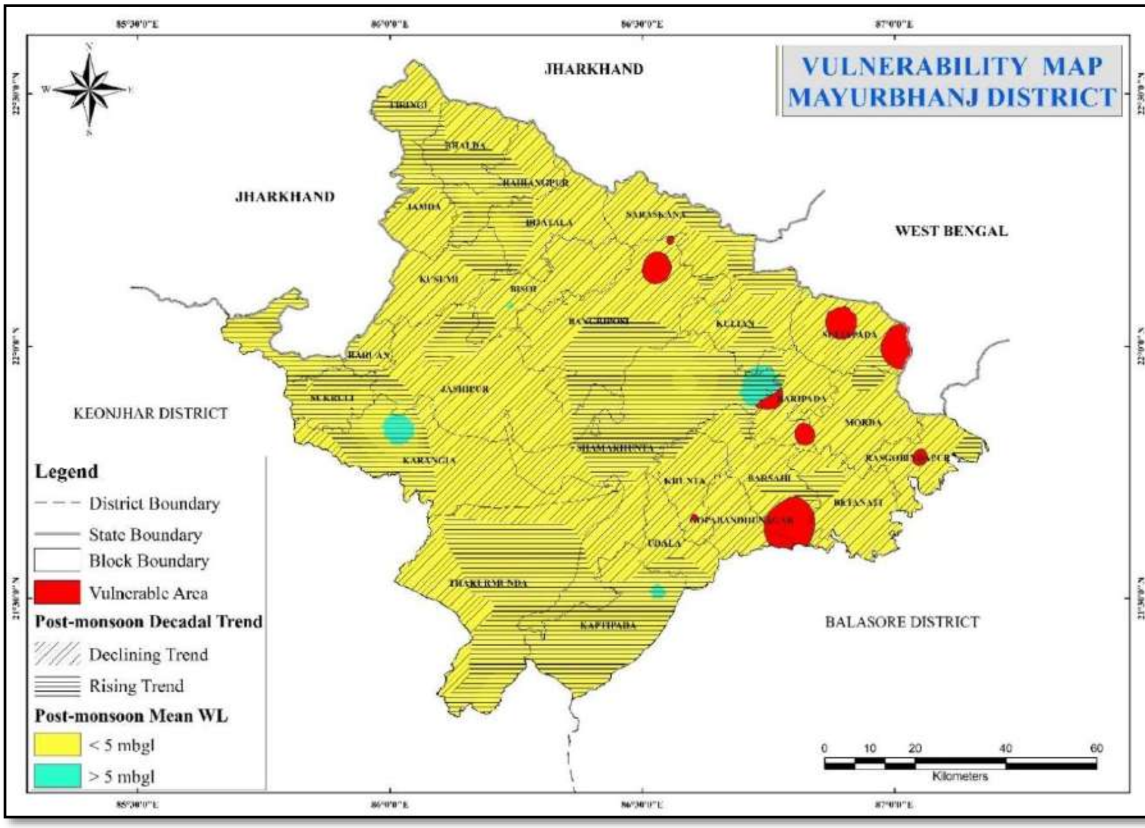


Figure 6.1 Vulnerability Map, Mayurbhanj District

Future demand

The most common use of extracted ground water is for domestic, livestock, irrigation, industrial purpose. As per water availability in the district, water demand and gap analysis was done by considering 13.30 % decadal population growth and irrigation, livestock and industrial details from District irrigation plan(2016-21) of Mayurbhanj district and presented in a tabular format (Table 6.1) it is clearly understood that water demand is increasing around 3-6 % per year. As shown in the table, the water demand in 2020 was 13968.72 ham which is estimated to be 25726.56 ham in 2035 in Mayurbhanj district. The water gap for the district was calculated from the available dynamic groundwater resource (GWRE, 2022 of CGWB) and the surface water availability data present in the district report (DIP, Mayurbhanj dist.) All the 26 blocks are showing surplus water to fulfil the demand in 2035 and then up to 2047.

Table 6.1 Details of water gap analysis for future use (all the figures are in ham)

Sl. No	Block	Water Demand 2015 in	Water Demand 2020	Water Demand 2025	Water Demand 2035	Water Demand 2047	Existing surface water availability	Annual Extractable Ground Water Resource	Total Water available	Water Gap 2025	Water Gap 2035	Water Gap 2047
1	Badasahi	622.63	865.45	1108.28	1593.93	2176.7	13579.13	7500.25	21079.38	19971.1	19485.45	18902.67
2	Bahalda	376.89	523.88	670.87	964.85	1317.62	16.75	4826.2	4842.95	4172.08	3878.1	3525.33
3	Bangiriposi	425.34	591.23	757.11	1088.88	1487	14.05	6260.46	6274.51	5517.39	5185.63	4787.5
4	Baripada	348.23	484.04	619.85	891.47	1217.41	2308.13	5031.88	7340.01	6720.16	6448.54	6122.59
5	Betnoti	610.69	848.86	1087.03	1563.36	2134.97	51.35	7355.26	7406.61	6319.58	5843.24	5271.64
6	Bijatala	283.07	393.46	503.86	724.65	989.61	200.49	4870.99	5071.48	4567.62	4346.82	4081.87
7	Bisoi	358.63	498.5	638.37	918.11	1253.79	100.25	3222.48	3322.73	2684.36	2404.62	2068.94
8	Gopabandhunagar	317.81	441.76	565.71	813.61	1111.08	149.73	3614.76	3764.49	3198.78	2950.88	2653.41
9	Jamada	307	426.73	546.46	785.92	1073.27	70.33	2875.18	2945.51	2399.05	2159.58	1872.23
10	Jashipur	402.22	559.08	715.95	1029.68	1406.15	4765.23	6928.14	11693.37	10977.42	10663.69	10287.22
11	Kaptipada	599.13	832.79	1066.45	1533.77	2094.56	29.67	9818.53	9848.2	8781.75	8314.42	7753.64
12	Karanjia	404.16	561.78	719.4	1034.64	1412.93	3782.73	7409.13	11191.86	10472.46	10157.22	9778.93
13	Khunta	321.03	446.23	571.43	821.83	1122.31	59364.43	5318.96	64683.39	64111.96	63861.56	63561.08
14	Kuliana	409.83	569.67	729.5	1049.17	1432.77	6042.59	5786.01	11828.6	11099.1	10779.43	10395.83
15	Kusumi	414.17	575.69	737.22	1060.27	1447.93	623.53	5254.63	5878.16	5140.94	4817.89	4430.23
16	Moroda	458.58	637.42	816.27	1173.96	1603.19	492.53	5934.66	6427.19	5610.92	5253.23	4824
17	Rasagovindapur	410.41	570.47	730.53	1050.65	1434.8	3028.33	4793.88	7822.21	7091.68	6771.55	6387.41
18	Rairangpur	287.46	399.58	511.69	735.91	1004.98	19.69	3151.83	3171.52	2659.83	2435.61	2166.54
19	Raruan	305.35	424.44	543.52	781.69	1067.5	763.83	5694.24	6458.07	5914.55	5676.37	5390.57
20	Saraskana	389.33	541.16	693	996.68	1361.09	17.95	10312.57	10330.52	9637.52	9333.84	8969.43
21	Shamakhunta	342.93	476.67	610.42	877.9	1198.88	1999.71	3515.86	5515.57	4905.15	4637.67	4316.68
22	Sukruli	246.56	342.71	438.87	631.19	861.96	18.33	2427.92	2446.25	2007.38	1815.06	1584.28
23	Suliapada	415.75	577.89	740.04	1064.32	1453.47	7126.91	5298.81	12425.72	11685.68	11361.39	10972.25
24	Thakurmunda	399.34	555.08	710.82	1022.3	1396.08	24.33	9196.55	9220.88	8510.06	8198.57	7824.79
25	Tiring	250.79	348.59	446.4	642.01	876.75	31.73	2668.2	2699.93	2253.53	2057.91	1823.18
26	Udala	342.12	475.55	608.97	875.83	1196.05	35214.05	3780.71	38994.76	38385.78	38118.93	37798.7
	Total	10049.44	13968.72	17888	25726.57	35132.84	139835.7	142848.09	282683.79	264795.79	256957.23	247550.95

Groundwater Quality

Ground water in this district is devoid of any geological contaminants. More than 200 samples were collected from the phreatic aquifers of all blocks of Mayurbhanj district to carry out the chemical analysis to determine the quality of the available ground water. From the analysis it is clear that the ground water of Mayurbhanj district is suitable for domestic and irrigation use. Iron is a big problem of some area in the district which occur higher than the permissible limit making the water in to red in colour.

Management Strategy

The groundwater regime of Mayurbhanj district is influenced by lithological variation and geomorphologic set up. The district can be divided into two slope classes, viz., slope >20% and slope <=20%. Areas with slope more than 20% are found is less than 20 % of the entire district and mostly restricted to the central portion of the district. Geomorphologically the district is comprised of Central hilly tract, Western hill range and Eastern undulating plains. The Central hilly tract is occupied by the Shimlipal hill complex, with highest elevation of the district. The western hill ranges present a rugged hilly terrain studded with rocky mounds. The eastern undulating plain extending from the foot hills towards the east are characterized by gentle slope, and endowed with most of the fertile and cultivable lands.

Sustainable Management Plan of Resource:

Some important points have to be taken into consideration during preparation of aquifer management plan.

- Stage of groundwater extraction in the district is just 40.79 % (table 4.2) leaving vast scope for further groundwater development. More than 20 blocks of the districts have ground water extraction stage less than 55%.
- Groundwater quality data indicates that aquifers are devoid of any geogenic contaminants and all the basic parameters, Arsenic, Fluoride are within the permissible limit set by WHO and BIS.
- Areas vulnerable to water table decline should have to be kept in focus.

Strategies for sustainable management must involve a combination of supply side and demand side measures depending on the regional setting and socio-economic situations. From the aquifer disposition study, it can be observed that ground water presents mostly in the weathered zone (avg. thickness 25 meter), fracture zones within 100 mbgl depth for the consolidated formation areas where as the water present in the granular zone in alluvial area. Decadal (2013-2022) water level map was prepared to understand the behaviour of water table for the past 10 years (fig.7.1) and decadal post monsoon mean water level layer was superimposed to identify the vulnerable areas (fig.6.1). It is observed that an area of 246.80 sq km in part of 10 blocks like Bangriposi, Baripada, Morda, Khunta, Rasagovindapur, Suliapada, Gopabandhunagar, Shamakhunta, Barasahi, Betnoti showing a ground water level falling trend as well as mean water level is more than 5 mbgl. Enhancement of ground water resources in this vulnerable area is required as the blocks are also suffering from rising ground water extraction situation.

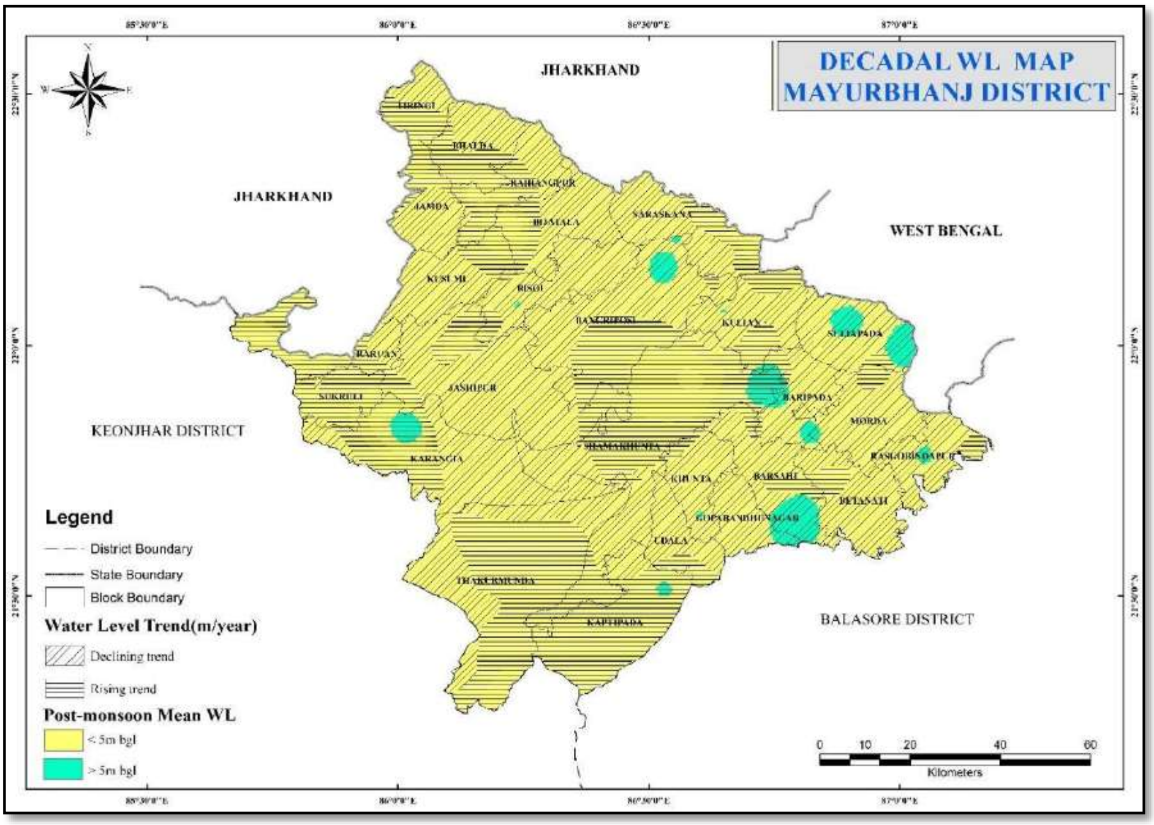


Figure 1 Decadal WL map, Mayurbhanj District

Supply side management

On the basis of Census 2011, village area, block area, number of total households were used. Then declining trend areas of 246 sq km in the demarcated 10 blocks have been selected for construction of artificial recharge structures like percolation tank, sub-surface dyke, Nala bunds and check dams to arrest the rainwater runoff for recharge. Vadose zone is calculated for the affected areas and then the volume of water required is determined which is given in the table 7.1. Number of structures are calculated to accommodate the volume of rain water for recharge to augment the ground water. Total 73 percolation tank, 37 subsurface dykes, 37 nala bunds and 73 check dams have to be constructed to recharge the excess rainfall going as runoff. By construction of the artificial recharge structures total 2742.09 ham of water can be recharged to the aquifers of mentioned affected blocks which helps enhancing in the ground water resources of the blocks to 65063.94 ham from present availability of ground water resources 62321.85 as given in the (table.7.2) ham in the affected blocks.

Table 7.1. Details of structures recommended for artificial recharge.

Sl. No.	Block	Affected Area in Sq. km.	Vol. of Vadose zone available in ham	Annual Rf runoff available for recharge in ham (Area*Ruoff coefficient (15 %) *Rf in m)	Water Volume required for recharge (75 % efficiency)	Water allocation for percolation tank (40%)	No. of Percolation tank with (@20 ham/PT)	Water allocation for sub surface dyke (15%)	No. of Sub-surface dyke (@15ham/str)	Water allocation for nala band/ contour bunding (15%)	No. of Nala Bund (@15ham/str)	Water allocation for check dam (30%)	No. of Check dam (@15ham/str)
1	**Bangriposi**	33.59	373.24	8065.57	497.65	199.06	10	74.65	5	74.65	5	149.30	10
2	**Baripada**	21.02	233.59	5047.84	311.46	124.58	6	46.72	3	46.72	3	93.44	6
3	**Morda**	4.62	51.28	1108.06	68.37	27.35	1	10.26	1	10.26	1	20.51	1
4	**Khunta**	1.63	18.15	392.11	24.19	9.68	0	3.63	0	3.63	0	7.26	0
5	**Rasagovindapur**	8.57	95.19	2057.02	126.92	50.77	3	19.04	1	19.04	1	38.08	3
6	**Suliapada**	81.21	902.27	19497.71	1203.02	481.21	24	180.45	12	180.45	12	360.91	24
7	**Gopabandhunagar**	16.84	187.14	4043.94	249.51	99.81	5	37.43	2	37.43	2	74.85	5
8	**Shamakhunta**	4.00	44.44	960.36	59.25	23.70	1	8.89	1	8.89	1	17.78	1
9	**Barasahi**	73.35	814.91	17609.93	1086.55	434.62	22	162.98	11	162.98	11	325.96	22
10	**Betnoti**	1.97	21.90	473.18	29.20	11.68	1	4.38	0	4.38	0	8.76	1
	Total	246.81	2742.09	59255.74	3656.12	1462.45	73	548.42	37	548.42	37	1096.84	73

Table 7.2. Estimated details of Ground water enhancement after construction of recharge structures

Sl. No.	Block	Affected Area in Sq. km.	No. of Percolation tank	Total vol recharged with (75 % efficiency)	No. of Sub-surface dyke	Total vol recharged with (75 % efficiency)	No. of Nala Bund	Total vol recharged with (75 % efficiency)	No. of Check dam	Total vol recharged with (75 % efficiency)	Total Quantum of water recharge in ham	Present Available resources of Blocks in ham	Augmentation of GW resource after recharge in ham
1	**Bangriposi**	33.59	10	149	5	56	5	56	10	111.97	373.24	6260.46	6633.70
2	**Baripada**	21.02	6	93	3	35	3	35	6	70.08	233.59	5031.88	5265.47
3	**Morda**	4.62	1	21	1	8	1	8	1	15.38	51.28	5934.66	5985.94
4	**Khunta**	1.63	0	7	0	3	0	3	0	5.44	18.15	5318.96	5337.11
5	**Rasagovindapur**	8.57	3	38	1	14	1	14	3	28.56	95.19	5694.24	5789.43
6	**Suliapada**	81.21	24	361	12	135	12	135	24	270.68	902.27	5298.81	6201.08
7	**Gopabandhunagar**	16.84	5	75	2	28	2	28	5	56.14	187.14	3614.76	3801.90
8	**Shamakhunta**	4.00	1	18	1	7	1	7	1	13.33	44.44	10312.57	10357.01
9	**Barasahi**	73.35	22	326	11	122	11	122	22	244.47	814.91	7500.25	8315.16
10	**Betnoti**	1.97	1	9	0	3	0	3	1	6.57	21.90	7355.26	7377.16
	Total	246.81	73	1097	37	411	37	411	73	822.63	2742.09	62321.85	65063.94

Demand side management:

Demand side management implies sustainable management of water. Groundwater resource of the district is sufficient to meet drinking water demand and also irrigation and other industrial demands under different condition.

For irrigation and drinking water supply also sufficient quantity of water loss occurs. Water use efficiency should be high in all sectors particularly in the irrigation sector. Loss in irrigation water will increase water logged area.

Irrigation efficiency can be increased by

- Reducing convenience loss
- Improving water application efficiency

Following demand side interventions will increase water use efficiency

<u>Use of water efficient irrigation method:</u>

Drip and sprinkler irrigation methods are very useful in saving water. Both of them save conveyance losses and improve water application efficiency by applying water near the root-zone of the plant. Drip systems convey water in small quantities through drippers/micro-tubes while sprinklers are pressurized systems where a fountain or spray of water is released by the sprinkler connected by pipes, resulting in foliar irrigation. Drip irrigation can increase crop yield per hectare and also saves water up to 70% than conventional irrigation. Water loss through supply canals can be minimized by proper lining in the canals. Adopting water saving rice irrigation: In this method instead of submerging the paddy field for longer duration, the rice field have to provide water through irrigation only after a certain number of days when the ponded water disappears. This technology is known as alternate wetting and drying (AWD) irrigation. With the optimal management, this technology reduces the amount of water required by about 25% without reduction in yields.

<u>Additional potential creation from ground water.</u>

Out of 26 blocks 21 blocks have stage of ground water development less than 55 percentage making them the low ground water extraction blocks. These blocks have the scope for more ground water extraction. Taking ground water development safely up to 60% of the resource available, the ground water potential for further development is calculated. The details of the resource calculation for different blocks of Mayurbhanj are shown in Table 7.3 and 7.4 respectively.

Table 7.3. Details of surplus GW resource and Number of feasible GW abstraction structures.

Sl No.	Block	Net Ground Water availability (Ham)	Stage of Ground Water development (%)	Present Ground Water Draft (Ham)	Ground Water draft at 60% Stage of development (Ham)	Surplus Ground Water at Present Stage of development (Ham)	Number of BW/ STW Recommended in Each block (assuming unit draft as 2.21/ ham/structure/ year) 50%	Number of DW Recommended in Each block (assuming unit draft as 0.8/ ham/structure/ year) 50%
1	**Badasahi**	7500.25	**66.25**	4968.55				
2	**Bahalda**	4826.2	42.17	2035.06	2895.72	860.66	195	538
3	**Bangiriposi**	6260.46	48.02	3006.02	3756.276	750.256	170	469
4	**Baripada**	5031.88	52.43	2638.36	3019.128	380.768	86	238
5	**Betnoti**	7355.26	**62.19**	4574.11				
6	**Bijatala**	4870.99	23.62	1150.66	2922.594	1771.934	401	1107
7	**Bisoi**	3222.48	34.62	1115.72	1933.488	817.768	185	511
8	**Gopabandhu Nagar**	3614.76	54.02	1952.84	2168.856	216.016	49	135
9	**Jamda**	2875.18	36.34	1044.8	1725.108	680.308	154	425
10	**Jashipur**	6928.14	26.15	1811.74	4156.884	2345.144	531	1466
11	**Kaptipada**	9818.53	28.93	2840.07	5891.118	3051.048	690	1907
12	**Karanjia**	7409.13	22.91	1697.53	4445.478	2747.948	622	1717
13	**Khunta**	5318.96	39.03	2075.78	3191.376	1115.596	252	697
14	**Kuliana**	5786.01	46.26	2676.84	3471.606	794.766	180	497
15	**Kusumi**	5254.63	25.89	1360.53	3152.778	1792.248	405	1120
16	**Moroda**	5934.66	51.38	3049.19	3560.796	511.606	116	320
17	**Rairangpur**	4793.88	33.53	1607.19	2876.328	1269.138	287	793
18	**Raruan**	3151.83	46.58	1468.02	1891.098	423.078	96	264
19	**Rasgovindpur**	5694.24	**66.97**	3813.37				
20	**Samakhunta**	10312.57	18.01	1856.86	6187.542	4330.682	980	2707
21	**Saraskana**	3515.86	46.68	1641.34	2109.516	468.176	106	293
22	**Sukruli**	2427.92	**65.70**	1595.17				
23	**Suliapada**	5298.81	48.47	2568.32	3179.286	610.966	138	382
24	**Thakurmunda**	9196.55	20.93	1924.62	5517.93	3593.31	813	2246
25	**Tiring**	2668.2	52.58	1402.81	1600.92	198.11	45	124
26	**Udala**	3780.71	**63.26**	2391.54				

Table 7.4. Additional irrigation potential to be created from ground water in Mayurbhanj district

Block	Present Stage of Ground Water Development (%)	Surplus Ground Water Available for 60% stage of Development (Ham)	Irrigation Potential likely to be created for Paddy (Ha)	Irrigation Potential likely to be created for Ground Nut, Oil seed (Ha)	Irrigation Potential likely to be created for vegetables (Ha)	Projected Area to be Irrigated (ha)
Badasahi	66.25					
Bahalda	42.17	860.66	239.0722222	827.5576923	956.2888889	2022.918803
Bangiriposi	48.02	750.256	208.4044444	721.4	833.6177778	1763.422222
Baripada	52.43	380.768	105.7688889	366.1230769	423.0755556	894.9675214
Betnoti	62.19					
Bijatala	23.62	1771.934	492.2038889	1703.782692	1968.815556	4164.802137
Bisoi	34.62	817.768	227.1577778	786.3153846	908.6311111	1922.104274
Gopabandhu Nagar	54.02	216.016	60.00444444	207.7076923	240.0177778	507.7299145
Jamda	36.34	680.308	188.9744444	654.1423077	755.8977778	1599.01453
Jashipur	26.15	2345.144	651.4288889	2254.946154	2605.715556	5512.090598
Kaptipada	28.93	3051.048	847.5133333	2933.7	3390.053333	7171.266667
Karanjia	22.91	2747.948	763.3188889	2642.257692	3053.275556	6458.852137
Khunta	39.03	1115.596	309.8877778	1072.688462	1239.551111	2622.12735
Kuliana	46.26	794.766	220.7683333	764.1980769	883.0733333	1868.039744
Kusumi	25.89	1792.248	497.8466667	1723.315385	1991.386667	4212.548718
Moroda	51.38	511.606	142.1127778	491.9288462	568.4511111	1202.492735
Rairangpur	33.53	1269.138	352.5383333	1220.325	1410.153333	2983.016667
Raruan	46.58	423.078	117.5216667	406.8057692	470.0866667	994.4141026
Rasgovindpur	66.97					
Samakhunta	18.01	4330.682	1202.967222	4164.117308	4811.868889	10178.95342
Saraskana	46.68	468.176	130.0488889	450.1692308	520.1955556	1100.413675
Sukruli	65.70					
Suliapada	48.47	610.966	169.7127778	587.4673077	678.8511111	1436.031197
Thakurmunda	20.93	3593.31	998.1416667	3455.105769	3992.566667	8445.814103
Tiring	52.58	198.11	55.03055556	190.4903846	220.1222222	465.6431624
Udala	63.26					

Other management Strategies

Ground Water Development

The ground water development is being done through dug wells, bore wells and tube wells. Tube wells include filter point and, shallow, medium deep tube wells. The use of ground water is for both domestic and as well as irrigation purposes.

The Groundwater abstraction structures are recommended are as follows

i. Dug wells: Dug wells are feasible in all the blocks of the district. The depth of the dug wells in hard rocks and semi consolidated rocks should be 10 to 12m while the depth of the wells in unconsolidated formations i.e., in the central and eastern part of the district may be 8-10m. The diameter of the wells in both the case may be 1 to 2m.

ii. Shallow Tube Wells: The shallow tube wells are feasible in the unconsolidated deposits. These are feasible in alluvial tract of Budhabalanga, Kharkai and Jamira. The depth of the shallow tube wells may be restricted within 50 mbgl and the diameter is 15cm. The depth of shallow tube wells may be restricted within 25 to 30 m. The expected yield is generally within 11-12 lps and submersible pumps of 3 to 5 H.P may be installed. The spacing between two tube wells should be at least 300m.

iii. Deep tube wells: As the thickness of alluvium gradually increases towards east / northeast (towards Betnati) and southeast (Badasahi, Puruna Baripada) medium deep tube well may be feasible down to 90 m bgl depending on availability of adequate thickness of aquifer as confirmed through resistivity surroundings.

iv. Borewells: The bore wells are feasible in most part of the area with consolidated formations which tap deeper saturated fractures in the depth range of 100 to 120 m. The depth of the wells should be restricted to 200 m. Yield on an average 2 to 10 lps. The weathered zones down to 25 to 30 m. depth may be cased and rest part should be left uncased. Generally, 2 to 3 saturated fractured zones occur within 120m depth. Spacing of wells should not be less than 150m

Quality Issues and management

No such remarkable quality issues for basic parameters are observed in the ground water. Both for domestic and irrigation ground water is suitable in the district. Ground water is devoid of any significant geogenic contaminants except iron in some pockets in different blocks of the district. As a remedy to iron contaminations in most of the locations around the district, iron removal plants (compact/traditional) should be installed before supplying water.

Conclusion and Recommendations

The district has ample resources as the stage of extraction is 40.79 %. There is huge scope for future irrigation in the lean period by ground water extractions taking the stage up to 60 % from the current stage. Quality wise the available ground water is suitable for both domestic and irrigation purpose. Iron in ground water can be removed using iron removal filter before consumption.

Following recommendations are suggested

- The majority of the fractures that contribute to productivity are situated at a depth of 100 meters below the ground. Within this depth, the aquifers can be utilized for drinking and irrigation purposes. The aquifer system is replenished by rainfall on a regular basis.
- Considering the significant potential for groundwater development, it would be beneficial to implement appropriate schemes aimed at increasing agricultural productivity in the district.
- Water distribution mechanism should minimize water loss by using lining distribution canals. Locally available materials are to be preferred as these materials are cheap and eco-friendly.
- Conservation of rain water in the up dip of cultivated field. During rabi season the conserved water can be drained to paddy field through gravity.
- In certain areas, the level of iron in the groundwater is elevated. The origin of this iron pollution in the deeper aquifers can be attributed to natural geological processes. Prior to human consumption, it is necessary to remove this excess iron using iron removal filters. Government water supplying should use iron removal plants in community level to remove excess iron.
- Rain water harvesting is the technique of collection and storage of rainwater at surface or sub-surface aquifer, before it is lost as surface runoff. Therefore, existing and abandoned dug wells may be utilized as recharge structure after cleaning and desilting for the purpose.
- Intensive groundwater exploration should be carried out to delineate deeper potential water saturated fracture zones and to compute aquifer parameter.
- Large scale planning for ground water development should be preceded by intensive hydrogeological and geophysical surveys aided by remote sensing studies.
- Existing dug wells should be deepened to tap the maximum saturated thickness of the weathered zones or vertical bores may be drilled through the bottom to enhance the well yield.
- The farmers should be educated through agricultural extension services for adopting suitable cropping pattern for optimal utilization of available groundwater resources.
- Apart from the available recharge structures in the district, extensive programmes for artificial recharge may also be taken up for augmentation of groundwater through construction of percolation tanks, subsurface dykes, and check dams and through contour bunding etc.

Annexure 01

Rainfall data for 30 years of Mayurbhanj District.

Sl. No.	Name of the Block																			
		1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004		NORMAL
1	Samakhunta	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0
2	Badasahi	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0
3	Betanati	1171.6	1589.8	2694.0	1462.8	1390.9	1464.8	1501.1	1391.4	970.9	1359.7	1229.5	1314.2	1192.7	1539.2	769.9	1318.9	1124.3		1328.9
4	Morda	871.0	753.0	1145.9	947.0	756.0	856.0	1075.0	381.0	774.0	1556.6	1171.2	1216.7	932.7	1459.0	679.4	1295.8	1428.6		1092.9
5	Rasgovindapur	1096.0	1057.6	1543.0	1044.0	765.0	1008.0	1714.0	1040.5	976.0	1305.0	822.5	1356.0	568.0	1429.0	969.4	1441.5	1056.9		1128.0
6	Kuliana	1238.9	1443.0	1505.0	1482.0	1176.0	1398.0	1069.7	1029.3	622.5	933.0	695.2	821.6	556.0	1043.8	598.6	1351.0	1087.0		1159.6
7	Sarasakana	942.0	1386.0	1491.0	1430.0	1024.0	1324.0	1497.6	1370.0	1029.5	1224.3	1098.0	1395.0	719.0	1323.0	740.7	2220.0	1325.0		1205.3
8	Suliapada	1153.1	1285.9	1466.6	2089.5	1209.6	1033.4	1992.0	1396.8	720.4	2112.0	1090.8	1281.6	973.2	2107.9	1025.6	1687.3	1211.5		1393.8
9	Bangriposi	924.5	1295.0	1496.4	1672.7	1405.0	1367.4	2326.9	1413.0	781.6	1605.8	1265.6	1389.6	925.5	2324.8	1039.5	2012.8	1260.3		1388.4
10	Baripada	1545.2	1213.0	1731.0	1534.3	1555.8	2380.5	2418.6	1983.3	1799.5	1728.7	1492.4	2026.0	1304.8	2080.1	1380.8	3025.5	2225.0		1789.9
11	Khunta	8942.3	10023.3	13072.9	11662.3	9282.3	10832.1	13594.9	10005.3	7674.4	11825.1	8865.2	10800.7	7171.9	13306.8	7203.9	14352.8	10718.6		10486.8
12	Gopabandhunagar	1117.8	1252.9	1634.1	1457.8	1160.3	1354.0	1699.4	1286.8	959.3	1478.1	1108.2	1350.1	896.5	1663.4	900.5	1794.1	1339.8		1308.0
13	Udala	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0
14	Kaptipada	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0
15	Besoi	1762.5	1320.2	1992.0	1744.7	1610.1	2376.0	1816.0	1967.0	1481.0	2068.8	2040.0	1838.0	1419.0	1450.0	1647.0	1927.0	1599.0		1756.8
16	Bijatala	1509.0	1227.0	1525.7	1145.3	1567.0	1500.5	1262.0	1648.0	1012.0	1936.0	1315.5	1635.0	1326.0	1667.0	1212.0	1304.0	997.0		1507.4
17	Rairangapur	1391.0	2009.0	2250.5	1473.4	1588.5	2245.5	1912.0	2014.0	1337.0	1988.0	1742.0	2042.0	1353.0	1984.0	1507.0	1471.0	1384.7		1635.1
18	Kusumi	1584.0	1828.0	2035.0	1632.5	1574.2	2469.5	2173.3	2275.0	1756.0	2922.0	2283.0	2792.0	2236.0	2432.0	1872.0	1854.0	1575.0		1885.1
19	Jamda	1513.0	1806.5	2076.5	1286.0	1661.0	1749.0	2009.0	2149.0	1348.0	2251.0	1254.4	1758.0	875.0	1362.9	1205.9	2744.0	2325.6		1691.6
20	Bahalda	1148.2	1753.0	1558.0	1617.0	2353.9	2057.0	2201.0	3093.0	2725.0	3394.0	1921.0	1600.0	1556.0	1692.0	1111.0	1643.0	1429.0		1738.2
21	Tiring	2102.0	1974.0	2523.0	1491.0	1748.6	1817.0	2096.0	2193.0	1471.0	2051.0	1679.0	2150.0	1244.0	1522.0	1209.0	1246.0	996.0		1737.7
22	Joshipur	2108.0	1605.0	2089.0	1617.0	1870.9	1953.1	1488.0	2379.0	910.3	2023.0	1142.0	2118.0	1180.0	1529.0	1235.0	1774.5	1473.5		1674.2
23	Karanjia	1452.5	1027.0	1509.0	938.5	2075.0	1013.5	1706.0	1813.0	1135.5	2094.0	1373.0	2174.0	1467.0	1913.0	1049.0	1542.0	1442.5		1519.1
24	Thakurmunda	1824.0	1838.7	2370.5	2027.0	1712.0	2390.0	1534.0	2168.8	1350.0	1860.0	1452.0	2071.0	1369.0	1091.3	911.0	2191.0	2338.0		1786.9
25	Sukuruli	2044.0	1844.0	2109.0	1474.0	1635.0	1982.0	1347.0	2192.0	1028.0	2048.0	1400.0	1937.0	1440.0	2022.0	1199.0	1568.0	1659.0		1756.4
26	Raruana	2228.1	2387.0	2421.0	1699.3	1809.0	2052.0	1663.0	2394.0	1376.0	2155.0	1695.0	4084.0	2445.0	2903.0	1692.0	2040.0	1867.0		1954.2
	Total	**20666.3**	**20619.4**	**24459.2**	**18145.7**	**21205.2**	**23605.1**	**21207.3**	**26285.8**	**16929.8**	**26790.8**	**19296.9**	**26199.0**	**17910.0**	**21568.2**	**15849.9**	**21304.5**	**19086.3**		20692.8
	Average	**1722.2**	**1718.3**	**2038.3**	**1512.1**	**1767.1**	**1967.1**	**1767.3**	**2190.5**	**1410.8**	**2232.6**	**1608.1**	**2183.3**	**1492.5**	**1841.9**	**1320.8**	**1775.4**	**1590.5**		1660.55

		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	
1	Samakhunta	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1935.5	1364.5	1580.0	
2	Badasahi	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1848	1460.4	1401.0	
3	Betanati	1398.6	1138.9	1052.2	1422.4	1267.1	1260.6	1227.5	1303.0	1416.5	1448.1	1214.4	1235.6	867.4	1539.6	1246.0	2296	1667.0	1582.0	
4	Morda	1124.3	1162.2	1262.2	1214.2	1188.7	974.9	1252.8	1299.1	1349.5	1411.7	903.6	1087.0	853.6	1423.4	1165.4	2035	1598.0	1364.0	
5	Rasgovindapur	1318.0	861.1	1106.6	1499.1	1121.8	724.1	1351.0	1138.7	1263.9	1268.1	957.7	1041.5	955.8	1240.1	1057.0	1644.2	1517.3	1293.5	
6	Kuliana	1589.3	1139.0	1164.5	1180.0	1298.0	821.0	1296.0	1514.0	1092.1	1683.0	1274.0	1246.2	967.0	1475.3	1318.0	1756.7	1835.0	1316.5	
7	Sarasakana	2006.3	1231.0	1026.0	1369.0	924.0	894.0	1087.0	1254.7	1297.6	1163.0	1054.0	631.0	623.4	1118.1	1350.9	2036.6	1808.5	1030.0	
8	Suliapada	1508.2	1892.9	1252.1	1521.4	1503.2	945.4	1219.8	1408.8	1410.2	1863.0	970.6	1181.4	1103.0	1502.2	1481.9	2048.8	1685.0	1516.4	
9	Bangriposi	1599.5	1735.4	1333.2	1368.0	1377.9	975.4	1406.6	1401.0	1246.6	1670.8	907.9	1470.4	960.1	1379.3	1090.7	1907	1794.8	1262.2	
10	Baripada	3169.2	1592.7	1701.2	1802.5	1457.6	1008.8	1918.7	1957.9	2478.0	2145.0	1302.0	1262.0	1389.6	1308.9	1358.4	2244	1849.0	1721.0	
11	Khunta	13713.4	10753.2	9898.0	11376.6	10138.3	7604.2	10759.4	11277.2	11554.4	12652.7	8584.2	9155.1	7719.9	10986.9	10068.3	2077.3	1988.9	1664.6	
12	Gopabandhunagar	1714.2	1344.2	1237.3	1422.1	1267.3	950.5	1344.9	1409.7	1444.3	1581.6	1073.0	1144.4	965.0	1373.4	1258.5	2077.3	1988.9	1717.9	
13	Udala	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1847.3	1879.3	1930.8	
14	Kaptipada	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1710	1991.2	2294.0	
15	Besoi	2960.6	1762.2	2217.4	1566.0	1347.0	978.0	1909.0	945.0	2041.0	2037.2	1289.9	1830.0	1659.5	1731.3	1884.7	1979.5	1839.0	1690.5	
16	Bijatala	1591.0	1789.0	2211.0	1769.0	1236.0	1159.0	1360.0	1313.0	2264.0	1847.0	1248.0	1777.4	1666.0	1686.0	1532.0	1545	1436.0	1388.0	
17	Rairangapur	2218.0	1801.0	2306.0	2073.0	772.0	1165.0	1376.0	925.0	2091.0	1665.0	1123.0	1369.0	1545.0	1500.0	1662.0	1452.5	1197.0	1041.0	
18	Kusumi	2628.2	1686.0	2446.5	1333.0	1140.0	1087.0	1421.0	1217.0	2250.0	2030.3	1187.0	1554.0	1634.0	1745.0	1672.0	1614.4	1575.0	1158.6	
19	Jamda	2057.0	1559.5	1582.5	1622.7	1439.0	1274.0	1246.0	1026.5	2297.0	2059.5	1453.0	1529.0	2128.0	1993.0	1489.0	1490	1406.2	1141.3	
20	Bahalda	1753.0	1563.0	2198.0	1855.0	1352.0	1641.5	1812.0	908.5	1447.0	1675.0	1253.0	1373.0	1609.0	1828.0	1461.7	1465.4	1566.8	1242.2	
21	Tiring	1662.5	1943.0	2183.9	1679.4	1660.0	1464.0	1265.5	958.5	2758.0	1930.1	1285.0	1953.8	1731.4	2061.4	1558.7	1263.7	1806.0	1204.8	
22	Joshipur	1490.0	1201.0	1839.0	1139.0	2393.5	1408.5	1808.5	1426.0	1917.0	2275.0	1431.0	1873.0	1084.0	1929.0	1863.4	1516.9	1659.6	1391.6	
23	Karanjia	1900.0	1775.0	2344.0	1293.0	1776.0	1041.0	1143.0	711.0	1828.0	1479.6	1363.0	1431.0	1388.0	1737.0	1358.0	1472.7	1317.0	1412.0	
24	Thakurmunda	2402.4	2406.0	2934.0	2213.0	1767.0	1294.0	1064.0	914.0	1624.6	1847.0	1334.0	1604.0	1520.0	2001.0	1757.3	2010.3	1550.2	1587.7	
25	Sukuruli	1711.0	1684.0	1858.0	2231.0	1964.0	1459.0	1734.0	1233.0	2970.0	2190.0	1295.0	1828.0	1270.0	2011.0	1840.0	1292	999.2	969.2	
26	Raruana	2480.0	2115.0	2110.0	1635.0	2109.0	1201.0	1711.0	768.0	1641.0	2139.0	1222.0	1419.0	1370.0	1840.0	1863.0	889	849.0	849.1	
	Total	**24853.7**	**21284.7**	**26230.3**	**20409.1**	**18955.5**	**15172.0**	**17850.0**	**12345.5**	**25128.6**	**23174.7**	**15483.9**	**19541.2**	**18604.9**	22062.7	19941.8	45455.1	41628.8	1413.5	
	Average	**2071.1**	**1773.7**	**2185.9**	**1700.8**	**1579.6**	**1264.3**	**1487.5**	**1028.8**	**2094.1**	**1931.2**	**1290.3**	**1628.4**	**1550.4**	1838.6	1661.8	1748.3	1601.1	1580.0	

Annexure 02

Pre & Post-monsoon (2022) WL details of Existing GWMS in Mayurbhanj District.

District	Site Name	Depth	Pre-Monsoon WL in mbgl	Post-Monsoon WL in mbgl	Fluctuation Pre- and Post- monsoon
Mayurbhanj	(Astia) Baripada	14.50	12.70	8.4	4.30
Mayurbhanj	Amarda village	12.95	5.65	1.65	4.00
Mayurbhanj	Ambadiha	6.00	3.32	2.8	0.52
Mayurbhanj	Asanbani	9.00	4.08	3.6	0.48
Mayurbhanj	Badampahad-1	15.16	7.27	5.64	1.63
Mayurbhanj	Badasahi	8.33	3.52		0.00
Mayurbhanj	Badchatra	8.50	3.50	3.1	0.40
Mayurbhanj	Bademtolia	9.00	2.30	1.82	0.48
Mayurbhanj	Bahalda 1	8.50	3.45	2.6	0.85
Mayurbhanj	Bahalda Road(kona)	8.71	3.51	2.31	1.20
Mayurbhanj	Baidipur	14.80	9.20	3	6.20
Mayurbhanj	Bangriposi	11.69	10.93	8.83	2.10
Mayurbhanj	Baripada 1	16.50	9.30	7.5	1.80
Mayurbhanj	Baura	8.50	6.50	3.6	2.90
Mayurbhanj	Bedhakudar	11.05	10.70	8.2	2.50
Mayurbhanj	Begna	12.40	2.38	1.52	0.86
Mayurbhanj	Belam	8.25	5.54	2.94	2.60
Mayurbhanj	Betanoti	15.90	4.40	1.6	2.80
Mayurbhanj	Bhatachhatra	8.00	4.11	2.82	1.29
Mayurbhanj	Bisoi	12.30	9.55	3.4	6.15
Mayurbhanj	Brundabanchan	7.93	6.48	2.88	3.60
Mayurbhanj	Brushavanupur	9.60	7.50	4.5	3.00
Mayurbhanj	Chadheibhol	10.15	3.67	1.65	2.02
Mayurbhanj	Champajhar	10.00	2.55	0.63	1.92
Mayurbhanj	Champrai	8.40	2.92	1.35	1.57
Mayurbhanj	Charchakia	13.60	9.60	6.4	3.20
Mayurbhanj	Chitrada	11.00	4.90	4.3	0.60
Mayurbhanj	Dahisahi (Banki sole)	20.00	15.70	4.8	10.90
Mayurbhanj	Dahisahi-Dipasahi	7.50	6.00	4.5	1.50
Mayurbhanj	Dandabose	12.50	2.31	0.87	1.44
Mayurbhanj	Dantiamuhani	14.20	6.30	6.3	0.00
Mayurbhanj	Deoli	7.50	6.00	5.2	0.80
Mayurbhanj	Devsol	7.90	6.00	3.5	2.50
Mayurbhanj	Dhampur	14.60	10.40	6.4	4.00
Mayurbhanj	Dukura	8.50	7.21	4.31	2.90
Mayurbhanj	Gambharia	10.53	1.31	0.78	0.53
Mayurbhanj	Gorumahisani	9.66	2.93	2.38	0.55
Mayurbhanj	Guhaldiha	14.00	6.75	7.25	-0.50
Mayurbhanj	Hatibandha	15.20	3.00	2.5	0.50
Mayurbhanj	Indupur	9.12	2.32	1.27	1.05
Mayurbhanj	Itighar	9.80	3.20	2.18	1.02
Mayurbhanj	Jamda 1	11.00	2.48	2.02	0.46
Mayurbhanj	Jamsola	15.00	5.85	1.95	3.90

Mayurbhanj	Jamukeswar	7.95	3.00	1.49	1.51
Mayurbhanj	Jharpokhari	14.63	4.07	2.87	1.20
Mayurbhanj	Jhunkapal	10.70	3.57	2.33	1.24
Mayurbhanj	Kalabadia	8.00	4.50	2.7	1.80
Mayurbhanj	Kalana	12.08	5.75	2.65	3.10
Mayurbhanj	Kaptipada 1	10.50	9.50	6.4	3.10
Mayurbhanj	KaranjeiBijatola Chhak	7.55	2.53	2.81	-0.28
Mayurbhanj	Kendujani	12.50	2.94	1.84	1.10
Mayurbhanj	Kendumundi	10.80	3.53	1.43	2.10
Mayurbhanj	Kherna	10.00	2.96	1.59	1.37
Mayurbhanj	Khiching	9.53	3.04	2.24	0.80
Mayurbhanj	Khunta	10.16	4.30	4.3	0.00
Mayurbhanj	Kostha	10.80	3.39	2.09	1.30
Mayurbhanj	Krishnachandrap	17.42	15.32	7.42	7.90
Mayurbhanj	Kuchei	17.50	3.60	2.1	1.50
Mayurbhanj	Kukurdima	7.20	4.50	1.6	2.90
Mayurbhanj	Kuliana	12.00	11.33	7.13	4.20
Mayurbhanj	Mahuldia	9.80	2.84	1.22	1.62
Mayurbhanj	Mananda	14.70	5.03	3.73	1.30
Mayurbhanj	Manda	9.00	2.59	1.34	1.25
Mayurbhanj	Matigarh	9.41	3.38	-	-
Mayurbhanj	Moranda	11.95	2.30	1.27	1.03
Mayurbhanj	Mundripal (Bankisole)	6.00	3.70	3.7	0.00
Mayurbhanj	Nada	10.40	3.35	2.32	1.03
Mayurbhanj	Naujara	10.76	3.02	2.41	0.61
Mayurbhanj	Nechuapada	9.45	8.59	4.49	4.10
Mayurbhanj	Niranjan	11.50	4.33	2.05	2.28
Mayurbhanj	Nischintapur	12.50	3.98	2.72	1.26
Mayurbhanj	Nuagaon	11.50	8.50	4.5	4.00
Mayurbhanj	Padampur	5.95	2.35	0.78	1.57
Mayurbhanj	Pathuri	8.85	4.78	2.68	2.10
Mayurbhanj	Patpur (Talpada)	13.80	1.35	1.35	0.00
Mayurbhanj	Pithabata	14.17	6.92	2.62	4.30
Mayurbhanj	Poilakunda	10.90	3.55	2.2	1.35
Mayurbhanj	Poradiha	9.36	6.02	2.62	3.40
Mayurbhanj	Purunapani	10.80	3.21	2.16	1.05
Mayurbhanj	Rajabasa	15.20	8.20	4.8	3.40
Mayurbhanj	Rashgovindpur 1	11.50	9.70	6	3.70
Mayurbhanj	Sapanpuar	11.50	10.50	3.7	6.80
Mayurbhanj	Saraskona	11.40	6.93	2.93	4.00
Mayurbhanj	Satkosia	10.50	2.65	2.67	-0.02
Mayurbhanj	Shamakunta	10.17	7.60	2.8	4.80
Mayurbhanj	Singada Chhak	10.50	2.80	1.72	1.08
Mayurbhanj	Sirsapal	11.50	5.50	2.5	3.00
Mayurbhanj	Sullyapada	12.14	9.44	5.94	3.50
Mayurbhanj	Talia	11.20	6.25	4.75	1.50
Mayurbhanj	Taramara	8.00	5.15	4.4	0.75
Mayurbhanj	Tato	16.60	3.20	1.8	1.40

Mayurbhanj	Thakurmunda	12.00	3.91	2.67	1.24
Mayurbhanj	Tikapada (Balisahi)	12.80	5.70	2.2	3.50
Mayurbhanj	Tiring	7.15	4.19	2.11	2.08
Mayurbhanj	Tongabila Chhak	7.00	3.30	2.36	0.94
Mayurbhanj	Udala	15.17	4.36	2.36	2.00
Mayurbhanj	Urmala	11.00	4.80	2	2.80
Mayurbhanj	Vejidiha	9.00	3.86	3.55	0.31
Mayurbhanj	Vurusani	9.00	8.50	3.6	4.90

Annexure 03

Pre & Post-monsoon (2022) WL details of established Key wells in Mayurbhanj District.

District	Site_Name	Depth	Pre-Monsoon WL in mbgl	Post-Monsoon WL in mbgl	Fluctuation Pre- and Post- monsoon
Mayurbhanj	Anlajodi	10.72	4.79	2.02	2.77
Mayurbhanj	Badgachbila	18.95	17.02	16.28	0.74
Mayurbhanj	Badgaon	7.72	5.11	1.58	3.53
Mayurbhanj	Badpakhna	10.3	8.69	dry	
Mayurbhanj	Bagdega	12.8	5.6	1.3	4.30
Mayurbhanj	Baghitaranagar	6.22	3.64	1.7	1.94
Mayurbhanj	Bantali	7.77	3.28	1.27	2.01
Mayurbhanj	Barajiani	8.7	5.54	1.66	3.88
Mayurbhanj	Baria	14.37	9.77	4.32	5.45
Mayurbhanj	Basingi	12.17	5.22	2.23	2.99
Mayurbhanj	Basmitala	6.78	5.2	4.38	0.82
Mayurbhanj	Beguniabandh	10.03	6.35	4.1	2.25
Mayurbhanj	Bhaleidihi	8.15	3.72	1.65	2.07
Mayurbhanj	Bhalupahadi	11.33	8.7	6.54	2.16
Mayurbhanj	Bhitarmda	8.03	1.94	0.42	1.52
Mayurbhanj	Birkatia	10	5.2	0.37	4.83
Mayurbhanj	Chadgipari	8.9	0.47	1.01	-0.54
Mayurbhanj	Chandanpur	10.26	7.58	6.45	1.13
Mayurbhanj	Dasisul	8.95	5.85	3.99	1.86
Mayurbhanj	Daunlikila	7	5.8	1.8	4.00
Mayurbhanj	Debradihi	9.22	5.48	3.19	2.29
Mayurbhanj	Deogaon	6.66	3.05	2.57	0.48
Mayurbhanj	Dhatiki	4.82	3.54	0.77	2.77
Mayurbhanj	Gambharia	9.1	4.16	1.87	2.29
Mayurbhanj	Garmunda	7.84	5.16	1.4	3.76
Mayurbhanj	Ghodaghagri	12.32	10.42	4.37	6.05
Mayurbhanj	Gunduria	11.45	4.58	1.92	2.66
Mayurbhanj	Hatibari	8.32	4.54	3.02	1.52
Mayurbhanj	Hatiguda	10.45	8.45	4.75	3.70
Mayurbhanj	Haulajhari	2.43	1.02	0.4	0.62
Mayurbhanj	Ichinda	7.2	3.16	2.7	0.46
Mayurbhanj	Indkholi	8.3	2.73	-0.6	3.33
Mayurbhanj	Jalda	7.5	3.67	1.82	1.85
Mayurbhanj	Jambilla	9.68	5.02	2.72	2.30
Mayurbhanj	Jamboni	3.35	2.9	0	2.90
Mayurbhanj	Jamti	9.75	7.54	2.72	4.82
Mayurbhanj	Jaritandi	6.72	4.62	2.15	2.47
Mayurbhanj	Jharbera	13.6	11.26	5.25	6.01
Mayurbhanj	Jhipabandha	6.47	3.07	1.35	1.72
Mayurbhanj	Kaduani	11.24	5.99	0.98	5.01
Mayurbhanj	Kesodiha	7.08	4.04	1.19	2.85
Mayurbhanj	Khadambeda	11.2	6.62	1.67	4.95
Mayurbhanj	Kopadiha	6.86	4.99	2.95	2.04
Mayurbhanj	Kuspoda	9.46	6.1	3.48	2.62

Mayurbhanj	Kusumi	9.02	5.03	2.08	2.95
Mayurbhanj	Luhakani	11.1	5.62	2.18	3.44
Mayurbhanj	Luhasila	10.16	8.03	4.88	3.15
Mayurbhanj	Mahubhanda	10.9	5.98	2.16	3.82
Mayurbhanj	Majhigaon	8.75	6.57	2.38	4.19
Mayurbhanj	Moranda	12.36	6.37	1.44	4.93
Mayurbhanj	Nakojhari	5.24	3.12	1.26	1.86
Mayurbhanj	Nuagaon	11.14	7.53	4.45	3.08
Mayurbhanj	Paktia	10.8	4.55	2.9	1.65
Mayurbhanj	Patijhari	13.83	9.65	6.18	3.47
Mayurbhanj	Phulguntha	10.56	7	3.26	3.74
Mayurbhanj	Rajaluka	11.25	9.79	6.33	3.46
Mayurbhanj	Ratansahi	9	6.62	-	-
Mayurbhanj	Salibeda	8.8	7.54	4.49	3.05
Mayurbhanj	Sanadhundu	9.17	5	2.6	2.40
Mayurbhanj	Sarbania	9.87	8.3	1.93	6.37
Mayurbhanj	Sargada	13.18	5.88	4.39	1.49
Mayurbhanj	Silffodi	7.45	3.92	2.32	1.60
Mayurbhanj	Sudarsanpur	11.29	5.86	1.32	4.54
Mayurbhanj	Sundhal	9.37	8.58	2.76	5.82
Mayurbhanj	Talabandha	10.78	8.5	2.41	6.09
Mayurbhanj	Thakurguda	2	1.1	dry	
Mayurbhanj	Tikasil	16.7	13.43	5.9	7.53
Mayurbhanj	Udayapur	8.86	5.17	1.8	3.37
Mayurbhanj	Ahari	14.2	12.76	5.3	7.46
Mayurbhanj	Amarda	6.9	5.64	0.65	4.99
Mayurbhanj	Arpata	14.2	7.31	2	5.31
Mayurbhanj	Asanoora	14.7	12.39	0.55	11.84
Mayurbhanj	Bada Nachana	8.8	7.27	1.5	5.77
Mayurbhanj	Badadhenia	10	9.07	-	-
Mayurbhanj	Badampur	10.1	7.26	1.23	6.03
Mayurbhanj	Badapathara	11.3	9.27	1.19	8.08
Mayurbhanj	Badasahi	11.6	9.64	2.49	7.15
Mayurbhanj	Baghajharan	12.5	11.37	5.07	6.30
Mayurbhanj	Baghamara	12.65	10.85	0.73	10.12
Mayurbhanj	Bahalda	8.5	7.71	3.91	3.80
Mayurbhanj	Bahubandh	11.57	8.81	1.49	7.32
Mayurbhanj	Baisingha	10	7.02	0.5	6.52
Mayurbhanj	Balarampur	8.3	7.7	2.2	5.50
Mayurbhanj	Baldipur	10.6	8.44	2.39	6.05
Mayurbhanj	Balichaturi	17.3	15.25	2.15	13.10
Mayurbhanj	Balidih	14.2	10.83	2.98	7.85
Mayurbhanj	Baripada	5.3	4.59	2.4	2.19
Mayurbhanj	Basipitha	5.3	4.61	filled	
Mayurbhanj	Betnati	12.5	10.59	1.3	9.29
Mayurbhanj	Bhauadiha	6.4	5.88	-	-
Mayurbhanj	Bholagaria	9.8	8.46	1.91	6.55
Mayurbhanj	Bhrungasol	12.9	11.25	2.2	9.05

Mayurbhanj	Chadheigaon	11	10.17	2.39	7.78
Mayurbhanj	Chakulia	12.5	10.03	3.41	6.62
Mayurbhanj	Chandabila	10.5	9.72	2.93	6.79
Mayurbhanj	Chandanpur	10.9	8.99	3.82	5.17
Mayurbhanj	Chandhu	11.5	8.4	2.26	6.14
Mayurbhanj	Charmania	10.7	8.62	1.62	7.00
Mayurbhanj	Chitrada	11.7	10.36	3.47	6.89
Mayurbhanj	Chuasul	20.62	14.05	3.1	10.95
Mayurbhanj	Chuliaposhi	7.59	2.52	2.5	0.02
Mayurbhanj	Deoli	12	10.84	3.3	7.54
Mayurbhanj	Deolia	9.8	6.68	4.03	2.65
Mayurbhanj	Dhabanisul	11.7	10.06	1.05	9.01
Mayurbhanj	Dhanpur	6.7	5.64	-	-
Mayurbhanj	Digira Astia	9.2	6.47	-	-
Mayurbhanj	Dukura	9.6	8.09	2.7	5.39
Mayurbhanj	Durgapur	8.7	6.83	1.06	5.77
Mayurbhanj	Durgapur	6.2	4.83	0.6	4.23
Mayurbhanj	Dutun	14.7	11.07	4.11	6.96
Mayurbhanj	Gadasahi	8.05	6.68		
Mayurbhanj	Garia	10.6	7.57	2.93	4.64
Mayurbhanj	Ghanaghana	9	6.54	1.92	4.62
Mayurbhanj	Godipokhari	7.25	6.19	2.51	3.68
Mayurbhanj	Hatjodi	13.15	11.18	0.63	10.55
Mayurbhanj	Indipahi	13.4	11.34	-	-
Mayurbhanj	Jadunathpur	9	7.79	3.26	4.53
Mayurbhanj	Jalbera	11.8	9.58	2.66	6.92
Mayurbhanj	Jhambhirapal	10.5	7.21	0.48	6.73
Mayurbhanj	K.C.Pur	17.7	14.26	4.33	9.93
Mayurbhanj	Kainsari	13.54	9.49	1.4	8.09
Mayurbhanj	Kakharusol	18.4	15.46	-	-
Mayurbhanj	Kalabada	8	7.44	1.97	5.47
Mayurbhanj	Kaladam	13.1	11.61	-	-
Mayurbhanj	Karkachia	6.8	5.72	2.66	3.06
Mayurbhanj	Kasiabeda	7.5	4.42	1.15	3.27
Mayurbhanj	Kendua	9.15	8.74	3.79	4.95
Mayurbhanj	Keotun Mari	10	7.34	-	-
Mayurbhanj	Kerko	13.3	11.92	-	-
Mayurbhanj	Kopai	12.6	10.99	1.2	9.79
Mayurbhanj	Kuamara	13.5	11.22	0.6	10.62
Mayurbhanj	Kujidih	11	10.04	4.23	5.81
Mayurbhanj	Lalganj	11.05	9.89	4.51	5.38
Mayurbhanj	Mahulbari	6.15	5.75	3.15	2.60
Mayurbhanj	Majna	13.55	11.49	4.1	7.39
Mayurbhanj	Makund	12.7	11.53	0.35	11.18
Mayurbhanj	Malihata	16	12.59		
Mayurbhanj	Mangalpur	11.4	9.13	1.46	7.67
Mayurbhanj	Manitri	14.4	6.99	2.07	4.92
Mayurbhanj	Mantapal	13.2	11.69	1.8	9.89

Mayurbhanj	Marangtandi	16	11.79	3.4	8.39
Mayurbhanj	Mohanpur	11.9	10.23		
Mayurbhanj	Nandigaon	8.6	6.24	3.21	3.03
Mayurbhanj	Narpur	8.2	6.24	2.23	4.01
Mayurbhanj	Nechuapada	11.2	9.59	4.01	5.58
Mayurbhanj	Nuasahi	13.09	8.39	1.9	6.49
Mayurbhanj	Nududiha	14.8	8.77	0.87	7.90
Mayurbhanj	Pala	10.6	8.36	2.88	5.48
Mayurbhanj	Palasmundali	11	9.36	3.27	6.09
Mayurbhanj	Patapada	11.3	10.18	-	-
Mayurbhanj	Patharnesa	6	4.54	-	-
Mayurbhanj	Phania	17.5	15.27	-	-
Mayurbhanj	Pratapur	13.2	11.39	6.01	5.38
Mayurbhanj	Rajabasa	14	12.49	3.15	9.34
Mayurbhanj	Rangamatia	10.8	8.67	2.08	6.59
Mayurbhanj	Rupsa Jn	15	13.49	dry	
Mayurbhanj	Saluadahar	10.2	8.34	4.48	3.86
Mayurbhanj	Sana Belakudi	15.2	11.97	-	-
Mayurbhanj	Sarujharana	10.3	8.21	-	-
Mayurbhanj	Simlabandh	7.45	6.69	-	-
Mayurbhanj	Sureidihi	12.1	9.68	2.92	6.76
Mayurbhanj	Talasahi	4.65	3.53	1.3	2.23
Mayurbhanj	Tarki	7.2	6.12	2.16	3.96
Mayurbhanj	Thakurtola	18.05	12.66	0.41	12.25
Mayurbhanj	Tikpada	13.5	11.99	1.52	10.47

Annexure 04

Pre-monsoon water quality data of Preheatic aquifers, Mayurbhanj district.

SL NO.	District	Block	Village	pH	EC	TDS	Hardness as CaCO3	Alkalinity as CaCO3	Ca^{++}	Mg^{++}	Na^{+}	K^{+}	$CO_3^{=}$	HCO_3^{-}	Cl^{-}	SO_4	NO_3	F^{-}	U
					µS/cm	µg/L													
1	Mayurbhanj	Thakurmunda	Daunlikia	7.34	70	48	29.4	31.57	5.9	3.56	5.24	1.97	<5	38.51	7.42	1.86	3.5	0.08	BDL
2	Mayurbhanj	Thakurmunda	Dhatiki	7.99	287	163	112.7	107.32	21.7	14.2	21.05	1.62	<5	130.93	29.69	2.53	9.23	0.23	BDL
3	Mayurbhanj	Thakurmunda	Jamboni	7.78	188	119	78.4	56.82	13.8	10.67	14.51	1.55	<5	69.32	22.27	10.01	12.6	0.17	BDL
4	Mayurbhanj	Thakurmunda	Kesodiha	8.02	289	161	112.7	107.32	31.6	8.19	17.62	5.92	<5	130.93	27.21	2.02	5.6	0.33	BDL
5	Mayurbhanj	Karanjia	Tikasil	7.88	200	146	102.9	88.38	35.5	3.44	15.4	3.13	<5	107.83	22.27	1.51	12.3	0.08	BDL
6	Mayurbhanj	Karanjia	Kuspoda	7.72	188	112	88.2	75.76	15.8	11.83	8.86	2.51	<5	92.42	12.37	8.23	7.39	0.04	BDL
7	Mayurbhanj	Karanjia	Jharbera	7.69	587	331	215.6	220.96	49.4	22.38	30.82	31.55	<5	269.57	47.01	2.25	17.5	0.19	0.002
8	Mayurbhanj	Karanjia	Ghodaghagri	7.83	165	93	58.8	56.82	13.8	5.9	11.94	1.84	<5	69.32	17.32	4.73	4.5	0.12	BDL
9	Mayurbhanj	Sukruli	Phulguntha	8.06	466	256	151.9	145.2	47.4	8.12	37.54	4.69	<5	177.14	54.43	9.85	9.23	0.11	BDL
10	Mayurbhanj	Sukruli	Baria	7.65	205	128	83.3	56.82	19.7	8.27	11.22	4.97	<5	69.32	17.32	24.97	8.63	0.07	BDL
11	Mayurbhanj	Karanjia	Badgaon	8.08	571	332	240.1	195.7	53.3	25.96	40.11	4.71	<5	238.76	56.9	9.72	26.3	0.16	BDL
12	Mayurbhanj	Bisoi	Patijhari	8.15	307	192	161.7	138.89	35.5	17.73	13.36	5.79	<5	169.44	19.79	7.41	9.63	0.1	BDL
13	Mayurbhanj	Bisoi	Jambilla	8.24	521	311	171.5	132.57	49.4	11.66	46.53	8.22	<5	161.74	66.8	33.9	18.63	0.25	BDL
14	Mayurbhanj	Bisoi	Luhakani	7.62	200	117	49	37.88	13.8	3.52	21.04	4.61	<5	46.21	29.69	14.31	8.63	0.07	BDL
15	Mayurbhanj	Kusumi	Deogaon	7.78	735	410	181.3	170.45	55.3	10.46	91.21	2.29	<5	207.95	113.8	24.12	16.3	0.37	0.002
16	Mayurbhanj	Rairangpur	Baidapaoi	7.59	445	270	137.2	107.32	43.4	6.97	41.14	9.19	<5	130.93	59.38	23.56	25.3	0.12	BDL
17	Mayurbhanj	Jamda	Sanadhundu	8.29	301	167	117.6	101.01	21.7	15.39	20.72	1.99	<5	123.23	29.69	3.96	14.23	0.31	BDL
18	Mayurbhanj	Jamda	Moranda	8.33	405	225	166.6	157.83	35.5	18.92	26.46	5.97	<5	192.55	32.16	3.8	8.63	0.36	BDL
19	Mayurbhanj	Bahalda	Jaritandi	8.17	571	328	235.2	202.02	57.3	22.34	42.83	1.92	<5	246.46	61.85	1.81	21.33	0.17	BDL
20	Mayurbhanj	Bahalda	Bhaleidihi	8.17	505	280	186.2	183.08	37.5	22.47	38.48	4.61	<5	223.35	56.9	0.89	11.2	0.71	BDL
21	Mayurbhanj	Bahalda	Bagdega	8.03	698	392	249.9	208.33	47.4	31.93	59.09	4.97	<5	254.16	84.12	2.24	41.23	0.22	BDL
22	Mayurbhanj	Tiring	Debradihi	8.06	295	155	122.5	107.32	21.7	16.58	16.6	1.69	<5	130.93	22.27	0.05	12.3	0.55	BDL
23	Mayurbhanj	Rairangpur	Ichinda	7.96	287	163	78.4	56.82	17.8	8.24	26.73	7.79	<5	69.32	37.11	19.05	14.3	0.1	BDL
24	Mayurbhanj	Bangriposi	Talabandha	7.40	946	559	284.2	246.21	61.2	31.88	110.2	17.18	<5	300.37	160.81	5.13	32.6	0.18	0.003
25	Mayurbhanj	Bangriposi	Beguniabandh	8.20	262	159	122.5	113.63	31.6	10.57	12.5	7.16	<5	138.63	19.79	0.05	10.23	0.17	BDL

26	Mayurbhanj	Bangriposi	Sarbania	8.00	365	208	156.8	151.51	29.6	20.12	21.88	3.25	<5	184.84	29.69	1.72	12.3	0.34	0.002
27	Mayurbhanj	Bangriposi	Baskitala	8.21	370	207	186.2	157.83	41.5	20.04	11.2	3.06	<5	192.55	17.32	1.11	18.3	0.2	BDL
28	Mayurbhanj	Saraskana	Rajaluka	7.99	160	95	63.7	56.82	13.8	7.1	10.06	3.35	<5	69.32	14.84	4.09	8.63	0.16	BDL
29	Mayurbhanj	Saraskana	Jalda	8.14	211	136	102.9	94.7	17.8	14.19	14.89	1.96	<5	115.53	22.27	2.69	6.53	0.18	BDL
30	Mayurbhanj	Saraskana	Badgachbila	8.09	710	419	200.9	164.14	51.3	17.65	66.78	29.82	<5	200.25	106.38	28.27	25.35	0.11	BDL
31	Mayurbhanj	Saraskana	Paktia	8.45	615	366	205.8	170.45	41.5	24.8	50.58	28.78	6.08	207.95	71.75	14.51	35.43	0.23	0.001
32	Mayurbhanj	Bangriposi	Birkatia	8.19	478	307	191.1	195.7	53.3	14.06	28.62	34.54	<5	238.76	39.58	5.63	25.63	0.46	0.001
33	Mayurbhanj	Rairangpur	Sudarsanpur	8.23	685	382	269.5	258.83	45.4	37.91	35.02	28.31	<5	315.78	51.95	5.62	25.3	0.2	BDL
34	Mayurbhanj	Rairangpur	Sundhal	7.98	521	299	205.8	157.83	29.6	32.03	31.25	3.65	<5	192.55	44.53	33.43	32	0.28	BDL
35	Mayurbhanj	Bijatala	Sargada	7.79	102	60	39.2	31.57	7.9	4.73	6.3	2.27	<5	38.51	9.9	6.01	4.2	0.08	BDL
36	Mayurbhanj	Bijatala	Bantali	8.01	190	106	58.8	44.19	11.8	7.12	15.63	5.48	<5	53.91	24.74	2.8	13.2	0.16	BDL
37	Mayurbhanj	Bijatala	Barajiani	8.27	329	191	117.6	94.7	23.7	14.18	30.85	3.75	<5	115.53	49.48	2.52	12.3	0.38	BDL
38	Mayurbhanj	Bijatala	Garmunda	8.04	370	221	137.2	107.32	27.6	16.57	23.5	8.3	<5	130.93	34.64	32.34	15.3	0.09	BDL
39	Mayurbhanj	Kusumi	Kusumi	8.12	480	293	186.2	151.51	43.4	18.88	31.5	11.94	<5	184.84	44.53	28.61	25.3	0.15	BDL
40	Mayurbhanj	Kusumi	Kaduani	8.22	520	305	205.8	164.14	41.5	24.8	33.73	4.31	<5	200.25	51.95	25.84	26.3	0.29	BDL
41	Mayurbhanj	Kusumi	Bhalupahdi	8.34	658	380	249.9	202.02	49.4	30.72	47.56	3	<5	246.46	76.69	29.85	25.6	0.42	BDL
42	Mayurbhanj	Kusumi	Majhigaon	8.11	740	478	298.9	252.52	53.3	40.25	69.3	24.2	<5	308.07	101.43	1.25	41	0.61	BDL
43	Mayurbhanj	Kusumi	Jhipabandha	8.03	635	323	235.2	195.7	23.7	42.76	42.82	4.09	<5	238.76	66.8	3.31	25	0.2	0.007
44	Mayurbhanj	Bisoi	Nuagaon	8.12	152	87	44.1	44.19	9.9	4.7	15.1	2.93	<5	53.91	22.27	1.23	5.63	0.17	BDL
45	Mayurbhanj	Bisoi	Bhitarmda	8.12	168	85	58.8	56.82	11.8	7.12	8.26	4.12	<5	69.32	12.37	1.72	5.63	0.16	BDL
46	Mayurbhanj	Raruan	Jamti	8.35	565	286	215.6	183.08	45.4	24.81	27.52	14.39	<5	223.35	39.58	4.6	21.3	0.12	BDL
47	Mayurbhanj	Kuliana	Asanoora	7.73	510	327.8	223.9	265.4	17.95	43.5	40.6	5.8	0	323.8	20.7	40	0.5	0.11	0.1
48	Mayurbhanj	Kuliana	Bhauadiha	6.76	79	67.5	39.1	14.8	6.5	5.57	6	5.2	0	18.1	28.6	0.8	6	0.06	0
49	Mayurbhanj	Bangriposi	Kalabada	6.9	76	51.4	30.4	22.7	6.19	3.64	4.6	3.9	0	27.7	12.2	1.5	5.8	0.03	0
50	Mayurbhanj	Kuliana	Bhrungasol	6.75	77	50.7	30.1	24	6.5	3.37	4.1	3.5	0	29.3	11.3	1.7	5.8	0.04	0
51	Mayurbhanj	Kuliana	Chandhu	7.75	536	308.4	204.6	262.5	17.95	38.81	39.1	5.8	0	320.3	9.7	39.4	0.6	0.09	0
52	Mayurbhanj	Kuliana	Kaladam	7.94	531	320.1	179.7	258.7	17.02	33.31	61	5.5	0	315.6	27	20.8	0.7	0.14	0
53	Mayurbhanj	Kuliana	Marangtandi	8.01	580	365.4	178	256.1	21.36	30.28	77.1	4.8	0	312.4	37	41	0.6	0.17	0
54	Mayurbhanj	Kuliana	Balarampur	7.73	525	320.1	220.3	246.3	17.95	42.6	43	6.3	0	300.4	26.2	36.4	0.5	0.08	0
55	Mayurbhanj	Kuliana	Charmania	6.99	75	49.4	30	24	6.5	3.34	4.4	3.9	0	29.2	11.2	2.1	3.5	0.03	0
56	Mayurbhanj	Suliapada	Dhabanisul	6.96	75	46.6	28.7	25.2	6.5	3.04	4.3	3.6	0	30.8	9.4	1.9	2.8	0.03	0

57	Mayurbhanj	Suliapada	Phania	8.2	485	302.7	161.4	269.2	10.83	32.62	57.1	5	0	328.5	16.5	18.7	0.9	0.12	0
58	Mayurbhanj	Suliapada	Saluadahar	7.92	189	113.8	96.5	76.9	33.12	3.36	4.7	0.6	0	93.8	16.5	6.4	3	0.14	0
59	Mayurbhanj	Suliapada	Pala	7.9	264	173.1	145.7	119.8	34.35	14.56	12.1	0.9	0	146.1	34.5	1.7	3.1	0.25	0
60	Mayurbhanj	Suliapada	Patharnesa	7.81	504	297.6	210.2	244.4	26.62	34.9	40.2	4.8	0	298.2	33	11.4	0.4	0.18	0
61	Mayurbhanj	Suliapada	Ghanaghana	8	580	336.7	155.2	264.4	22.28	24.18	69.8	4.5	0	322.6	36.9	20.4	0.4	0.17	0.1
62	Mayurbhanj	Suliapada	Bagra	7.8	534	288.1	201.5	259.6	18.57	37.68	38.1	5.6	0	316.7	12.3	20.3	0.3	0.09	0
63	Mayurbhanj	Morda	Chadheigaon	7.96	488	338.1	236.3	209.6	24.76	42.38	44.7	5.4	0	255.7	84.8	9.9	0.7	0.18	0
64	Mayurbhanj	Suliapada	Dharampur	7.36	108	85.7	69.5	40.4	12.69	9.19	4.9	1.9	0	49.2	26.2	2.2	4.4	0.09	0
65	Mayurbhanj	Suliapada	Kostha	7.96	590	361.7	186.6	259.3	22.28	31.79	72.9	4.6	0	316.3	36.3	38.2	0.5	0.16	0
66	Mayurbhanj	Baripada	Indipahi	7.94	499	333.2	234.3	200.4	22.28	43.37	43.6	5.2	0	244.5	87	11.2	0.6	0.18	0
67	Mayurbhanj	Baripada	Chandanpur	7.56	108	72.4	58.8	50	14.24	5.66	4.3	1.7	0	60.9	10.4	3.1	3	0.08	0
68	Mayurbhanj	Morda	Garia	7.55	107	88	71.7	37.6	12.69	9.71	5	2	0	45.9	31.2	1.5	3.4	0.07	0
69	Mayurbhanj	Suliapada	Kujidih	7.68	108	74.8	60.5	47.4	14.24	6.07	4.2	1.5	0	57.8	12.5	2.4	5.5	0.08	0
70	Mayurbhanj	Suliapada	Badadhenia	7.89	530	314.5	229.3	264.4	21.05	42.93	35.8	5.2	0	322.6	12	39.4	0	0.07	0
71	Mayurbhanj	Morda	Majna	8.2	712	430.9	167.6	300	25.07	25.49	100.9	5.2	0	366	38.2	55.1	1.4	0.26	0
72	Mayurbhanj	Morda	San Mundhabani	8.25	643	445.8	150.2	233.9	14.86	27.48	117.7	6	0	285.4	93.1	45.1	1.4	0.25	0
73	Mayurbhanj	Morda	Malihata	8.2	265	215.5	181.8	83.9	31.57	25.01	13.7	1.1	0	102.4	87.9	2.7	3.1	0.29	0
74	Mayurbhanj	Morda	Palasmundali	8.2	189	154.2	134	56.9	34.42	11.67	6	0.8	0	69.5	60.3	4.1	2.7	0.15	0
75	Mayurbhanj	Rasagovindapur	Tikpada	8.12	575	358.4	178.3	239.3	22.28	29.8	73.9	4.7	0	292	47.8	36.1	0.6	0.16	0
76	Mayurbhanj	Rasagovindapur	Mangalpur	8.3	711	426.6	158.4	276.7	24.76	23.46	107.4	5.6	0	337.6	49.7	48.5	1.5	0.26	0
77	Mayurbhanj	Rasagovindapur	Patapada	8.01	190	138.6	122.2	74.8	34.66	8.65	5.2	0.7	0	91.3	36.8	5.7	1.9	0.15	0
78	Mayurbhanj	Shamakhunta	Rupsa Jn	8.19	258	156.4	134.5	123.5	31.88	13.33	10.2	0.8	0	150.7	19.6	3.9	2.6	0.25	0
79	Mayurbhanj	Baripada	Sarujharana	7.99	538	297.1	178.5	259.8	17.64	32.65	52.7	4.8	0	316.9	10.9	22.2	0.7	0.16	0
80	Mayurbhanj	Morda	Mohanpur	8.21	192	124.8	105.8	91.3	30.95	6.92	4.3	0.5	0	111.4	12.3	12	3.1	0.15	0
81	Mayurbhanj	Morda	Chitrada	8	512	283.9	198.5	264.4	23.83	33.74	34.3	4.1	0	322.6	13.6	15.4	0.7	0.17	0
82	Mayurbhanj	Rasagovindapur	Kopai	7.67	110	68.3	52.1	40.4	14.55	3.83	4.3	1.6	0	49.3	10.8	3.4	5.6	0.09	0
83	Mayurbhanj	Morda	Makund	7.86	246	164.4	149	130.8	32.5	16.49	9.8	0.8	0	159.5	20.7	3.1	2.6	0.28	0
84	Mayurbhanj	Morda	Chuasul	8	680	417.4	160.1	277.3	24.45	24.06	104	5.2	0	338.3	48.5	43.7	1.4	0.28	0.1
85	Mayurbhanj	Morda	Mahulbari	7.94	523	304	189.9	266.7	19.5	34.29	51.3	4.8	0	325.4	12.9	20.9	0.6	0.17	0
86	Mayurbhanj	Betnati	Betnati	8.15	184	116.9	103.5	92.3	27.85	8.24	4.3	0.6	0	112.6	11.3	6.3	3	0.15	0
87	Mayurbhanj	Barsahi	Durgapur	8	427	252.7	185.3	254.8	24.76	29.99	28	2.5	0	310.9	9.7	4.6	0.2	0.62	0

88	Mayurbhanj	Betnati	Dhanpur	8.1	565	317.5	144.8	251.8	20.43	22.78	73.8	3.5	0	307.3	26.3	19.1	0.8	0.15	0
89	Mayurbhanj	Baripada	K.C.Pur	7.99	580	327.9	202.2	252.1	24.14	34.46	56.2	2.9	0	307.6	37.1	21.9	0.3	0.19	0
90	Mayurbhanj	Shamakhunta	Sana Khunta	8.11	556	327.6	159.5	257.7	18.57	27.48	72.4	3.4	0	314.4	26.9	23.7	1	0.15	0
91	Mayurbhanj	Shamakhunta	Balidih	8.01	429	245.2	190.1	231.3	26	30.39	29	2.5	0	282.2	11.7	6.7	0.1	0.62	0
92	Mayurbhanj	Barsahi	Kerko	7.74	107	73.2	48.6	57.1	8.98	6.37	10.4	1.3	0	69.7	9.2	2.4	0.3	0.09	0
93	Mayurbhanj	Barsahi	Dutun	7.88	451	246	195.3	216.2	29.71	29.41	26.6	0.7	0	263.7	15.4	13.9	0.6	0.46	0
94	Mayurbhanj	Barsahi	Jalbera	7.89	450	244.7	186.1	231.7	30.64	26.61	25.7	0.7	0	282.7	16.5	4.7	0.8	0.48	0
95	Mayurbhanj	Khunta	Bholagaria	7.88	586	317.7	247.1	263.5	32.19	40.49	31.4	0.7	0	321.4	38.8	15.6	0.5	0.54	0
96	Mayurbhanj	Khunta	Khunta	8.07	460	277.7	223.2	231.7	33.43	33.92	26.4	0.9	0	282.7	36.2	7.4	0.2	0.72	0
97	Mayurbhanj	Khunta	Dukura	8.03	568	325	201.4	255	24.14	34.27	55.6	2.7	0	311.1	33.8	21.3	0.5	0.21	0
98	Mayurbhanj	Khunta	Badapathara	8.05	425	242.9	190.5	230.4	26.62	30.11	27.9	2.6	0	281	11.5	5.9	0.1	0.63	0
99	Mayurbhanj	Khunta	Karkachia	7.9	729	403.8	319.7	231.7	37.45	54.92	35.8	0.8	0	282.7	109.4	25.2	1.1	0.61	6.1
100	Mayurbhanj	Gopabandhunagar	Sana Belakudi	8.23	477	274.4	215.4	224	38.69	28.86	26.1	0.8	0	273.3	34.9	10	0.3	0.75	0
101	Mayurbhanj	Gopabandhunagar	Kuamara	8.23	476	275.8	225	231.5	29.71	36.63	28.7	0.9	0	282.4	34.7	5.9	0.1	0.76	0
102	Mayurbhanj	Barsahi	Manitri	7.89	729	398	315.8	231.7	33.74	56.24	33.8	0.8	0	282.7	110.6	23.4	0.2	0.66	6.1
103	Mayurbhanj	Betnati	Narpur	7.74	106	69.5	42	49.6	9.28	4.56	10.9	1.3	0	60.5	9.5	3.3	0.9	0.1	0
104	Mayurbhanj	Baripada	Baripada	7.97	562	312.1	252.1	246.5	32.19	41.7	32.2	0.8	0	300.7	42.4	14.6	0.5	0.51	0
105	Mayurbhanj	Betnati	Mantapal	7.92	456	248.5	199.2	220.8	35.9	26.61	25.4	0.7	0	269.3	12.9	14.2	0.3	0.49	0
106	Mayurbhanj	Rasagovindapur	Badampur	7.82	106	74.9	49	54.2	10.83	5.33	10.4	1.2	0	66.1	10.4	3.7	0.5	0.1	0
107	Mayurbhanj	Udla	Chuliaposhi	8	575	313	191.6	239.1	23.21	32.46	53.9	2.7	0	291.7	35.2	21.9	0.5	0.18	0
108	Mayurbhanj	Kaptipada	Nududiha	7.78	757	392.2	302.7	235.6	36.83	51.17	34.6	0.8	0	287.4	110.6	16.1	0.6	0.65	6.3
109	Mayurbhanj	Rasa-gobindapur	Amarda village	7.2	680	378	169	170	25	26	51	46.4	0	207	79	40	9	0.22	
110	Mayurbhanj	Baripada	(Astia) Baripada	7.6	560	311	180	155	60	7	41	7.8	0	189	44	32	27	0.23	
111	Mayurbhanj	Bar sahi	Badasahi	7	450	236	91	125	20	10	60	1.8	0	153	46	12	12	0.07	
112	Mayurbhanj	Bar sahi	Baidipur	7.2	120	63	39	40	14	1	6	2.6	0	49	5	2	9	0.04	
113	Mayurbhanj	Saras kana	Bangriposi	7.3	110	57	39	40	14	1	7	0.4	0	49	5	1	5	0.04	
114	Mayurbhanj	Baripada	Baripada 1	7.6	670	335	278	205	57	33	22	3.4	0	250	60	25	12	0.46	
115	Mayurbhanj	Baripada	Baura	6.8	440	270	102	50	39	1	49	5.6	0	61	63	48	35	0.11	
116	Mayurbhanj	Bangiriposi	Bedhakudar	6.7	190	101	66	60	18	5	7	10	0	73	9	11	5	0.07	
117	Mayurbhanj	Bar sahi	Belam	8	740	391	291	280	82	21	32	5	0	342	63	11	10	0.41	
118	Mayurbhanj	Beta nati	Betanoti	7.5	1210	643	433	230	127	28	76	3.2	0	281	195	75	1	0.65	

119	Mayurbhanj	Khunta	Brundabanchan	7.8	570	339	147	85	57	1	61	3.2	0	104	86	46	34	0.15	
120	Mayurbhanj	Saras kana	Brushavanupur	7.8	150	79	61	50	16	5	6	0.06	0	61	14	2	6	0.1	
121	Mayurbhanj	Saras kana	Badchatra	7.3	470	237	177	190	41	18	25	0.6	0	232	26	12	1	0.48	
122	Mayurbhanj	Sulia pada	Charchakia	7.8	270	151	76	40	22	5	22	5.8	0	49	58	5	9	0.09	
123	Mayurbhanj	Muruda	Chitrada	7.1	110	51	43	40	14	2	3	0.6	0	49	7	0	1	0.06	
124	Mayurbhanj	Baripada	Dahisahi (Banki sole)	7.2	650	390	175	125	60	6	42	45.4	0	153	67	61	34	0.11	
125	Mayurbhanj	Bangiriposi	Dahisahi-Dipasahi	7.2	270	157	91	50	20	10	14	9.6	0	61	30	2	41	0.08	
126	Mayurbhanj	Muruda	Dantiamuhani	7.8	590	295	243	250	61	22	23	0.5	0	305	23	15	1	0.52	
127	Mayurbhanj	Sulia pada	Deoli	7.3	230	125	61	45	16	5	14	14.5	0	55	33	9	7	0.09	
128	Mayurbhanj	Rasa-gobindapur	Devsol	6.3	230	139	65	45	16	6	18	4.8	0	55	26	3	38	0.06	
129	Mayurbhanj	Khunta	Dhampur	7.5	190	90	75	70	20	6	6	2.3	0	85	9	1	5	0.06	
130	Mayurbhanj	Khunta	Dukura	7.7	360	188	131	75	31	13	21	1.11	0	92	58	12	7	0.12	
131	Mayurbhanj	Bar sahi	Hatibandha	7.4	300	169	86	45	18	10	27	0.8	0	55	44	10	32	0.08	
132	Mayurbhanj	Bangiriposi	Jamsola	7.1	270	148	70	45	18	6	26	5.04	0	55	42	15	9	0.06	
133	Mayurbhanj	Bangiriposi	Jharpokhari	8.1	710	401	182	170	43	18	76	5.6	0	207	100	54	3	0.26	
134	Mayurbhanj	Bangiriposi	Kalabadia	7.5	460	239	168	130	49	11	25	2.1	0	159	63	10	1	0.11	
135	Mayurbhanj	Beta nati	Kalana	7.1	290	166	91	50	25	7	21	6.07	0	61	46	3	28	0.05	
136	Mayurbhanj	Kaptipada	Kaptipada 1	7.6	610	352	143	90	31	16	74	0.84	0	110	104	71	2	0.1	
137	Mayurbhanj	Gopa bandhu nagar	Khunta	7.5	490	260	163	150	39	16	35	1.4	0	183	28	42	9	0.21	
138	Mayurbhanj	Sulia pada	Kostha	7.2	180	87	71	60	20	5	6	0.98	0	73	14	3	2	0.1	
139	Mayurbhanj	Beta nati	Krishnachandrap	7	200	115	56	45	16	4	17	2.8	0	55	23	5	20	0.07	
140	Mayurbhanj	Koliana	Kuchei	7.2	180	91	51	45	14	4	13	4.5	0	55	23	0	6	0.06	
141	Mayurbhanj	Kaptipada	Kukurdima	7.7	350	186	115	95	31	9	18	13.5	0	116	33	21	3	0.08	
142	Mayurbhanj	Koliana	Kuliana	8	380	194	136	155	33	13	20	7.3	0	189	16	11	1	0.1	
143	Mayurbhanj	Sulia pada	Mundripal (Bankisole)	7.5	300	166	100	60	22	11	21	3	0	73	44	1	28	0.09	
144	Mayurbhanj	Muruda	Nechuapada	7.1	110	64	33	30	10	2	5	5.4	0	37	5	7	11	0.06	
145	Mayurbhanj	Saras kana	Nuagaon	7.3	170	91	66	50	20	4	6	1.07	0	61	14	2	14	0.07	
146	Mayurbhanj	Sulia pada	Pakatia	7.8	480	237	191	175	45	19	21	0.63	0	214	23	20	4	0.21	
147	Mayurbhanj	Bar sahi	Patpur (Talpada)	7.9	540	321	119	145	41	4	44	40.1	0	177	49	43	13	0.21	
148	Mayurbhanj	Koliana	Pathuri	7.8	840	425	307	285	39	51	44	10.7	0	348	65	42	3	0.38	

149	Mayurbhanj	Samakhunta	Pithabata	7.1	280	136	123	115	31	11	6	1.7	0	140	9	2	7	0.1	
150	Mayurbhanj	Kaptipada	Poradiha	7.3	100	50	36	35	8	4	5	0.6	0	43	9	1	2	0.08	
151	Mayurbhanj	Bangiriposi	Rajabasa	7.7	430	210	154	165	22	24	24	5.2	0	201	21	15	0	0.18	
152	Mayurbhanj	Rasa-gobindapur	Rashgovindpur 1	6.8	340	201	101	80	29	7	29	2.1	0	98	26	9	51	0.11	
153	Mayurbhanj	Samakhunta	Sapanpuar	7.1	170	89	60	40	14	6	8	2.4	0	49	19	1	15	0.1	
154	Mayurbhanj	Bangiriposi	Saraskona	7.8	840	454	294	255	65	32	50	11	0	311	58	59	27	0.2	
155	Mayurbhanj	Samakhunta	Shamakunta	7.7	720	354	292	215	61	34	30	0.94	0	262	58	37	5	0.24	
156	Mayurbhanj	Muruda	Sirsapal	7.3	150	85	48	40	16	2	10	2.3	0	49	9	9	12	0.07	
157	Mayurbhanj	Sulia pada	Sullyapada	7.1	110	54	41	40	8	5	6	0.2	0	49	5	0	6	0.08	
158	Mayurbhanj	Kaptipada	Talia	8	510	301	169	110	61	4	27	20.8	0	134	53	34	35	0.09	
159	Mayurbhanj	Rasa-gobindapur	Tikapada (Balisahi)	7.4	180	106	61	55	18	4	9	5.8	0	67	9	7	20	0.1	
160	Mayurbhanj	Udala	Urmala	7.3	100	46	40	45	6	6	4	0.04	0	55	2	1	1	0.07	
161	Mayurbhanj	Kaptipada	Udala	7.3	540	316	153	125	43	11	46	11.8	0	153	65	16	48	0.07	
162	Mayurbhanj	Muruda	Vurusani	7.3	490	255	179	180	47	15	10	33	0	220	33	4	5	0.11	
163	Mayurbhanj	Bisoi	Ambadiha	7.12	656	328	245	136	73	15	12	7.7	0	166	59	42	39	0.1	
164	Mayurbhanj	Thakur munda	Asanbani	7.25	269	141	120	115	39	6	5	3.9	0	140	10	5	4	0.1	
165	Mayurbhanj	Bisoi	Badampahad-1	7.51	558	268	221	94	50	23	16	0.6	0	115	73	11	38	0.28	
166	Mayurbhanj	Bija tola	Bademtolia	7.53	595	231	170	175	37	19	27	0.5	0	214	27	13	3	0.28	
167	Mayurbhanj	Bahalda	Bahalda 1	6.78	262	127	63	26	15	6	16	5.8	0	32	34	2	32	0.06	
168	Mayurbhanj	Bahalda	Bahalda Road(kona)	7.45	211	103	58	61	21	1	17	0.2	0	74	18	5	5	0.32	
169	Mayurbhanj	Jashi pur	Begna	6.76	126	70	34	26	8	4	11	0.3	0	32	12	0	19	0.7	
170	Mayurbhanj	Bisoi	Bhatachhatra	7.12	479	216	82	37	17	9	42	5.3	0	45	95	3	22	0.13	
171	Mayurbhanj	Bisoi	Bisoi	7.39	377	188	115	101	35	7	21	7.1	0	123	36	3	19	0.1	
172	Mayurbhanj	Karanjia	Chadheibhol	7.5	389	201	115	63	21	15	32	5.7	0	77	63	20	7	0.1	
173	Mayurbhanj	Thakur munda	Champajhar	6.83	200	93	69	61	13	9	7	5.3	0	75	18	1	4	0.07	
174	Mayurbhanj	Rairang pur	Champrai	7.96	491	245	192	162	40	22	15	5.5	0	198	42	15	9	0.13	
175	Mayurbhanj	Bahalda	Dandabose	7.33	729	343	149	79	31	18	63	13	0	96	100	29	43	0.08	
176	Mayurbhanj	Bahalda	Gambharia	7.24	2080	840	644	188	148	67	50	0.6	0	230	337	81	45	0.2	
177	Mayurbhanj	Bija tola	Gorumahisani 1	7.22	200	96	68	72	21	4	4	10.9	0	88	9	4	1	0.18	
178	Mayurbhanj	Sukruli	Indupur	7.12	349	187	107	54	35	5	8	16.2	0	66	21	30	40	0.07	
179	Mayurbhanj	Raruan	Itighar	7.23	1610	684	405	188	92	42	95	6	0	229	222	111	3	0.78	

180	Mayurbhanj	Jamda	Jamda 1	7.69	1121	520	267	243	69	23	35	81.6	0	297	94	57	16	0.2	
181	Mayurbhanj	Jashi pur	Jamukeswar	7.68	555	281	164	94	56	6	24	8.3	0	115	54	35	42	0.08	
182	Mayurbhanj	Raruan	Jhunkapal	7.21	415	202	86	59	27	5	37	5.7	0	72	64	10	17	0.07	
183	Mayurbhanj	Bisoi	Karanjei-Bijatola Chhak	7.54	1020	463	141	238	39	11	117	11.3	0	290	75	52	16	0.66	
184	Mayurbhanj	Thakur munda	Kendujani	6.75	362	175	120	94	29	12	18	2.8	0	115	34	20	3	0.11	
185	Mayurbhanj	Karanjia	Kendumundi	6.13	290	152	63	26	13	7	23	6.5	0	32	51	1	35	0.06	
186	Mayurbhanj	Kusumi	Kherna	6.98	222	109	67	31	13	8	10	7.3	0	38	34	5	12	0.05	
187	Mayurbhanj	Raruan	Khiching	7.62	920	357	232	229	54	24	53	1	0	279	73	14	1	0.96	
188	Mayurbhanj	Thakur munda	Mahuldia	8.09	280	145	104	116	29	8	16	2.9	0	141	14	5	1	0.35	
189	Mayurbhanj	Jashi pur	Mananda 1	7.87	1853	905	379	293	121	19	163	34.5	0	357	236	114	42	0.43	
190	Mayurbhanj	Bisoi	Manda	7.85	700	348	258	147	79	15	19	4.9	0	179	53	52	38	0.15	
191	Mayurbhanj	Jashi pur	Matigarh 1	7.3	600	291	120	58	21	16	53	10.2	0	70	85	30	41	0.08	
192	Mayurbhanj	Jamda	Moranda	7.81	562	222	206	203	33	30	12	0.4	0	247	9	15	1	0.44	
193	Mayurbhanj	Thakur munda	Nada	7.23	558	328	155	126	39	14	47	19.1	0	154	75	23	36	0.12	
194	Mayurbhanj	Kusumi	Naujara	6.4	142	76	47	48	12	4	12	1.3	0	59	16	3	0	0.03	
195	Mayurbhanj	Rairang pur	Niranjan	7.28	1529	731	254	306	56	28	156	48	0	373	224	21	15	0.19	
196	Mayurbhanj	Tiringi	Nischintapur	7.78	1024	541	351	225	75	40	45	21.2	0	274	166	56	3	0.57	
197	Mayurbhanj	Jashi pur	Padampur	7.04	79	57	43	37	10	5	4	0.4	0	45	7	2	7	0.08	
198	Mayurbhanj	Rairang pur	Purunapani	7.77	418	201	148	147	46	8	19	2.3	0	179	21	16	0	0.07	
199	Mayurbhanj	Thakur munda	Satkosia	7.47	1940	961	303	277	58	39	185	75.2	0	338	254	140	45	0.2	
200	Mayurbhanj	Sukruli	Singada Chhak	7.48	200	106	82	73	21	7	5	4.5	0	89	12	11	2	0.08	
201	Mayurbhanj	Thakur munda	Taramara	7.68	421	231	168	152	48	12	8	17.9	0	185	32	20	4	0.1	
202	Mayurbhanj	Karanjia	Tato	7.33	35	21	20	17	4	2	1	0.3	0	20	3	1	0	0.03	
203	Mayurbhanj	Thakur munda	Thakurmunda	7.55	220	117	72	58	15	8	15	1.1	0	70	27	4	12	0.08	
204	Mayurbhanj	Tiringi	Tiring	7.45	163	94	77	67	17	8	6	0.7	0	81	12	5	3	0.07	
205	Mayurbhanj	Karanjia	Tongabila Chhak	7.56	675	365	284	157	81	20	11	6.2	0	191	63	46	44	0.06	
206	Mayurbhanj	Karanjia	Vejidiha	6.96	382	224	101	42	21	12	28	18.1	0	51	44	35	40	0.06	
1	Mayurbhanj	Jashipur	Thakurguda	8.18	471	272	230.3	214.64	41.5	30.75	19.96	8.65	<5	261.86	27.21	1.1	15.2	0.23	BDL
2	Mayurbhanj	Bahalda	Gambharia	8.43	485	266	132.3	126.26	39.5	8.15	53.01	2.82	<5	154.04	81.64	1.12	8.23	0.23	BDL
3	Mayurbhanj	Saraskana	Silffodi	8.28	470	260	166.6	138.89	41.5	15.27	39.55	3.69	<5	169.44	56.9	9.19	12.34	1.4	0.003
4	Mayurbhanj	Rairangpur	Badpakhna	8.34	352	195	156.8	126.26	35.5	16.54	18.1	2.6	<5	154.04	27.21	5.69	15.3	0.14	BDL

5	Mayurbhanj	Bahalda	Anlajodi	7.70	1924	986	607.6	467.16	138.2	63.69	174	7.53	<5	569.94	252.35	1.18	82	0.2	BDL
6	Mayurbhanj	Rairangpur	Udaypur	8.15	506	277	235.2	183.08	43.4	30.79	20.17	2.97	<5	223.35	29.69	19.91	21.5	0.17	BDL
7	Mayurbhanj	Bijatala	Luhasila	8.43	415	247	220.5	208.33	41.5	28.37	16.62	3.1	<5	254.16	22.27	1.12	10.2	0.11	BDL
8	Mayurbhanj	Bijatala	Baghitaranagar	7.83	210	130	78.4	63.13	15.8	9.45	16.69	5.87	<5	77.02	24.74	7.96	12.53	0.11	BDL
9	Mayurbhanj	Bisoi	Gunduria	8.12	465	294	230.3	176.76	55.3	22.37	26.09	3.11	<5	215.65	37.11	26.57	19.63	0.12	BDL

Annexure 05

Post-monsoon water quality data for Preheatic aquifers, Mayurbhanj District.

Sl. No.	Block	Village	pH	EC	TDS	TH	TA	Ca++	Mg++	Na+	K+	CO3-	HCO3-	Cl-	SO4(2-)	NO3-	F-	U
				µS/cm	µg/L													
1	Kuliana	Andhari	7.73	408	193	148	179	32.33	16.33	22.3	1.1	0	218.3	10.9	2.6	0	0.32	0
2	Bahalda	Anlajodi	8.06	853	336.6	250.6	136.5	25.89	45.17	32.6	0.7	0	166.5	93.5	36.3	20.5	0.31	0.5
3	Rasgovindpur	Bachuripal	8.25	633	281.6	59.5	214.1	11	7.77	93	2.4	0	261.2	24.8	14.2	0	0.47	0
4	Karanjia	Badgaon	8.18	445	178.2	146.5	157.8	32.33	15.97	16.1	0.7	0	192.5	13.7	3.6	1.3	0.16	0.13
5	Rairangpur	Baidaposi	7.73	630	288.2	139.5	108.8	19.32	22.16	54.7	0.9	0	132.7	68	37	20.8	0.32	0
6	Bijatala	Barajiani	7.55	753	321.4	167	172.8	42.12	15.02	60.7	0.7	0	210.8	75.7	3.5	19.5	0.92	0.06
7	Sukruli	Baria	8.19	469	188.5	160.5	181.6	25.89	23.27	16.8	1.3	0	221.6	9.2	3.2	0	0.25	0.01
8	Bahalda	Basingi	8.05	708	303.5	151.6	135.9	36.62	14.61	59.9	1.8	0	165.8	92.2	16.8	0	0.26	0
9	Bangriposi	Baskitala	7.6	213	103.9	91	93	19.32	10.39	6.8	0.5	0	113.4	3.9	7.1	0	0.26	0
10	Bahalda	Bhaleidihi	7.76	2068	787.5	585.7	271.1	29.11	124.57	74.3	6.6	0	330.7	296.5	56.7	36.9	0.8	1.9
11	Kusumi	Bhalupahadi	8	941	378.1	281.6	123.7	75.79	22.43	30.5	1.1	0	151	132.2	24	17.9	0.3	0
12	Bangriposi	Birkatia	7.85	904	385.4	246.6	147.3	51.91	28.4	45.4	2.8	0	179.7	98.2	31.2	38.7	0.75	3.1
13	Moruda	Dakoi	7.77	192	103.6	88.5	82.6	19.32	9.79	6.7	1.5	0	100.8	11.3	5.1	0	0.42	0
14	Bangriposi	Dasisul	7.98	530	194.1	156.7	172.9	14.22	29.43	19.8	3.3	0	211	14.9	8.9	0	0.26	0.02
15	Thakurmunda	Daunlikila	8.07	600	275.5	180.9	126.5	12.88	36.13	37.5	2.7	0	154.4	73.9	24	12.6	0.2	0.1
16	Tiring	Debradihi	7.97	272	144.3	103.1	84.3	26.02	9.25	14.6	0.4	0	102.8	18.6	18.3	6.5	0.28	0.11
17	Thakurmunda	Dhatiki	7.48	1453	545	288.3	142.6	32.46	50.32	96.1	1.8	0	174	205.1	42.8	30.9	0.38	9.7
18	Bisoi	Gunduria	7.68	567	258.4	184.5	98.7	35.81	23.1	25.9	0.7	0	120.5	81.2	13.3	19.2	0.19	0
19	Baripada	Gunjusahi	8.01	883	339.8	224.1	220.9	29.24	36.69	43.7	5.1	0	269.5	20.7	72.2	0	0.13	0
20	Bahalda	Indkholi	7.53	889	314.6	243	135.4	25.89	43.32	29.2	0.7	0	165.2	87	42.5	4.5	0.54	0.8
21	Raruan	Jamti	7.84	605	277.5	215.8	95	46.55	24.18	20.5	0.9	0	115.9	100.2	12.6	15.6	0.12	0
22	Bahalda	Jaritandi	8.18	601	228.5	221.8	187.3	27.1	37.43	9.1	0.1	0	228.5	26.8	15.8	0	0.09	0.3
23	Kusumi	Kusumi	8.04	1101	468	305.7	145.2	38.9	50.65	48.9	12.8	0	177.1	148.7	41.7	39.4	0.26	0.11
24	Jamda	Moranda	7.96	806	346.4	234.3	174.3	38.77	33.38	31.9	8	0	212.7	95.2	33.1	1.1	0.73	0.7
25	Saraskana	Paktia	7.5	792	385.9	213.9	162.7	55.13	18.52	33.6	33	0	198.5	60.8	49.3	38.1	0.15	0.17

26	Sukruli	Phulguntha	8.3	826	348.8	227.1	203.4	35.55	33.58	49.2	1.7	0	248.1	61.7	37.2	7.8	0.56	0.18
27	Kuliana	Rajaloka	7.88	208	104.5	83.3	69.9	18.38	9.07	6.8	2.6	0	85.2	10.9	14.4	0	0.53	0
28	Jamda	Sanadhundu	7.65	1310	579	422.4	191.6	90.94	47.42	46	0.9	0	233.8	170.1	62.5	45.7	0.86	0.39
29	Bangriposi	Sarbania	7.98	328	145.4	106	125.8	22.67	12.01	18	1.9	0	153.5	9.8	4.2	0	1.52	0.04
30	Rairangpur	Sudarsanpur	7.55	1660	551.1	397.3	139.3	97.38	37.42	55.6	3.1	0	169.9	212.9	37.2	24	0.29	0.67
31	Bangriposi	Talabandha	7.87	703	229.9	195.1	173.3	21.46	34.36	18.7	1.2	0	211.4	33.5	11.7	5	0.31	0.6
32	Jashipur	Thakurguda	7.9	703	277.2	209.9	222.4	38.9	27.39	27.7	6.7	0	271.3	28.2	15.2	0	0.23	0.3

Annexure 06

Existing Vertical Electrical Sounding data till date, Mayurbhanj district.

SL NO.	LOCATION	BLOCK	Layer	Resistivity (ohmm)	Thickness (m)	Depth (m)	Inferred lithology	Aquifer Characteristics	Depth Range(m)	Inferred aquifer water quality
1	Jhiliribani	Morada	1	449	1.7	1.7	Top Soil			
			2	95	6.5	8.2	Weather Formation	Aquifer	1.7-8.2	Potable
			3	15.34	45	53.2	Sand	Aquifer	8.2-53.2	Potable
			4	74.57			Weather formation			
2	Bholghati	Morada	1	26.5	1.64	1.64	Top Soil			
			2	270			Less compact formation	Aquifer		
3	Bholghati 2	Morada	1	11.1	1	1	Top Soil			
			2	384	13.2	14.2	Weathered Formation (Gravel)	Aquifer	1-14.2	Potable
			3	3.4			Sand			
4	Kishantandi	Morada	1	140	2.2	2.2	Top Soil			
			2	12	26	28.2	Clay			
			3	426			Compact Formation			
5	Chitrada 1	Morada	1	47.7	1.5	1.5	Top Soil			
			2	5.58	26	27.5	Clay	Aquifer	27.5-	Potable
			3	20.2			Sand			
6	Morada	Morada	1	61.5	1.2	1.2	Top Soil			
			2	8.2	5.3	6.5	clay			
			3	23.94	96.11	102.61	Sand	Aquifer	6-102.6	Potable
			4	10.17			Clay			
7	Chitrada 2	Morada	1	88.55	1.5	1.5	Top Soil			
			2	6.4	25.27	27.7	Clay			
			3	25.12			Sand	Aquifer	27.7-	Potable
8	Nalaganja	Morada	1	292	2.53	2.53	Top Soil			
			2	75.7	10.1	12.63	Weathered Formation	Aquifer	2.53-12.63	Potable
			3	2.65	14.5	27.03	Clay			

			4	25.6			Sand	Aquifer	27.03-	Potable
9	Chitrada-3	Morada	1	95.4	2.13	2.13	Top Soil			
			2	42			Sand	Aquifer	2.13-	Potable
10	Sangadi	Morada	1	739	7.26	7.26	Top Soil			
			2	71	6.32	13.58	Weathered formation	Aquifer	7.26-13.58	Potable
			3	253	14	27.58	Semi Weathered Formation	Aquifer	13.58-27.58	Potable
			4	29	55	82.58	Sand		27.58-82.58	
			5	352			Compact Formation			
11	Kalional	Morada	1	11.5	2.5	2.5	Top Soil			
			2	72.1	20.4	20.9	Weathered Formation	Aquifer	2.5-20.9	Potable
			3	4.92	58.9	79.8	Clay			
			4	VH			Compact Formation			
12	Saitpur	Morada	1	550	5.67	5.67	Top Soil			
			2	8.47	18.2	23.87	Clay			
			3	52.5	10.6	34.47	Sand	Aquifer	23.87-34.47	Potable
			3	8.42			Clay			
13	Bholagadi	Morada	1	559	3.2	3.2	Top Soil			
			2	28	107	110.2	Sand	Aquifer	3.2-110.2	Potable
			3	VH			Compact Formation			
14	Baura	Morada	1	26.8	2	2	Top Soil			
			2	43.25	8.1	10.1	Sand	Aquifer	2-10.1	Potable
			3	10.62			Clay			
15	Badmunda	Morada	1	216	3.63	3.63	Top Soil			
			2	56.4	16.7	21.13	Sand	Aquifer	13.63-21.13	Potable
			3	12.9	146	167.13	Clay			
			4	VH			Compact Formation			
16	Andhari	Morada	1	935	6.81	6.81	Top Soil			
			2	15.6	112	118.81	Clay			
			3	25.1			Sand	Aquifer	118.8-	Potable
17	Anua	Morada	1	45.36	4.6	4.6	Top Soil			
			2	22.37	18.24	22.84	Sand	Aquifer	4.6 -22.84	Potable

			3	10.86	15.72	38.54	Clay			
			4	29.68			Sand	Aquifer	38.54-	Potable
18	Raipal	Rasgovindpur	1	125	7.5	7.5	Top Soil			
			2	13.1	5.5	13	Clay			
			3	20.39			Sand	Aquifer	13-	Potable
19	Patharchatia	Rasgovindpur	1	213	5.1	5.1	Top Soil			
			2	6.49	2.76	7.86	Clay	Aquifer	7.86-	Potable
			3	19.8			Sand			
20	Totapada	Rasgovindpur	1	47.81	5.3	5.3	Top Soil			
			2	13.3	95.2	100.5	Clay			
			3	47.02			Sand	Aquifer	100.5-	Potable
21	Andhari	Rasgovindpur	1	22.1	2.5	2.5	Top Soil			
			2	10.73	17.47	19.97	Clay			
			3	48.41	15	34.97	Sand	Aquifer	19.97-34.97	Potable
			4	10.33			Clay			
22	Bramhanda	Rasgovindpur	1	84	3.32	3.32	Top Soil			
			2	21	50	53.32	Sand	Aquifer	3.32-53.32	Potable
			3	11.1			Clay			
23	Raghunathpur	Rasgovindpur	1	347	3.4	3.4	Top Soil			
			2	99.5	9.3	12.7	Weathered Formation	Aquifer	3.4-12.7	Potable
			3	5.59	12.2	24.9	Clay			
			4	27.9			Sand	Aquifer	24.9-	Potable
24	Rangamatia	Rasgovindpur	1	367	2.8	2.8	Top Soil			
			2	28.1	40.28	41.08	Sand	Aquifer	2.8-41.08	Potable
			3	7.5	71.44	113.52	Clay			
			4	58.03			Sand	Aquifer	114-	Potable
25	Bachhariapal	Rasgovindpur	1	13.81	4.9	4.9	Top Soil			
			2	25.4	4.2	9.1	Sand	Aquifer	4.9-9.1	Potable
			3	7.4	12.5	21.6	Clay			
			4	30.5			Sand	Aquifer	21.6-	Potable
26	Kaptipada	Rasgovindpur	1	256	5.5	5.5	Top Soil			

			2	148	32	37.5	Weathered Formation	Aquifer	5.5-37.5	Potable
			3	40			Sand	Aquifer	37.5	Potable
27	Denganalia	Rasgovindpur	1	108	2.5	2.5	Top Soil			
			2	42.1	88	90.5	Sand	Aquifer	2.5-90.5	Potable
			3	5.1			Clay			
28	Khadi Sole	Rasgovindpur	1	131.4	4.8	4.8	Top Soil			
			2	26	27	31.8	Sand	Aquifer	4.8-31.8	Potable
			3	12.8			Clay			
29	Betanati	Betanati	1	171	1	1	Top Soil			
			2	47.9	88	89	Sand	Aquifer	Jan-89	Potable
			3	8.9			Clay			
30	Udaipura	Betanati	1	12.1	4	4	Top Soil			
			2	37.3	33.1	37.1	Sand	Aquifer	4-37.1	Potable
			3	2	50.7	87.8	Saline Sand			
			4	50.6			Sand	Aquifer	87.8-	Potable
31	Bartana	Barasahi	1	33.78	5.3	5.3	Top Soil			
			2	174.4	5.7	11	Weathered Formation	Aquifer	5.3-88	Potable
			3	25.76	77	88	Sand			
			4	12			Clay			
32	Aldia	Betanati	1	170	3.5	3.5	Top Soil			
			2	4.9	32	35.5	Clay			
			3	35.25			Sand	Aquifer	35.5-	Potable
33	Bhulagadia	Betanati	1	47.3	2	2	Top Soil			
			2	17.54	26	28	Sand	Aquifer	Feb-28	Potable
			3	9.1	69	97	Clay			
			4	37.37			Sand	Aquifer	97-	Potable
34	Manatri	Barasahi	1	46.8	1.3	1.3	Top Soil			
			2	17	6.3	7.6	Clay			
			3	31	7.1	14.7	Sand	Aquifer	7.6-14.7	Potable
			4	6.3	22	36.7	Clay			
			5	119			Weathered Formation			

35	Tikarbati	Betanati	1	45.2	1.9	1.9	Top Soil			
			2	17	167	168.9	Sand	Aquifer	1.9-168.9	Potable
			3	2			Saline Sand			
36	Bhadrasia	Barasahi	1	29.8	1.2	1.2	Top Soil			
			2	8.6	9.9	11.1	Clay			
			3	13.1	37.1	48.2	Sand	Aquifer	11.1-48.25	Potable
			4	8.82			Clay			
37	Khurushali	Barasahi	1	121.4	4.1	4.1	Top Soil			
			2	9.2	86.62	90.72	Clay			
			3	23.23			Sand	Aquifer	90.72-	Potable
38	Jamunadevipur	Barasahi	1	365	3	3	Top Soil			
			2	25.3	4	7	Sand	Aquifer	03-Jul	Potable
			3	13.3	30	37	Clay			
			4	54.3	20	57	Sand	Aquifer	37-57	Potable
			5	12.7			Clay			
39	Sialighati	Barasahi	1	19.8	2.5	2.5	Top Soil			
			2	12.8	20.4	22.9	Clay	Aquifer	1.2-11.02	Potable
			3	16.7			Sand			
40	Barasahi	Barasahi	1	40	1	1	Top Soil			
			2	8.1	5.7	6.7	Clay			
			3	17.53	74	80.7	Sand	Aquifer	6.7-80.7	Potable
			4	11.83			Clay			
41	Baincha	Barasahi	1	344	4.3	4.3	Top Soil			
			2	42.2	11.8	16.1	Sand	Aquifer	4.3-16.1	Potable
			3	16.6			Clay			
42	Chahasapada	Barasahi	1	257	4.7	4.7	Top Soil			
			2	3.9	11.8	16.5	Saline Sand	Aquifer	4.7-16.5	Saline
			3	11.6	104	120.5	Clay			
			4	0.38			Saline Sand	Aquifer	120.5-	Saline
43	Bahalda	Khunta	1	53.5	2.53	2.53	Top Soil			
			2	23	8	10.53	Sand	Aquifer	2.53-10.53	Potable

			3	VH			Compact Formation			
44	Sampanda	Khunta	1	121	2.5	2.5	Top Soil			
			2	8.2	9	11.5	Clay			
			3	68.5			Sand	Aquifer	11.5-	Potable
45	Gadadeulia	Betanati	1	125	1	1	Top Soil			
			2	51.7	11.5	12.5	Sand	Aquifer	1.27-14.3	Potable
			3	8.5			Clay			
46	Kendua	Betanati	1	28.1	2	2	Top Soil			
			2	28.2	1.59	3.59	Sand	Aquifer	2-3.59	Potable
			3	11.3	143	146.59	Clay			
			4	VH			Compact Formation			
47	Kusagadia	Khunta	1	329	4	4	Top Soil			
			2	33	6.1	10.1	Sand	Aquifer	4-10.1	Potable
			3	5	16.1	26.2	Clay			
			4	VH			Compact Formation			
48	Dukura	Khunta	1	17.1	2.5	2.5	Top Soil			
			2	29.97	2.5	5	Sand	Aquifer	2.5-5	Potable
			3	11.9	51.7	56.7	Clay			
			4	36.74			Sand	Aquifer	56.7-	Potable
49	Nangalkata	Baripada	1	218	2	2	Top Soil			
			2	28.4	3.5	5.5	Sand	Aquifer	2-5.5	Potable
			3	8.52	25.6	31.1	Clay			
			4	34.2			Sand	Aquifer	31.1-	Potable
50	Jagannathpur	Baripada	1	12.6	1.2	1.2	Top Soil			
			2	8.7	4.1	5.3	Clay	Aquifer	5.3-11	Potable
			3	26.93	5.7	11	Sand			
			4	11.53	37.17	48.17	Clay			
			5	15			Sand	Aquifer	48.17-	Potable
51	Dantiamunha	Baripada	1	7.91	2.51	2.51	Top Soil			
			2	16.8	20.5	23.01	Sand	Aquifer	2.51-23.01	Potable
			3	45.4			Sand	Aquifer		Potable

52	Itamundia	Shamakhunta	1	8.1	2.92	2.92	Top Soil			
			2	9.5	13.4	16.32	Clay			
			3	25.6			Sand	Aquifer	2.92-16.32	Potable
53	Balipal	Baripada	1	50	2.8	2.8	Top Soil			
			2	22.2	7.84	12.64	Sand	Aquifer	2.8-12.64	Potable
			3	8.14	26	38.64	Clay			
			4	16.99			Sand	Aquifer	38.64-	Potable
54	Pratappur	Barasahi	1	9.22	2.5	2.5	Top Soil			
			2	4.9	8.5	11	Clay	Aquifer	11-22.9	Potable
			3	116.6	11.9	22.9	Weathered Formation			
			4	10.12			Clay			
55	Kandaliapal	Barasahi	1	7.62	2.51	2.51	Top Soil			
			2	17.7	8.6	11.11	Sand	Aquifer	2.51-11.11	Potable
			3	2.9	11.9	23.01	Saline Sand	Aquifer	23.01-	Saline
			4	19			Sand			
56	Kamalasole	Barasahi	1	880	2.51	2.51	Top Soil			
			2	13.3	46	48.51	Clay			
			3	29.4			Sand	Aquifer	48.51-	Potable
57	Khunta	Khunta	1	15.8	1.82	1.82	Top Soil			
			2	16.4	6.33	8.15	Sand	Aquifer	1.82-8.15	Potable
			3	VH			Compact Formation			
58	MPC COLLEGE	Baripada	1	311	2	2	Top Soil			
			2	62.4	7.3	9.3	Sand	Aquifer	2-9.3	Potable
			3	12.9	44.7	54	Clay			
			4	5.15			Saline Sand	Aquifer	54-	Saline
59	Khunta-ii	Khunta	1	83.3	2.76	2.76	Top Soil			
			2	27.5			Sand	Aquifer	2.76-	Potable
60	Karkachia	Khunta	1	11.42	2	2	Top Soil			
			2	7.5	17.14	19.14	Clay	Aquifer	19.4-	Potable/Saline
			3	3.9	24.75	43.89	Saline Sand			
			4	15.2			Sand			

61	Brundabanchandraper	Khunta	1	290	5.24	5.24	Top Soil			
			2	31.6	18	23.24	Sand	Aquifer	5.24-48.24	Potable/Saline
			3	4.73	25	48.24	Saline Sand			
			4	12.9			Clay			
62	Bandhagoda	Khunta	1	9.5	4.32	4.32	Top Soil			
			2	69.83	5.8	10.12	Sand	Aquifer	4.32-10.12	Potable
			3	3.3	30.24	40.36	Saline Sand	Aquifer	10.12-40.36	Saline
			4	18.45			Sand			
63	Kailashchandrapur	Baripada	1	23.7	1.3	1.3	Top Soil			
			2	74.56	5.7	7	Weathered Formation			
			3	18.57	30.52	37.52	Sand	Aquifer	7-37.52	Potable
			4	9.3			Clay			
64	Nayatarna	Baripada	1	28.85	5.2	5.2	Top Soil			
			2	15.21	17	22.2	Clay			
			3	24	25	47.2	Sand	Aquifer	22.2-47.2	Potable
			4	3.82	52	99.2	Saline Sand	Aquifer	47.2-99.2	Potable
			5	VH			Compact Formation			
65	Masinasole	Baripada	1	23.1	9.03	9.03	Top Soil			
			2	1817	17.5	26.53	Compact Formation			
			3	21.1			Highly Weathered Rock			
66	Mohaniganj	Baripada	1	66.4	6.6	6.6	Top Soil			
			2	42.3	31.3	37.9	Sand	Aquifer	6.6-37.9	Potable
			3	14.9			Clay			
67	Rangamati	Betanoti	1	2387	0.3	0.3	Top Soil			
			2	27.2	28	28.03	Sand	Aquifer	0.3-28.03	Potable
			3	10.4	35	63.03	Clay			
			4	6.36			Saline Sand	Aquifer	63.03-	Saline
68	Hatiputka	Betanoti	1	70.2	1.25	1.25	Top Soil			
			2	19.2	9.33	10.58	Sand	Aquifer	1.25-10.58	Potable
			3	13.9	25.8	36.38	Clay			
			4	8.02			Clay			

69	Haripur	Rasgovindpur	1	10.9	2.51	2.51	Top Soil			
			2	68.5	20.65	23.16	Sand	Aquifer	2.51-23.16	Potable
			3	15.6			Clay			
70	Amarada	Rasgovindpur	1	574.9	0.3	0.3	Top Soil			
			2	5.6	8.2	8.23	Clay			
			3	34.48	13.7	21.93	Sand	Aquifer	8.23-21.93	Potable
			4	11.4			Clay			

Annexure 07

Generated Vertical Electrical Sounding data in AAP 2022-23, Mayurbhanj district.

Direct interpretation of VES layer parameters by software										
Sl. No.	**Locations**	**Block**	**Layer**	**Resistivity (ohmm)**	**Thickness (m)**	**Depth (m)**	**Inferred lithology**	**Aquifer Characteristics**	**Depth Range(m)**	**Inferred aquifer water quality**
1	Sankumrum	Tiring	1	24.1	1.04	1.04	Top Soil			
			2	6.58	1.7	2.75	Clay			
			3	42.4	12.7	15.5	Highly Weathered Formation	Aquifer	3 to 15	Potable
			4	429			Fractured Granite			
2	Tiring	Tiring	1	36	1.05	1.05	Top Soil			
			2	10.8	3.96	5.02	Clay			
			3	53.7	22.5	27.5	Highly Weathered Formation	Aquifer	5 to 27	Potable
			4	433			Fractured Granite			
3	Badagobarg	Tiring	1	28.1	1.1	1.1	Top Soil/Clay			
			2	5.15	1.21	2.31				
			3	37.3	9.21	11.5	Highly Weathered Formation	Aquifer	3 to 11	Potable
			4	726	11.2	22.7	Fractured Granite	Aquifer	11 to 22	Potable
			5	Vh			Granite Formation			
4	Naghaba	Rairangpur	1	78.6	1.2	1.2	Top Soil/Clay			
			2	275	1.31	2.51				
			3	21.4	2.73	5.24	Highly Weathered Formation			
			4	367	48.5	53.7	Fractured Granite	Aquifer	5 to 53	Potable
			5	VH			Granite Formation			
5	Kusumi	Kusumi	1	166	1.44	1.44	Top Soil			
			2	39.1	10.4	11.8	Highly Weathered Formation			
			3	288	42	53.8	Fractured Granite	Aquifer	11 to 53	Potable
			4	3383			Granite Formation			
6	Hatbadra	Kusumi	1	223	0.888	0.888	Top Soil			
			2	62.8	6.85	7.74	Weathered Formation			

			3	30.4	6.5	14.2	Highly Weathered Formation	Aquifer	7 to 14	Potable
			4	3053			Granite Formation			
7	Badampahar	Kusumi	1	497	2.516	2.516	Top Soil			
			2	2594	2.192	4.708	Compact Clay			
			3	557	33.79	38.49	Fractured Granite			
			4	62	41.86	80.35	Weathered Formation	Aquifer	38 to 80	Potable
			5	8114			Granite Formation			
8	Jhipabandh	Kusumi	1	12.4	1.43	1.43	Top Soil			
			2	5.09	2.81	4.24	Clay			
			3	VH			Granite Formation			
9	Thuntipani	Kusumi	1	63.8	1.34	1.34	Top Soil			
			2	24.4	3.79	3.79	Highly Weathered Formation			
			3	482	43.3	48.4	Fractured Granite	Aquifer	4 to 48	Potable
			4	Vh			Granite Formation			
10	Amagaon	Kusumi	1	86.89	0.9751	0.9751	Top Soil			
			2	33.98	4.291	5.266	Highly Weathered Formation			
			3	134.8	30.31	35.58	Weathered Formation	Aquifer	5 to 35	Potable
			4	3798			Granite Formation			
11	Dumadihi	Jamda	1	68.3	0.681	0.681	Top Soil			
			2	434	1.49	2.17	Compact Clay			
			3	2.78	2.68	4.84	Highly Weathered Formation			
			4	7365			Granite Formation			
12	Matiali	Jamda	1	356	1.96	1.96	Top Soil			
			2	93.5	17.2	19.1	Weathered Formation	Aquifer	2 to 19	Potable
			3	8077			Granite Formation			
13	Uperbeda	Jamda	1	58.9	1.24	1.24	Top Soil			
			2	14.8	3.95	5.19	Highly Weathered Formation			
			3	VH			Granite Formation			
14	Jamda	Jamda	1	21.7	1.36	1.36	Top Soil			

			2	8.34	1.35	2.71	Clay			
			3	42.8	7.46	10.2	Highly Weathered Formation			
			4	VH			Granite Formation			
15	Rangamatia	Jamda	1	102	1.2	1.2	Top Soil			
			2	92.3	4.04	5.24	Compact clay			
			3	22.5	5.71	11	Highly Weathered Formation			
			4	264.5	37.3	48.2	Fractured Granite	Aquifer	11 to 48	Potable
			5	VH			Granite Formation			
16	Bhagabeda	Jamda	1	255	1.83	1.83	Top Soil			
			2	59.4	4.05	5.87	Highly Weathered Formation			
			3	13.2	4.41	10.3	Clay			
			4	4935			Granite Formation			
17	Dighiabeda	Jamda	1	123	1.25	1.25	Top Soil			
			2	33.2	3.49	4.73	Highly Weathered Formation			
			3	V H			Granite Formation			
18	Natuar	Jamda	1	77.9	0.722	0.722	Top Soil/Dry soil			
			2	288	0.95	1.67				
			3	74.9	11.6	13.3	Highly Weathered Formation			
			4	358	64.3	77.5	Fractured Granite	Aquifer	13 to 77	Potable
			5	VH			Granite Formation			
19	Bada Dalmia	Tiring	1	37.8	1.24	1.24	Top Soil			
			2	15.7	14	15.3	Highly Weathered Formation			
			3	VH			Granite Formation			
20	Hensadihi	Tiring	1	160.1	1.307	1.307	Top Soil			
			2	74.22	3.683	4.99	Weathered Formation			
			3	25.92	5.615	10.61	Highly Weathered Formation			
			4	1285			Granite Formation			

21	Bahalda	Bahalda	1	135	0.533	0.533	Top Soil/Dry Soil			
			2	584	1.16	1.69				
			3	18.6	19.8	21.5	Highly Weathered Formation	Aquifer	2 to 21	Potable
			4	7482			Granite Formation			
22	Gidighaty	Bahalda	1	27.4	0.903	0.903	Top Soil			
			2	7.31	1.65	2.55	Clay			
			3	267	47.2	49.7	Fractured Granite	Aquifer	3 to 49	Potable
			4	VH			Granite Formation			
23	Basingi	Bahalda	1	27	1.48	1.48	Top Soil			
			2	3.06	0.823	2.3	Clay			
			3	5076			Granite Formation			
24	Banki	Bijatala	1	136.3	1.064	1.064	Top Soil			
			2	105.2	3.27	4.334	Compact Clay			
			3	26.86	29.23	33.56	Highly Weathered Formation	Aquifer	4 to 33	Potable
			4	904.3			Fractured Granite			
25	Patpur	Bijatala	1	120	1.5	1.5	Top Soil			
			2	17.2	2.4	3.9	Clay			
			3	424	65.5	69.4	Fractured Granite	Aquifer	4 to 69	Potable
			4	VH			Granite Formation			
26	Khunta	Bijatala	1	208	1.52	1.52	Top Soil			
			2	42.8	16.5	18.02	Highly Weathered Formation			
			3	8932			Granite Formation			
27	Paunsaia	Bijatala	1	23.1	1.74	1.74	Top Soil			
			2	3.16	2.64	4.38	Clay			
			3	8283			Granite Formation			
28	Bhejidihi	Bijatala	1	51	1.21	1.21	Top Soil			
			2	48	6.35	7.56	Highly Weathered Formation			
			3	VH			Granite Formation			
29	Podachakdi	Bijatala	1	120	1.2	1.2	Top Soil			
			2	8.45	0.866	2.07	Clay			

			3	50.8	15.1	17.1	Highly Weathered Formation			
			4	2687			Granite Formation			
30	Luhamalia	Bisoi	1	118	1.75	1.75	Top Soil			
			2	6.26	8.82	10.6	Clay/ Highly Weathered Formation			
			3	VH			Granite Formation			
31	Bisoi	Bisoi	1	261	1.2	1.2	Top Soil			
			2	1303	1.31	2.51	Dry Soil			
			3	94	20.7	23.2	Weathered Formation	Aquifer	3 to 23	Potable
			4	405	77.1	100	Fractured Granite	Aquifer	23 to 100	Potable
			5	2712			Granite Formation			
32	Mahubhandar	Bisoi	1	48.4	0.637	0.637	Top Soil			
			2	254	0.984	1.62	Dry Soil			
			3	29.6	7.98	9.6	Highly Weathered Formation			
			4	VH			Granite Formation			
33	Asna	Bisoi	1	34.6	1.14	1.14	Top Soil			
			2	8.52	5.38	6.53	Clay			
			3	VH			Granite Formation			
34	bhaludunguri	Rairangpur	1	42.5	1.09	1.09	Top Soil			
			2	8.26	5.22	6.31	Clay			
			3	VH			Granite Formation			
35	Totanetra	Rairangpur	1	53.8	1.3	1.3	Top Soil			
			2	6.51	0.735	2.03	Clay			
			3	29.7	16.3	18.3	Highly Weathered Formation			
			4	VH			Granite Formation			
36	Gorumahisani	Rairangpur	1	141	8.19	8.19	Top Soil			
			2	19.3	10.8	18.9	Highly Weathered Formation	Aquifer	9 to 18	Potable
			3	VH			Granite Formation			
37	Rairangpur	Rairangpur	1	122	0.667	0.667	Top Soil/Dry Soil			
			2	869	1.71	2.38				

			3	20.8	4.48	6.86	Highly Weathered Formation			
			4	VH			Granite Formation			
38	Malikedam	Bahalda	1	35.7	2.54	2.54	Top Soil			
			2	7.51	2.75	5.28	Clay/Highly Weathered Formation			
			3	VH			Granite Formation			
39	Kudarsahi	Bahalda	1	25	0.546	0.546	Top Soil			
			2	10.6	6.97	7.52	Highly Weathered Formation			
			3	VH			Granite Formation			
40	Asana	Bahalda	1	213	1.45	1.45	Top Soil			
			2	13.3	1.91	3.36	Clay			
			3	521	4.54	7.9	Fractured Granite			
			4	15.7	12.8	20.7	Highly Weathered Formation	Aquifer	8 to 20	Potable
			5	VH			Granite Formation			
41	Kaluta	Bahalda	1	302	1.8	1.8	Top Soil			
			2	910	1.12	2.92	Dry Soil			
			3	32	13.2	16.1	Highly Weathered Formation			
			4	VH			Granite Formation			
42	Halda	Rairangpur	1	200	2.48	2.48	Top Soil			
			2	94.1	18.9	21.4	Highly Weathered Formation	Aquifer	3 to 21	Potable
			3	314	69.4	90.8	Fractured Granite	Aquifer	22 to 90	Potable
			4	Vh			Granite Formation			
43	Rairangpur to 2	Rairangpur	1	31.8	1.2	1.2	Top Soil			
			2	4.16	1.31	2.51	Clay			
			3	59	8.56	11.1	Highly Weathered Formation			
			4	254	93.5	105	Fractured Granite	Aquifer	11 to 105	Potable
			VH	5493			Granite Formation			
44	Dandbose	Rairangpur	1	57.3	1.46	1.46	Top Soil			

			2	13.8	5.37	6.83	Clay			
			3	8932			Granite Formation			
45	Bijatala	Bijatala	1	190	1.24	1.24	Top Soil			
			2	45.7	9.96	11.2	Highly Weathered Formation			
			3	1104			Granite Formation			
46	Nuagoan	Karanjia	1	204	3.36	3.36	Top Soil			
			2	22.6	3.87	7.23	Highly Weathered Formation			
			3	79.1	29.5	36.7	Weathered Formation	Aquifer	7 to 36	Potable
			4	919			Fractured Granite			
47	Sunaposi	Karanjia	1	40.6	1.28	1.28	Top Soil			
			2	7.3	1.29	2.58	Clay			
			3	32.6	13.8	16.4	Highly Weathered Formation			
			4	262			Fractured Granite			
48	Karanjia	Karanjia	1	54.5	4.73	4.73	Top Soil			
			2	297	4.57	9.31	Compact Clay			
			3	19.7	11.8	21.1	Highly Weathered Formation	Aquifer	9 to 21	Potable
			4	VH			Granite Formation			
49	Nuagaon	Bisoi	1	171	1.2	1.2	Top Soil			
			2	797	1.31	2.51	Dry Soil			
			3	44.6	9.37	11.9	Highly Weathered Formation			
			4	1014			Granite Formation			
50	Durdura	Jashipur	1	50	5.7	5.7	Top Soil			
			2	7.08	14	19.7	Clay/Highly Weathered Formation	Aquifer	6 to 19	Potable
			3	5147			Granite Formation			
51	Tingiriani	Jashipur	1	50.69	4.473	4.473	Top Soil			
			2	93.76	14.7	19.25	Weathered Formation			
			3	510.2			Fractured Granite			
52	Sinduria	Jashipur	1	85	1.2	1.2	Top Soil			

			2	25.3	4.07	5.27	Clay			
			3	386	44.6	49.9	Fractured Granite	Aquifer	6 to 49	Potable
			4	VH			Granite Formation			
53	Kendumundi	Jashipur	1	226	1.55	1.55	Top Soil			
			2	9.58	1.42	2.97	Clay			
			3	30.8	25	27.9	Highly Weathered Formation	Aquifer	3 to 27	Potable
			4	VH			Granite Formation			
54	Tato	Karanjia	1	193	1.71	1.71	Top Soil			
			2	554	2.73	4.43	Dry Soil			
			3	113	3.1	7.53	Highly Weathered Formation			
			4	426	34	41.5	Fractured Granite	Aquifer	8 to 41	Potable
			5	VH			Granite Formation			
55	Tangabila	Jashipur	1	242	0.762	0.762	Top Soil/Dry Soil			
			2	1633	1.1	1.86				
			3	95.4	37	38	Weathered Formation	Aquifer	2 to 38	Potable
			4	4664			Granite Formation			
56	Jaunriposi	Jashipur	1	91.2	0.662	0.662	Top Soil			
			2	307	1.15	1.75	Dry Soil			
			3	30.5	34.3	36.1	Highly Weathered Formation	Aquifer	2 to 36	Potable
			4	VH			Granite Formation			
57	Jashipur	Jashipur	1	122	1.2	1.2	Top Soil			
			2	17.3	4.04	5.24	Clay			
			3	36.1	33	38.24	Highly Weathered Formation	Aquifer	5 to 38	Potable
			4	2805			Granite Formation			
58	Kanchikina	Jashipur	1	120	1.43	1.43	Top Soil			
			2	34.6	18.6	20.1	Highly Weathered Formation	Aquifer	2 to 20	Potable
			3	VH			Granite Formation			
59	Thakurgoda	Jashipur	1	144	1.2	1.2	Top Soil			
			2	61.5	1.31	2.51				

			3	109	8.47	11	Weathered Formation			
			4	50.5	11.9	22.9	Highly Weathered Formation	Aquifer	11 to 22	Potable
			5	1404			Granite Formation			
60	Basantapur	Jashipur	1	49.2	1.683	1.683	Top Soil			
			2	10.39	4.323	6.006	Clay			
			3	4.157	5.216	11.2	Highly Weathered Formation			
			4	55.85	73.71	84.93	Weathered Formation	Aquifer	11 to 84	Potable
			5	2942			Granite Formation			
61	Batapalasa	Karanjia	1	120	0.875	0.875	Top Soil			
			2	31.9	12.5	13.4	Highly Weathered Formation			
			3	83.7	27.6	41.1	Weathered Formation	Aquifer	13 to 41	Potable
			4	VH			Granite Formation			
62	Kudarsahi	Karanjia	1	62.6	2.16	2.16	Top Soil			
			2	16	2.83	4.99	Clay			
			3	107	55.2	60.1	Weathered Formation	Aquifer	5 to 60	Potable
			4	2651			Granite Formation			
63	Kendumudi	Karanjia	1	70.7	1.04	1.04	Top Soil			
			2	19.7	3.25	4.29	Highly Weathered Formation			
			3	6.96	6.11	10.4	Clay			
			4	53.1	25.1	35.5	Highly Weathered Formation	Aquifer	10 to 35	Potable
				VH			Granite Formation			
64	Bhaglota	Karanjia	1	79.6	4.05	4.05	Top Soil			
			2	237	5.89	9.94	Weathered Formation			
			3	39	10.9	20.8	Highly Weathered Formation	Aquifer	9 to 20	Potable
			4	1450			Granite Formation			
65	Jiuli	Karanjia	1	86.5	1.37	1.37	Top Soil			
			2	12.5	8.36	9.73	Clay			
			3	VH			Granite Formation			

66	Baradapal	Rauan	1	571.4	1.014	1.014	Top Soil / Dry soil			
			2	189	1.957	2.971				
			3	57	14	17.07	Highly Weathered Formation			
			4	VH			Granite Formation			
67	Khiching	Rauan	1	35.9	1.14	1.14	Top Soil			
			2	8.47	4.56	5.69	Clay			
			3	73.6	24.6	30.3	Highly Weathered Formation	Aquifer	6 to 30	Potable
			4	VH			Granite Formation			
68	Dhudipani	Rauan	1	101	1.2	1.2	Top Soil			
			2	67.3	11	12.2	Highly Weathered Formation			
			3	VH			Granite Formation			
69	Kamarabandha	Rauan	1	140	0.668	0.668	Top Soil/Dry Soil			
			2	965	1.1	1.77				
			3	59.8	23.8	25.6	Highly Weathered Formation	Aquifer	2 to 25	Potable
			4	VH			Granite Formation			
70	Ful comp	Rauan	1	85.4	2.83	2.83	Top Soil			
			2	10.8	10.2	13	Clay/Highly Weathered Formation			
			3	Vh			Granite Formation			
71	Fagu	Rauan	1	327	0.501	0.501	Top Soil			
			2	82	10.7	11.2	Highly Weathered Formation			
			3	291	24	35.2	Fractured Granite	Aquifer	11 to 35	Potable
			4	VH			Granite Formation			
72	Dhanyatri	Rauan	1	215	1.37	1.37	Top Soil			
			2	27.9	20.4	21.7	Highly Weathered Formation	Aquifer	2 to 20	Potable
			3	225	70.4	92.1	Fractured Granite	Aquifer	22 to 90	Potable
			4	VH			Granite Formation			
73	Mahuldiha	Thakurmunda	1	86.4	1.05	1.05	Top Soil			

			2	41	9.02	10.1	Highly Weathered Formation			
			3	420	38.1	48.2	Fractured Granite	Aquifer	10 to 48	Potable
			4	VH			Granite Formation			
74	Mahuldiha to 2	Thakurmunda	1	66.1	5.11	5.11	Top Soil			
			2	2044	5.73	10.8	Compact Clay			
			3	35.9	11.4	22.3	Highly Weathered Formation	Aquifer	11 to 22	Potable
			4	VH			Granite Formation			
75	Mahuldiha to 3	Thakurmunda	1	83.22	1.224	1.224	Top Soil			
			2	53.53	3.002	4.226	Highly Weathered Formation			
			3	VH			Granite Formation			
76	Boring	Thakurmunda	1	119	2.61	2.61	Top Soil			
			2	26.4	9.07	11.7	Highly Weathered Formation			
			3	VH			Granite Formation			
77	Boring 2	Thakurmunda	1	145	1.8	1.8	Top Soil			
			2	24	8.5	10.3	Highly Weathered Formation			
			3	VH			Granite Formation			
78	Hatigoda	Thakurmunda	1	239	1.39	1.39	Top Soil			
			2	442	3.68	5.08	Compact Clay			
			3	90	5.65	10.7	Highly Weathered Formation			
			4	VH			Granite Formation			
79	Hatigoda to 2	Thakurmunda	1	621	1.2	1.2	Top Soil			
			2	1255	1.33	2.53	Dry Soil			
			3	344	8.43	11	Fractured Granite	Aquifer	3 to 11	Potable
			4	VH			Granite Formation			
80	Hatigoda to 3	Thakurmunda	1	216	2.36	2.36	Top Soil			
			2	1274	1.04	3.41	Compact Clay			

			3	136	7.75	11.2	Highly Weathered Formation			
			4	VH			Granite Formation			
81	Patbil	Karanjia	1	154	3.99	3.99	Top Soil			
			2	60.4	14.9	18.9	Weathered Formation	Aquifer	4 to 18	Potable
			3	22.9	18.2	37	Highly Weathered Formation	Aquifer	18 to 37	Potable
			4	VH			Granite Formation			
82	Patbil 2	Karanjia	1	166	3.2	3.2	Top Soil			
			2	310	2.98	6.18	Compact Clay			
			3	20.7	19.4	25.6	Highly Weathered Formation	Aquifer	7 to 25	Potable
			4	1133			Granite Formation			
83	Raruan	Raruan	1	14.7	0.895	0.895	Top Soil			
			2	4.05	0.986	1.88	Clay			
			3	26.2	12.4	14.3	Highly Weathered Formation			
			4	VH			Granite Formation			
84	Bhanjakia	Raruan	1	114	0.601	0.601	Top Soil			
			2	38.6	10.4	11	Highly Weathered Formation			
			3	270	59.3	70.2	Fractured Granite	Aquifer	11 to 70	Potable
			4	4346			Granite Formation			
85	Manada	Jashipur	1	100	1.75	1.75	Top Soil			
			2	11.5	11.6	13.3	Clay			
			3	53.7	69.9	83.2	Highly Weathered Formation	Aquifer	14 to 83	Potable
			4	832			Granite Formation			
86	Dari	Raruan	1	649	1.48	1.48	Top Soil			
			2	320	4.09	5.57	Compact Clay			
			3	200	26	31.6	Weathered Formation	Aquifer	5 to 31	Potable
			4	20	28.6	60.2	Highly Weathered Formation	Aquifer	32 to 60	Potable
			5	VH			Granite Formation			

87	Kendujiani	Thakurmunda	1	138	1.78	1.78	Top Soil			
			2	233	1.49	3.26	Compact Clay			
			3	55.1	45.2	48.5	Highly Weathered Formation	Aquifer	4 to 48	Potable
			4	Vh			Granite Formation			
88	Asanabani	Thakurmunda	1	46.8	1.09	1.09	Top Soil			
			2	11.8	4.89	5.98	Clay			
			3	23.5	16.4	22.3	Highly Weathered Formation	Aquifer	6 to 22	Potable
			4	VH			Granite Formation			
89	Satkosia	Thakurmunda	1	63.8	2.06	2.06	Top Soil			
			2	25.8	10.4	12.5	Highly Weathered Formation			
			3	VH			Granite Formation			
90	Thakurmunda	Thakurmunda	1	7.49	3.68	3.68	Top Soil			
			2	40.7	12.4	16	Highly Weathered Formation	Aquifer	4 to 16	Potable
			3	VH			Granite Formation			
91	Khandapal	Thakurmunda	1	10.9	2.09	2.09	Top Soil			
			2	29.5	13.2	15.3	Highly Weathered Formation			
			3	VH			Granite Formation			
92	Deogaon	Kaptipada	1	28.3	1.2	1.2	Top Soil			
			2	16.7	1.26	2.46	Clay			
			3	44.9	20.9	23.3	Highly Weathered Formation	Aquifer	3 to 23	Potable
			4	VH			Granite Formation			
93	Sarat	Kaptipada	1	75.2	0.925	0.925	Top Soil			
			2	25.1	0.825	1.75	Clay			
			3	77.8	5.44	7.19	Highly Weathered Formation			
			4	345	21.5	28.7	Fractured Granite	Aquifer	8 to 28	Potable
			5	VH			Granite Formation			
94	Sukhapata	Kaptipada	1	22.9	3.44	3.44	Top Soil			

			2	57.8	25.7	29.2	Highly Weathered Formation	Aquifer	4 to 29	Potable
			3	VH			Granite Formation			
95	Dugudha	Kaptipada	1	2.61	0.818	0.818	Top Soil			
			2	448	1.96	2.78	Compact Clay			
			3	Vh			Granite Formation			
96	Tulagadia	Kaptipada	1	188	0.738	0.738	Top Soil			
			2	46.7	5.69	6.43	Highly Weathered Formation			
			3	234	21.8	28.3	Fractured Granite	Aquifer	7 to 28	Potable
			4	VH			Granite Formation			
97	Badakhman	Kaptipada	1	782	0.803	0.803	Top Soil			
			2	306	2.11	2.91	Compact Clay			
			3	52	17.24	20.2	Highly Weathered Formation	Aquifer	3 to 20	Potable
			5	VH			Granite Formation			
98	Bhandaripal	Kaptipada	1	14.9	3.31	3.31	Top Soil			
			2	79.1	12.7	16	Highly Weathered Formation			
			3	VH			Granite Formation			
99	Kaptipada	Kaptipada	1	61.1	0.45	0.458	Top Soil			
			2	8.24	12.8	13.3	Clay/Highly weathered Formation			
			3	VH			Granite Formation			
100	Majhigadia	Kaptipada	1	450	0.975	0.975	Top Soil			
			2	196	3.09	4.06	Weathered Formation			
			3	27.7	27.2	31.3	Highly Weathered Formation	Aquifer	5 to 31	Potable
			4	VH			Granite Formation			
101	Rajgonj	GB Nagar	1	7.74	3.57	3.57	Top Soil			
			2	18.5	8.33	11.9	Highly Weathered Formation			
			3	VH			Granite Formation			
102	Purana baripada to I	Purana baripada	1	7.75	0.875	0.875	Top Soil/Dry soil			

			2	71.5	0.752	1.52				
			3	13	10.4	12	Clay			
			4	2.1	14	26	Highly Weathered Formation	Aquifer	12 to 26	Potable
			5	893			Granite Formation			
103	Purana baripada to II	Purana baripada	1	8.6	1.2	1.2	Top Soil			
			2	5.7	4.08	5.28	Clay			
			3	20.3	42.9	48.2	Highly Weathered Formation	Aquifer	6 to 48	Potable
			4	VH			Granite Formation			
104	Puradihi	GB Nagar	1	16.45	0.79	0.79	Top Soil			
			2	5.44	5.471	6.26	Clay			
			3	16.23	61.13	67.4	Highly Weathered Formation	Aquifer	7 to 67	Potable
			4	1904			Granite Formation			
105	Radho	GB Nagar	1	203.8	0.7482	0.748	Top Soil			
			2	45.77	6.986	6.986	Highly Weathered Formation			
			3	307.8	34.72	42.45	Fractured Granite	Aquifer	7 to 42	Potable
			4	VH			Granite Formation			
106	Udala	Udala	1	40.5	0.248	0.348	Top Soil			
			2	5.97	7.59	7.93	Clay			
			3	15	31	38.9	Highly Weathered Formation	Aquifer	8 to 38	Potable
			4	VH			Granite Formation			
107	Angarpoda	Udala	1	17.8	0.787	0.787	Top Soil			
			2	7.67	727	8.05	clay			
			3	5022			Granite Formation			
108	Dumasahi	Udala	1	10.3	2.05	2.05	Top Soil			
			2	76.5	11.2	13.2	Highly Weathered Formation			
			3	VH			Granite Formation			
109	Kendua	Shamakhunta	1	332	2.49	2.49	Top Soil			

			2	1028	11.5	14.46	Granite			
			3	42.8	32	46	Weathered Formation	Aquifer	15 to 46	Potable
			4	2805			Granite Formation			
110	Balidiha	Shamakhunta	1	12.77	1.311	1.311	Top Soil			
			2	8.456	3.318	4.628	Clay			
			3	126.5	5.287	9.915	Weathered Formation			
			4	11.33	35.63	45.55	Highly Weathered Formation	Aquifer	10 to 45	Potable
			5	4056			Granite Formation			
111	Shamakhunta	Shamakhunta	1	22.5	1.11	1.11	Top Soil			
			2	6.36	12.6	13.7	Clay			
			3	17.1	27.8	41.5	Highly Weathered Formation	Aquifer	14 to 41	Potable
			4	893			Granite Formation			
112	Kendudiha	Shamakhunta	1	79.63	0.3494	0.3494	Top Soil			
			2	9.675	4.238	4.588	Clay			
			3	44.43	37.671	9.964	Highly Weathered Formation			
			4	5280			Granite Formation			
113	Kaliasole	Suliapada	1	23.5	0.835	0.835	Top Soil			
			2	5.06	1.26	2.09	Clay			
			3	66.5	1.14	3.23	Weathered Formation			
			4	21	82.7	85.9	Highly Weathered Formation	Aquifer	4 to 85	Potable
			5	1511			Granite Formation			
114	Bagheda	Suliapada	1	16.8	1.2	1.2	Top Soil			
			2	5.26	1.31	2.51	Clay			
			3	70.6	8.64	11.1	Sand			
			4	7.22	11.9	23.1	Clay			
			5	103			Weathered Formation			
115	Suliapada	Suliapada	1	55.03	0.4301	0.4301	Top Soil			
			2	8.26	4.047	4.477	Clay			
			3	5.401	8.983	13.46	Saline Sand			
			4	8.938	55.38	68.64	Clay			

			5	20.45			Sand			
116	Nadigaon	Suliapada	1	9.006	2.031	2.031	Top Soil			
			2	50.47	3.251	5.281	Sand			
			3	9.249	63.59	68.87	Clay			
			4	67.8			sand			
117	Nuagaon	Suliapada	1	9.33	1.91	1.91	Top Soil			
			2	95.2	1.89	3.81	Compact Clay			
			3	11.6	64.1	67.9	clay			
			4	137			Weathered Formation			
118	Debendrapur i	Baripada	1	17.67	1.218	1.218	Top Soil			
			2	5.612	1.478	2.696	Clay			
			3	19.39	15.69	18.39	sand	Aquifer	3 to 18	Potable
			4	15.59			clay			
119	Debendrapur ii	Baripada	1	13.7	0.876	0.876	Top Soil			
			2	2.68	1.33	2.21	Clay			
			3	18.7	1.74	3.94	Sand			
			4	8.08			clay			
120	Badagaon	bangarposi	1	67.4	1.4	1.4	Top Soil			
			2	28.8	9.12	10.5	Highly Weathered Formation			
			3	782	18	28.5	Fractured Granite	Aquifer	11 to 28	Potable
			4	VH			Granite Formation			
121	Kusumbadha	bangarposi	1	32.3	1.2	1.2	Top Soil			
			2	96.9	4.52	5.72	Clay/Highly Weathered Formation			
			3	179	18.2	23.9	Highly Weathered Formation	Aquifer	6 to 24	Potable
			4	332	77.6	101	Fractured Granite	Aquifer	25 to 101	Potable
			5	VH			Granite Formation			
122	Basilakacha	bangarposi	1	65.4	1.56	1.56	Top Soil			
			2	31.1	9.07	10.6	Highly Weathered Formation			
			3	1522			Granite Formation			
123	bangarposi	bangarposi	1	10.4	0.822	0.822	Top Soil			

			2	6.23	3.88	4.71	Clay			
			3	VH			Granite Formation			
124	Danadar	Saraskana	1	9.5	2.23	2.23	Top Soil			
			2	19.1	4.31	6.54	Highly Weathered Formation			
			3	VH			Granite Formation			
125	Bazargoda	Saraskana	1	8.35	0.574	0.574	Top Soil			
			2	18.3	4.56	5.13	Highly Weathered Formation			
			3	VH			Granite Formation			
126	Milkudi	Saraskana	1	540	1.09	1.09	Top Soil			
			2	150	5.36	6.46	Weathered Formation			
			3	35.2	5.97	12.4	Highly Weathered Formation			
			4	VH			Granite Formation			
127	Barubeda	Saraskana	1	40.5	1.2	1.2	Top Soil			
			2	25.2	4.05	5.25	Highly Weathered Formation			
			3	317	17.8	23	Fractured Granite	Aquifer	6 to 23	Potable
			4	VH			Granite Formation			
128	Saraskana	Saraskana	1	21.28	1.313	1.313	Top Soil			
			2	41.12	1.104	2.416	Dry Soil			
			3	10.23	3.411	5.828	Clay			
			4	16.67	19.84	25.67	Highly Weathered Formation	Aquifer	6 to 25	Potable
			5	VH			Granite Formation			
129	Bankisole	Saraskana	1	16.86	1.2	1.2	Top Soil			
			2	40.07	1.308	2.508	Dry Soil			
			3	12.16	8.476	10.98	Highly Weathered Formation			
			4	96.01	36.91	47.89	Weathered Formation	Aquifer	11 to 48	Potable
			5	VH			Granite Formation			
130	Ghantibuda	Saraskana	1	21.5	0.462	0.462	Top Soil			
			2	4.76	5.76	6.22	clay			

			3	22.4	18.1	24.3	Highly Weathered Formation	Aquifer	7 to 24	Potable
			4	VH			Granite Formation			
131	Nagadihi	Saraskana	1	55.12	1.727	1.727	Top Soil			
			2	24.35	10.54	12.27	Highly Weathered Formation			
			3	258.9	86.64	98.91	Fractured Granite	Aquifer	13 to 98	Potable
			4	VH			Granite Formation			
132	Satapoutia	kuliana	1	139	0.549	0.549	Top Soil			
			2	54.2	6.2	6.75	Weathered Formation			
			3	14	37.6	44.3	Highly Weathered Formation	Aquifer	7 to 44	Potable
			4	216			Weathered Formation			
133	Chandua	kuliana	1	15.8	0.956	0.956	Top Soil			
			2	11.2	4.67	5.626	Clay			
			3	178	10.2	15.826	Weathered Formation			
			4	7.64	22.8	38.626	Clay			
			5	184			Weathered Formation			
134	kuliana	kuliana	1	11.9	4.27	4.27	Top Soil			
			2	155	25.5	29.8	Weathered Formation	Aquifer	5 to 29	Potable
			3	VH			Granite Formation			
135	Rangamatia	kuliana	1	52.9	1.73	1.73	Top Soil			
			2	27.1	8.79	10.5	Highly Weathered Formation			
			3	2271			Granite Formation			
136	Khairbani	Bangarposi	1	8.59	1.2	1.2	Top Soil			
			2	6.866	4.045	5.245	Clay			
			3	17.8	5.713	10.96	Highly Weathered Formation			
			4	112.8	38.27	49.22	Weathered Formation	Aquifer	11 to 49	Potable
			5	3139			Granite Formation			

137	Jharpokharia	Saraskana	1	7.74	1.2	1.2	Top Soil			
			2	3.2	1.58	2.78	Clay			
			3	17.1	12.2	15	Highly Weathered Formation			
			4	VH			Granite Formation			
138	Kadamdiha	Saraskana	1	29.64	1.835	1.835	Top Soil			
			2	11.04	4.53	6.365	Clay			
			3	27.22	23.46	29.83	Highly Weathered Formation	Aquifer	7 to 29	Potable
			4	VH			Granite Formation			
139	Salabani	Bangarposi	1	62.4	0.712	0.712	Top Soil			
			2	13.1	14.5	15.2	Clay/Highly Weathered Formation			
			3	VH			Granite Formation			
140	Gadubhanga	kuliana	1	45.79	1.2	1.2	Top Soil			
			2	324	1.264	2.464	Dry Soil			
			3	21.89	7.931	10.4	Highly Weathered Formation			
			4	136	79.65	90.05	Weathered Formation	Aquifer	11 to 90	Potable
			5	VH			Granite Formation			
141	Kuchei	kuliana	1	86.39	1.168	1.168	Top Soil			
			2	27.82	11.78	12.95	Highly Weathered Formation			
			3	VH			Granite Formation			
142	Mangalpur	Baripada	1	46.9	2.2	2.2	Top Soil			
			2	80.5	1.72	3.91	Compact Clay			
			3	4.94	7.39	11.3	Clay			
			4	229			Weathered Formation			
143	Baripada	Baripada	1	104	1.478	1.478	Top Soil			
			2	49	6.612	8.09	Compact Clay			
			3	4.7	10.51	18.6	Clay			

			4	266			Weathered Formation			
144	Malhua	Baripada	1	13.9	2.22	2.22	Top Soil			
			2	6.7	7.83	10	Clay			
			3	17	42.5	52.5	Highly weathered Formation	Aquifer	10 to 52	Potable
			4	138.8			Weathered Formation			

Annexure 08.

Exploration details of Mayurbhanj District

Sl. No	Block	Location	Well Type	Depth drilled (mbgl)	Lithology	Depth to Bed rock (mbgl) Casing Pipe Lowered	Granular zones/ Fracture zone (mbgl)	SWL (mbgl)	Discharge (lps)	DD (m)	T (m^2 / day)	S
1	Bangriposi	Jamsola	EW	200.40	Gr.gneiss mica schist	-						
2	Bangriposi	Saraskora	EW	138.37	Gr.gneiss	-	22,30,50,55	10.2	1.50			
3	Barasahi	Barasahi	EW	211.73	Gr.gneiss mica schist	-		8.40	18.00	14.70		
4	Barasahi	Barasahi	EW	303.00	Gr.gneiss	-	34,73-58.51, 279.07-294.01	10.96	5.46	5.44		
5	Baripada	Baripada	EW	186.30	Tertiary	-		17.72	12.50			
6	Baripada	Baripada	EW	151.00	Tertiary	-	22,91,129	6.4	2.00	14.40		
7	Baripada	Kashantandi	OW	186.30	Tertiary	-	36-38,48-51, 63-69,90-95, 115-188, 154-160, 171-175	17.72	12.50	-		
8	Baripada	Kistantandi	EW	273.39	Tertiary	-		9.50	10.00	9.16		
9	Betnoti	Betnote	EW	251.50	Tertiary	-	55-63,73-78,94-102,121-130,135-146	16.64	7.20	6.10		
10	Betnoti	Betnoti	EW	194.30	Tertiary	-						
11	Bisoi	Badamtalia	EW	120.83	Gr.gneiss	-	-	5.5	2.13	-		
12	Bisoi	Bisoi	EW	114.15	Gr.gneiss	-	60,65,68,78, 90,95, 106, 112	10.25	2.16	24.30		
13	Bisoi	Bisoi	OW	59.00	Gr.gneiss	-	23-27 (Aluvium) 49.59 (Gr.Greiss)	3.82	3.16	1.99		

14	Bisoi	Bodamtalia	OW	154.66	Gr.gneiss	-	34	6.19	1.60	10.00		
15	Jamada	Jamda		75.98	Granite Gniess with Pegmatite	-	22-24,28-34, 37-48	8	10.83	10.62		
16	Jamda	Rangamatia	EW	107.14	Gr.Gneiss	-			0.66			
17	Joshipur	Bhanjakia	EW	200.50	Gr. Gneiss	-	45,48	5.43	0.16	23.75		
18	Joshipur	Jamakeswar	EW	134.88	Gr. Gneiss	-	5,06,51,25,130	3.9	3.16	25.13		
19	Joshipur	Jamkeswar	OW	114.15	Gr. Gneiss	-	60-65,68-78, 90-95, 106-112.	10.26	2.16	24.30		
20	Joshipur	Jashipur	EW	22.11	Alluvium	-	-	3.34	6.26	11.03		
21	kaptipada	Badabisol	Pz	63.5	Granite gneiss	11.2	58.4-58.8		0.4			
22	Kaptipada	Jadida	EW	178.40	Gr.Gneiss	10.40	111					
23	Kaptipada	Jhinkepada	EW	141.80	Granite Gniess	20.3	50.30-51.30, 68.60-69.60					
24	kaptipada	Jhinkepada (Mandirsahi)	EW	55	Granite gneiss	19.3	15.80-19.30	4.7	11	11.1	193.4	
25	Kaptipada	Kaptipada	EW	75.9	Granite gneiss	12.2	15.80-16.80,73.80-74.80	6.4	11	6.7	193.38	8.54*10-6
26	Kaptipada	Katuria	EW	166.2	Granite gneiss	18.7	111.00-111.50					
27	kaptipada	Labanyadeipur	EW	117.3	Granite gneiss	19.8	21.80-22.30,99.00-99.50	4.75	6.2	14.5	16.34	
28	Kaptipada	Majhigadia	EW	142.80	Gr.Gneiss	20.30	102.2	5.79	5.50	17.20	15.54	
29	Kaptipada	Majhigadia	OW	109.00	Gr.Gneiss	19.90	107.2	5.81	8.30	14.35	24.81	
30	Kaptipada	Nuagaon	EW	196.2	Granite	22.9						

31	Kaptipada	Nududiha	EW	132.20	Granite gneiss	22.60	122	5.83	4.30	15.08	14.47	
32	kaptipada	Padmapokhari	EW	86.9	Granite gneiss	21.9	22.90-23.90,32.10-33.10,37.10-38.10	6.75	10	14	28.4	
33	Kaptipada	Pingoo	EW	105.30	Granite gneiss	17.30	66-66.5,89-89.5,104.5-105.2		9.50	5.86	32.67	
34	Kaptipada	Pingoo	OW	56.40	Granite gneiss	17.30	32-32.5,45.5-49	4.54	9.00			
35	Kaptipada	Salechuan	Pz	63.00	Gr.Gneiss	23.50	49					
36	Kaptipada	Sulagadia	EW	172.30	Gr.Gneiss	21.80						
37	Kaptipada	Sun-Bishosi	EW	86.90	Granite gneiss	14.30	54-54.5,75.5-76,81-81.5	3.02	9.00	7.63	15.23	
38	Kaptipada	Sun-Bishosi	OW	56.40	Granite gneiss	11.40	34-34.5,37.5-38,42-42.5		9.00			
39	Karanjia	Karanjia	EW	171.74	Gr. Gneiss	-	46,84	3.91	2.60	20.58		
40	Karanjia	Karanjia	OW	167.14	Granite Gniess	-	-	-	0.66	-		
41	Karanjia	Patbil	OW	139.5	Granite	37		5.98		16.18	23.7	3.8×10-5
42	Karanjia	Patbil	EW	170	Granite	36	100.5	6.74	7.34	18.71	23.56	
43	Khunta	Badolina	EW	118.00	Granite gneiss	18.10	93					
44	Khunta	Baraolia	EW	118	Granite gneiss	18.1						
45	Khunta	Dhangera	EW	141.30	Granite gneiss	20.00	44.20-56.40	5	4.50	8.61	7.1	
46	Khunta	Dharampur ii (Kanheibandh)	EW	151.00	Granite gneiss	28.00	87-87.25	3.2	1.00			
47	Khunta	Dharampuri	EW	150.10	Granite gneiss	29.05	91-91.25		0.50			
48	Khunta	Ekalavya	Pz	62.50	Granite gneiss	14.80						

49	khunta	Hatisahi	EW	172.3	Granite	36.1						
50	Khunta	Jamdiha	EW	55.90	Granite gneiss	45.13	33.6-40.0	4.5	4.00	16.33	8.7	
51	khunta	Kanheibandh	Pz	62.5	Granite gneiss	28.3	58.4-59.4		1			
52	Khuntia	Dhanger Emrs	EW	62.50	Gr.Gneiss	15.30						
53	Khuntia	Nuagaon	EW	56.40	Gr.Gneiss	19.80	24.80,45.20	5.89	0.20	14.31	0.1873	
54	Kuliana	Kuliana	EW	131.16	Tertiary alluvium	-	28,34,48,52	9.9	6.33	18.38		
55	Morada	Chitrada	EW	251.50	Tertiary alluvium	-	56,62,97,106,114,137,147, 151,155	12.82	8.45	5.45		
56	Morada	Chitrada	EW	251.50	Tertiary alluvium	-	47-56,92-97, 106-114, 137-147, 157-155	12.82	8.45	5.45		
57	Morada	Dantiamohan	EW	211.73	Tertiary alluvium	-	48-52,67-73, 120-123, 128-142, 171-176, 184-190, 190-200	8.6	17.99	14.70		
58	Morada	Dantianohan	OW	233.20	Tertiary alluvium	-	46,52,68,111-121,215-225	10.38	10.13	7.56		
59	Rairangpur	Jodia	EW	158.86	Gr.gneiss	-	32	1	0.33	10.40		
60	Rairangpur	Rairangpur	EW	120.53	Gr.gneiss	-	20,22,42,50	4.94	2.97	14.76		
61	Rairangpur	Rairangpur	OW	138.37	Gr.gneiss	-	22-30,50-55.	10.280 (9.3.83)	1.50	-		
62	Rairangpur	Zodia	OW	154.60	Gr.gneiss	-	34.00	6.195 (19.6.84)	1.60	16.06		
63	Raruan			82.70	Crystalline quartz faffro	-	38,40,45,59, 83	0.14	10.91	12.40		
64	Rasgovindpur	Rasgovindpur	EW	251.20	Crystaline Quartz Gabbro	-	43-51, 54-66, 88-104,109-116	7.73	6.56	12.07		
65	Samakhunta	Samakhunta	OW	151.00	Gr.gneiss	-	22,120	6.4	12.00	14.40		

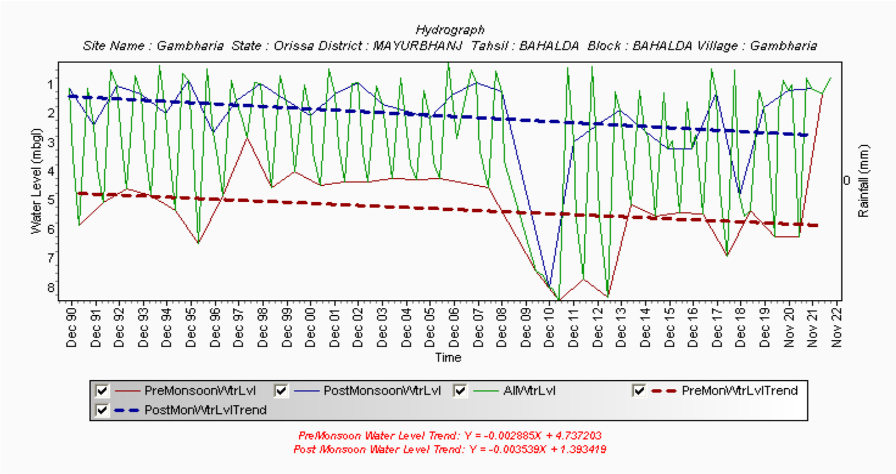
66	Saraskona	Jamsola	OW	59.65	Gr.gneiss	-	35-38,48-54	10		-		
67	Saraskona	Saraskana	OW	105.31	Gr.gneiss	-	48-50,58-69, 20,82-88, 92-105.	5.76	4.83	25.00		
68	Shamakhunta	Shamakhunta	EW	200.40	Granite & Gneiss Mica Schist	-	76	-	2.96	-		
69	Suliapada	Kujhidihi	EW	273.39	Granite & Gneiss Mica Schist	-	81-92,221-224,238-264	9.50 (15.6.85)	10.00	9.17		
70	Suliapada	Kujidihi	EW	303.00	Granite & Gneiss Mica Schist	-	35,59,280,294	10.96	5.46	5.44		
71	Thakurmunda	Kendujiani	OW	196	Granite	23			1.2			
72	Thakurmunda	Kendujiani	EW	195	Granite	24	119		4.4			
73	Thakurmunda	Mirigimundi	Pz	104	Granite	33.5						
74	Udala	Adivasi Cultural Ground	OW	165.70	Granite gneiss	-						
75	Udala	Chuliaposi	EW	153.60	Granite gneiss	27.50			9.50			
76	Udala	Dhangera	EW	141.30	Granite gneiss	31.00	38.0-53.0	4.21	3.50	5.86	32.67	
77	Udala	Fire Station	EW	80.30	Granite gneiss	19.50	70	4.6	5.00	17.20	10.04	
78	Udala	Fire Station	OW	105.20	Granite gneiss	17.60			9.00			
79	Udala	Horticulture Compound	EW	150.1	Granite gneiss	25.50	27		0.50			
80	Udala	Jagannathbari	EW	80.80	Granite gneiss	40.10	49	4.91	2.00	19.24	4.76	
81	Udala	Kanakpada	EW	160.10	Granite gneiss	25.60	86.5-87	4.2	0.50			
82	Udala	Mandakhai	EW	62.50	Granite gneiss	18.00	34.0-39		8.00			

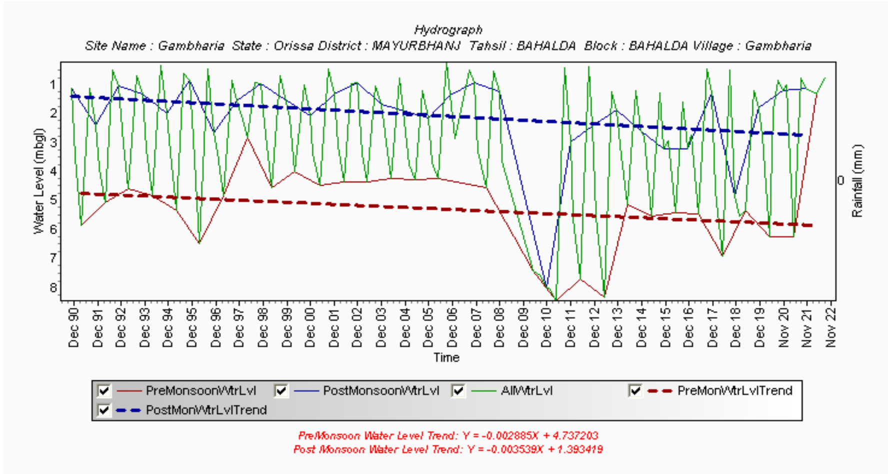
83	Udala	Mioffice	PZ	63.00	Granite gneiss	18.30						
84	Udala	Nabara	EW	135.70	Granite gneiss	25.40	52-52.5,86.5-87,102-102.5	3.7	5.30	8.70	12.33	
85	Udala	Nabara	OW	100.20	Grnite gneiss	28.00	50-50.5,79.5-80,92-92.5	3.53	5.00	9.98	12.79	
86	Udala	Nac Office	EW	153.80	Granite gneiss	22.15	118		0.50			
87	Udala	Nagpal	EW	104.80	Granite gneiss	31.00	95	5.31	5.50	14.00	71.73	
88	Udala	Nagpal	OW	133.60	Granite gneiss	32.50	131.6	5.81	12.00	11.50	31.64	
89	Udala	Pedagadi	EW	117.40	Granite gneiss	25.40	62-62.5,99-99.5		8.00	6.11	26.33	
90	Udala	Pedagadi	OW	104.20	Granite gneiss	25.90	67-67.5,97-97.5		7.50	6.19	23.43	
91	Udala	Police Station	EW	31.60	Granite gneiss	24.70	26.5	3.2	18.00			
92	Udala	Police Station	OW	93.00	Grnite gneiss	26.50	69	5.8	3.80	9.03	14.31	
93	Udala	Pwdib	EW	153.60	Granite gneiss	25.50	26,35,46	4.95	4.00	19.30	11.79	
94	Udala	Revenue Compound	EW	129.60	Granite gneiss	26.10	116.3	6.21	4.30	18.77	7.19	
95	Udala	Revenue Compound	OW	135.70	Granite gneiss	25.80	128.2		4.40			
96	Udala	Sanadei	EW	142.3	Granite gneiss	10.5	21.00-21.30,102.00-102.50	5.59	4.3	18	11.33	
97	Udala	Subidabandh	OW	74.70	Granite gneiss	28.30			0.25			
98	Udala	Subidhabandh	EW	62.50	Granite gneiss	20.80	29.9,36,50	5.01	9.00	13.60	54.76	
99	Udala	Swapneswar Mandir	EW	150.60	Granite gneiss	18.05	117	7.7	3.50	19.42	21.75	
100	Udala	Swapneswar Mandir	OW	141.30	Granite gneiss	28.00	87-87.25		0.50			

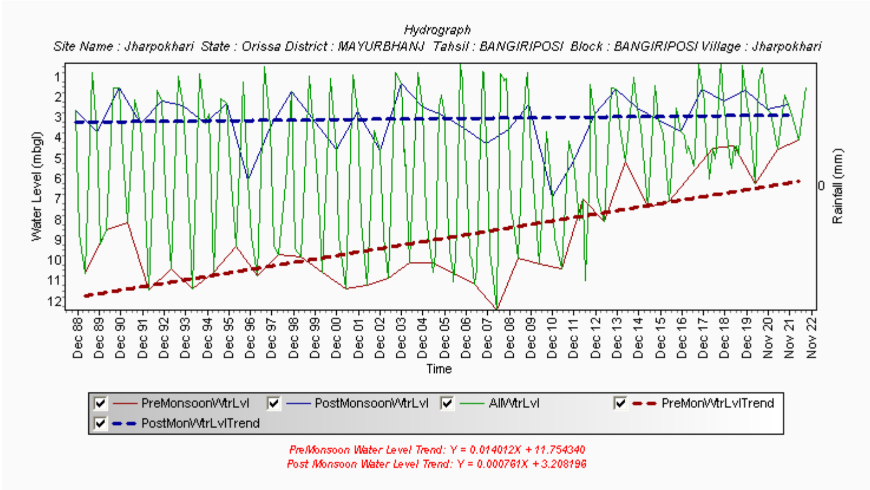
101	Udala	Udala	OW	76.40	Gr.gneiss pegmatite	-	25,35,45,55	1.74	10.00	14.32		
102	Udala	Udala	EW	158.86	Gr.gneiss pegmatite	-	31.51	1.600 (5.11.84)	0.33	16.40		
103	Udala	Udala	OW	76.49	Gr.gneiss pegmatite	-	35-38, 48-54,59-65	1.74	8.84	14.32		
104	Udala	Udala	EW	86.40	Granite gneiss	39.25	16.8-23.1,36.8-76.3	8.3	4.00	16.70	19.77	
105	Udala	Udala Boys High School	EW	173.00	Granite gneiss	36.00						
106	Udala	Udala College	EW	151.9	Granite gneiss	35.4	76.3-77.00,86.00-87.00	6.7	4	29.7	7.49	
107	Udala	Udala College	EW	86.40	Granite gneiss	17.30	32-32.5,45.5-49		3.50			
108	Udala	Urmool	EW	178.30	Granite gneiss	16.80	91		2.00			

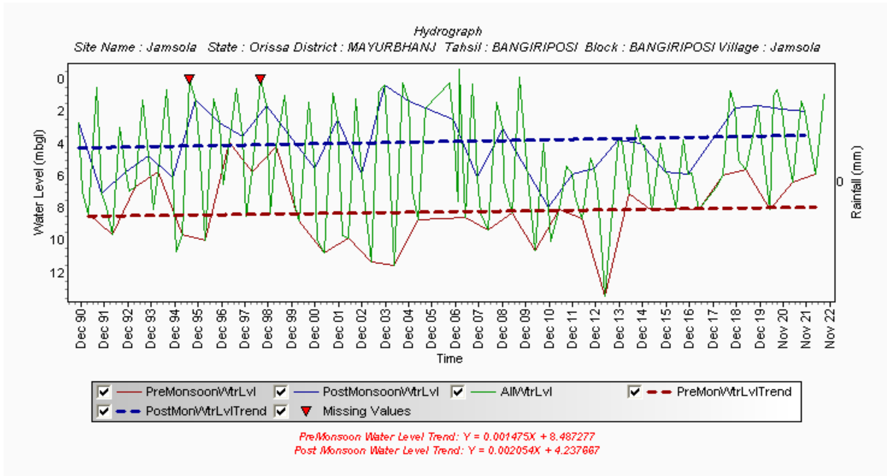
Annexure 09

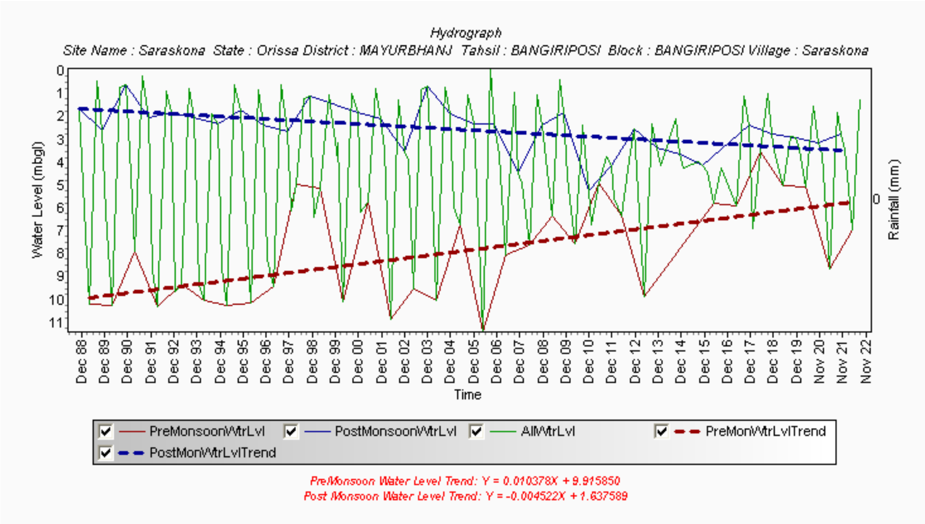
Figure 3.18. Hydrograph of Ground Water Monitoring Stations (GWMS)in Mayurbhanj District

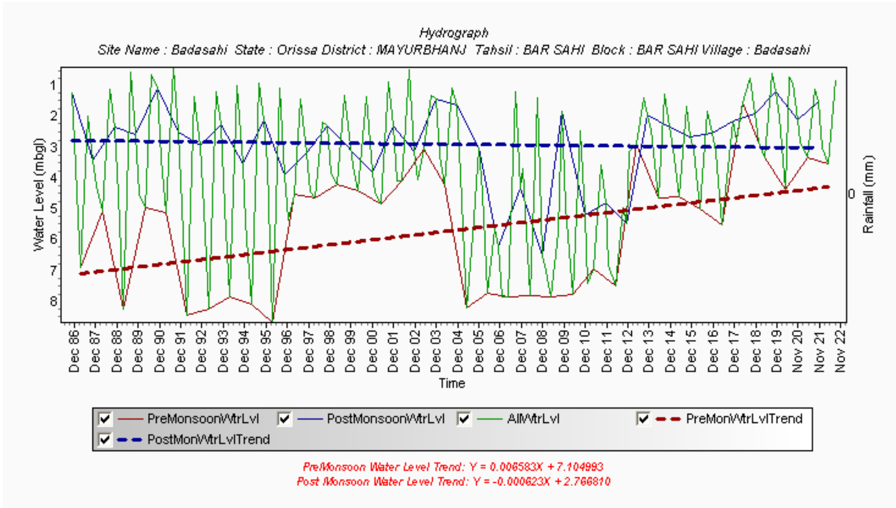


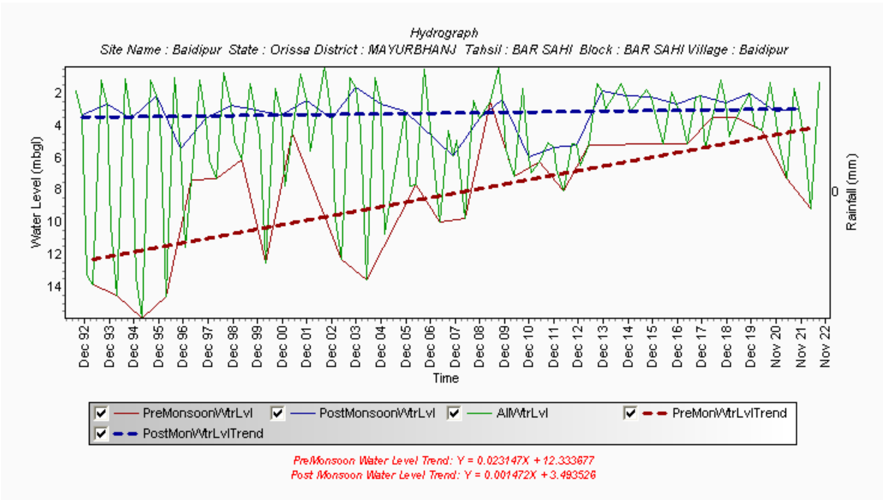


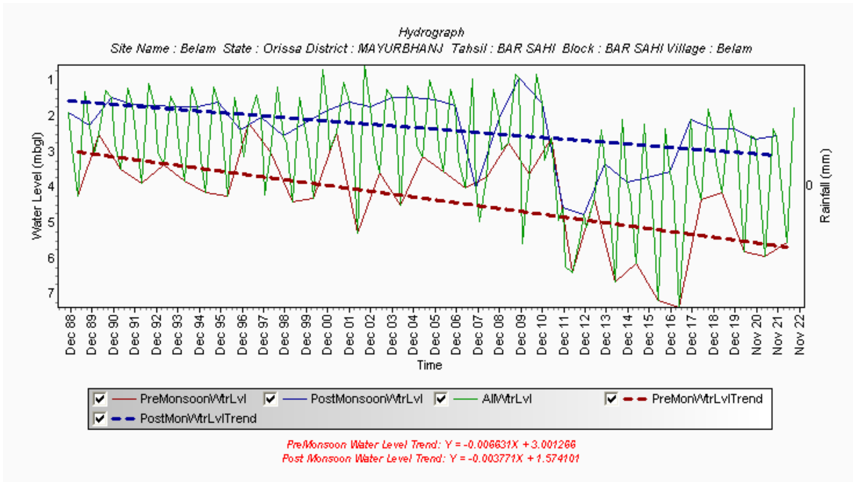


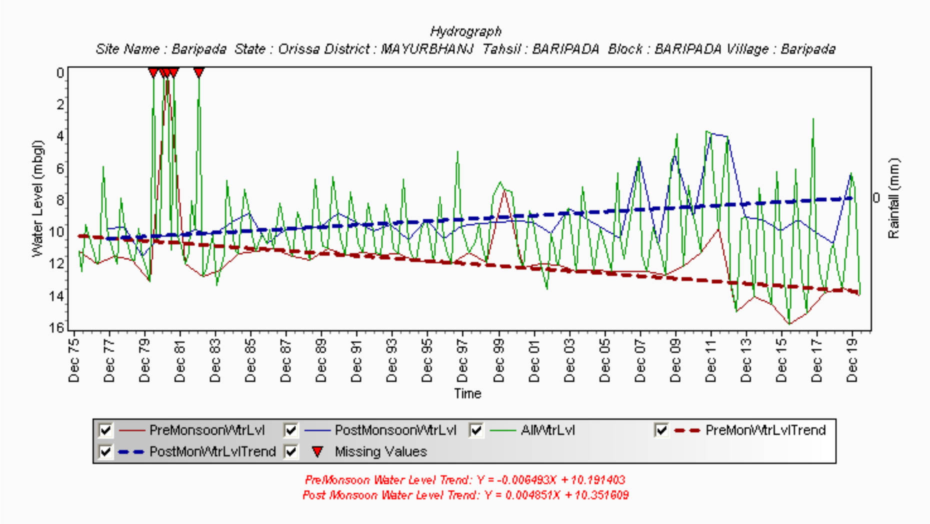


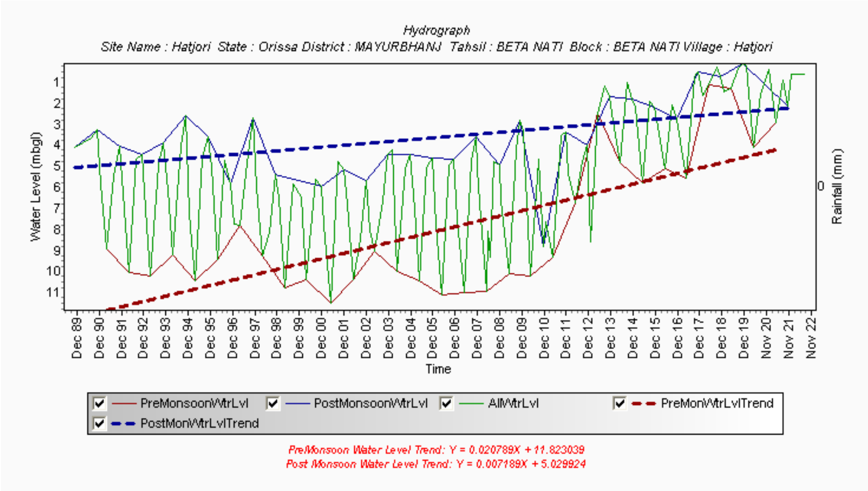

Hydrograph
Site Name : Saraskona State : Orissa District : MAYURBHANJ Tahsil : BANGIRIPOSI Block : BANGIRIPOSI Village : Saraskona
Water Level (mbgl)
Rainfall (mm)
Time
PreMonsoonWtrLvl
PostMonsoonWtrLvl
AllWtrLvl
PreMonWtrLvlTrend
PostMonWtrLvlTrend
PreMonsoon Water Level Trend: Y = 0.010378X + 9.915850
Post Monsoon Water Level Trend: Y = -0.004522X + 1.637589

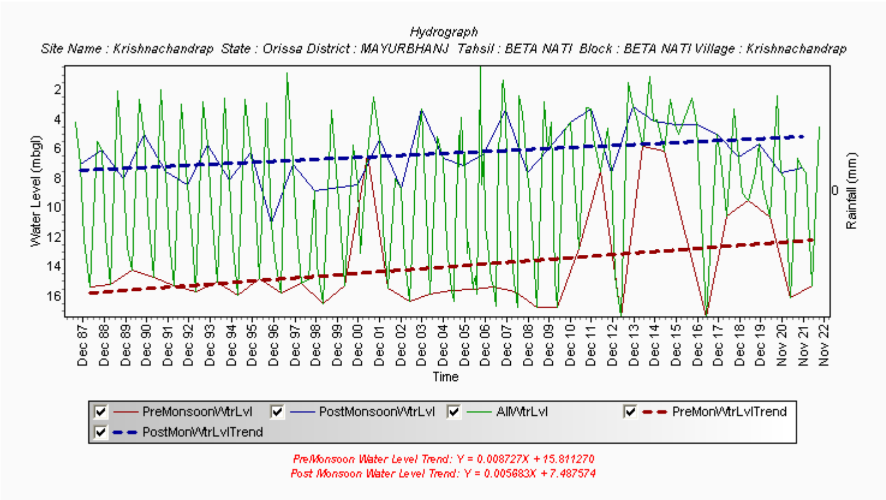

Hydrograph
Site Name : Badasahi State : Orissa District : MAYURBHANJ Tahsil : BAR SAHI Block : BAR SAHI Village : Badasahi
Water Level (mbgl)
Rainfall (mm)
Time
PreMonsoonWtrLvl
PostMonsoonWtrLvl
AllWtrLvl
PreMonWtrLvlTrend
PostMonWtrLvlTrend
PreMonsoon Water Level Trend: Y = 0.006583X + 7.104993
Post Monsoon Water Level Trend: Y = -0.000623X + 2.766810

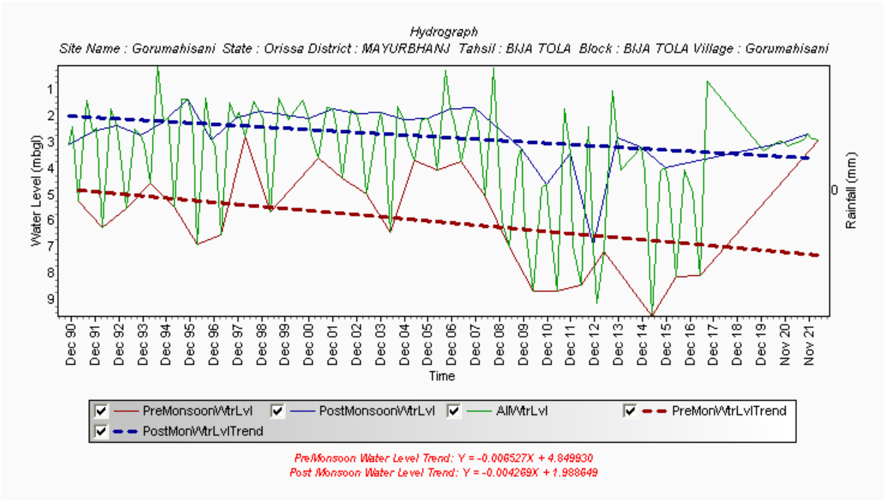

Hydrograph
Site Name : Baidipur State : Orissa District : MAYURBHANJ Tahsil : BAR SAHI Block : BAR SAHI Village : Baidipur
Water Level (mbgl)
Rainfall (mm)
Time
PreMonsoonWtrLvl
PostMonsoonWtrLvl
AllWtrLvl
PreMonWtrLvlTrend
PostMonWtrLvlTrend
PreMonsoon Water Level Trend: Y = 0.023147X + 12.333677
Post Monsoon Water Level Trend: Y = 0.001472X + 3.493526

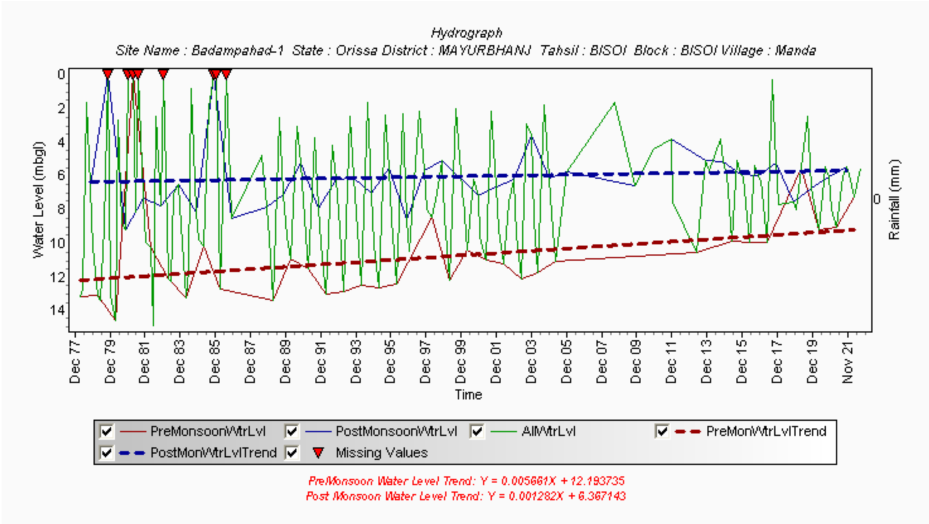

Hydrograph
Site Name : Belam State : Orissa District : MAYURBHANJ Tahsil : BAR SAHI Block : BAR SAHI Village : Belam
Water Level (mbgl)
Rainfall (mm)
Time
PreMonsoonWtrLvl
PostMonsoonWtrLvl
AllWtrLvl
PreMonWtrLvlTrend
PostMonWtrLvlTrend
PreMonsoon Water Level Trend: Y = -0.006631X + 3.001266
Post Monsoon Water Level Trend: Y = -0.003771X + 1.574101

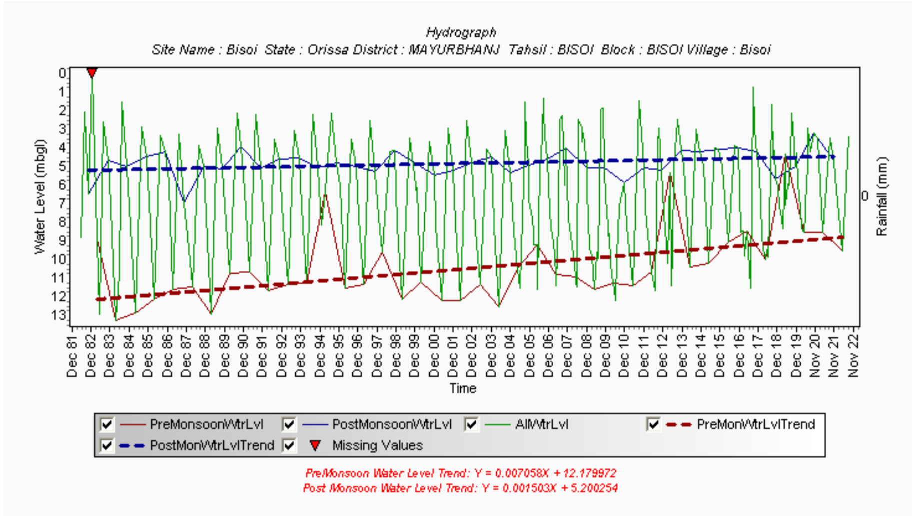

Hydrograph
Site Name : Baripada State : Orissa District : MAYURBHANJ Tahsil : BARIPADA Block : BARIPADA Village : Baripada
Water Level (mbgl)
Rainfall (mm)
Time
PreMonsoonWtrLvl
PostMonsoonWtrLvl
AllWtrLvl
PreMonWtrLvlTrend
PostMonWtrLvlTrend
Missing Values
PreMonsoon Water Level Trend: Y = -0.006493X + 10.191403
Post Monsoon Water Level Trend: Y = 0.004851X + 10.351609

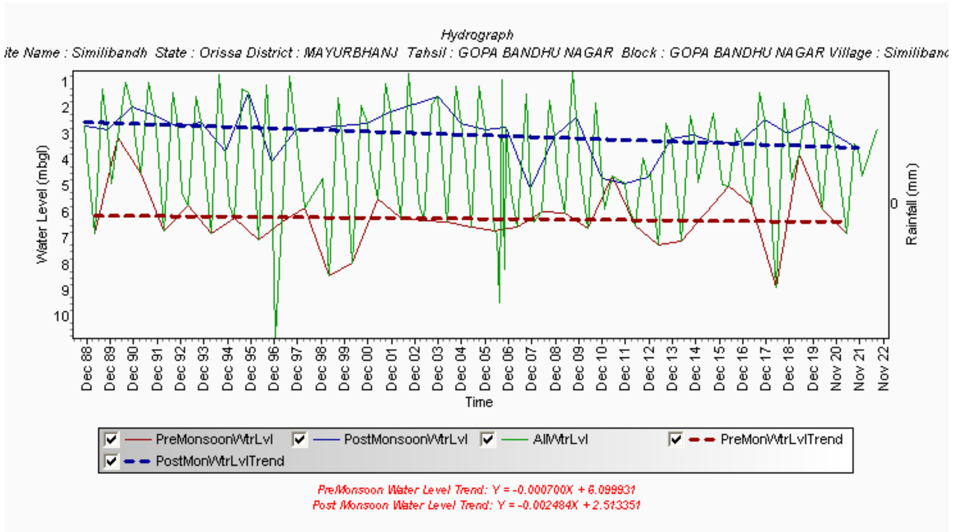

Hydrograph
Site Name : Hatjori State : Orissa District : MAYURBHANJ Tahsil : BETA NATI Block : BETA NATI Village : Hatjori
Water Level (mbgl)
Rainfall (mm)
Time
PreMonsoonWtrLvl
PostMonsoonWtrLvl
AllWtrLvl
PreMonWtrLvlTrend
PostMonWtrLvlTrend
PreMonsoon Water Level Trend: Y = 0.020789X + 11.823039
Post Monsoon Water Level Trend: Y = 0.007189X + 5.029924

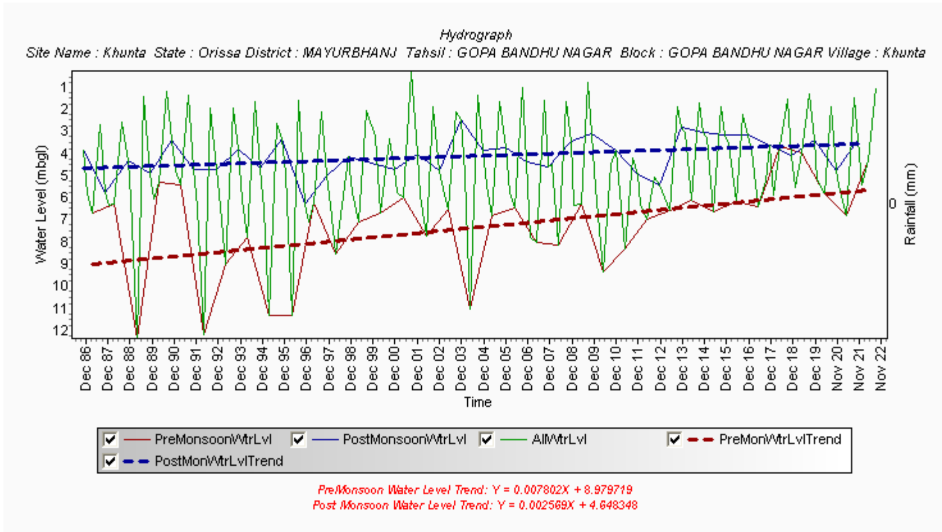

Hydrograph
Site Name : Krishnachandrap State : Orissa District : MAYURBHANJ Tahsil : BETA NATI Block : BETA NATI Village : Krishnachandrap
Water Level (mbgl)
Rainfall (mm)
Time
PreMonsoonWtrLvl
PostMonsoonWtrLvl
AllWtrLvl
PreMonWtrLvlTrend
PostMonWtrLvlTrend
PreMonsoon Water Level Trend: Y = 0.008727X + 15.811270
Post Monsoon Water Level Trend: Y = 0.005683X + 7.487574

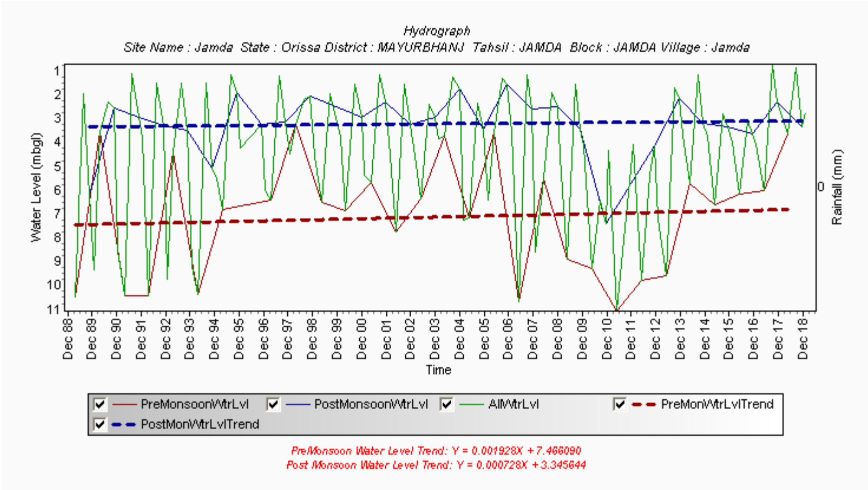

Hydrograph
Site Name : Gorumahisani State : Orissa District : MAYURBHANJ Tahsil : BIJA TOLA Block : BIJA TOLA Village : Gorumahisani
Water Level (mbgl)
Rainfall (mm)
Time
PreMonsoonWtrLvl
PostMonsoonWtrLvl
AllWtrLvl
PreMonWtrLvlTrend
PostMonWtrLvlTrend
PreMonsoon Water Level Trend: Y = -0.006527X + 4.849930
Post Monsoon Water Level Trend: Y = -0.004269X + 1.988649

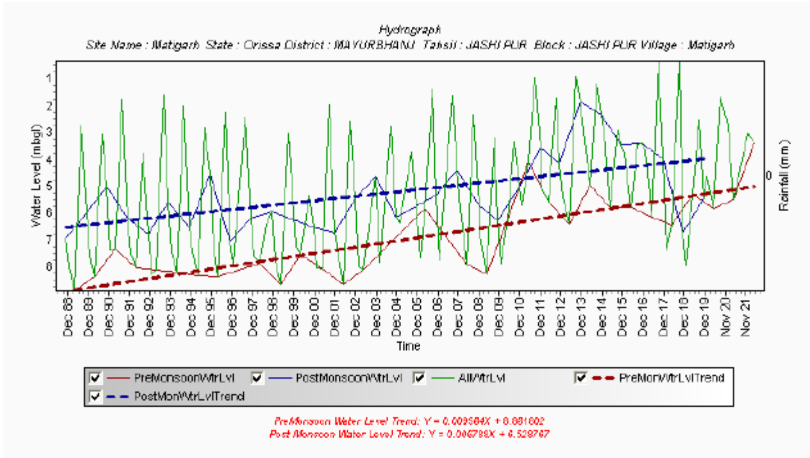

Hydrograph
Site Name : Badampahad-1 State : Orissa District : MAYURBHANJ Tahsil : BISOI Block : BISOI Village : Manda
Water Level (mbgl)
Rainfall (mm)
Time
PreMonsoonWtrLvl
PostMonsoonWtrLvl
AllWtrLvl
PreMonWtrLvlTrend
PostMonWtrLvlTrend
Missing Values
PreMonsoon Water Level Trend: Y = 0.005661X + 12.193735
Post Monsoon Water Level Trend: Y = 0.001282X + 6.367143

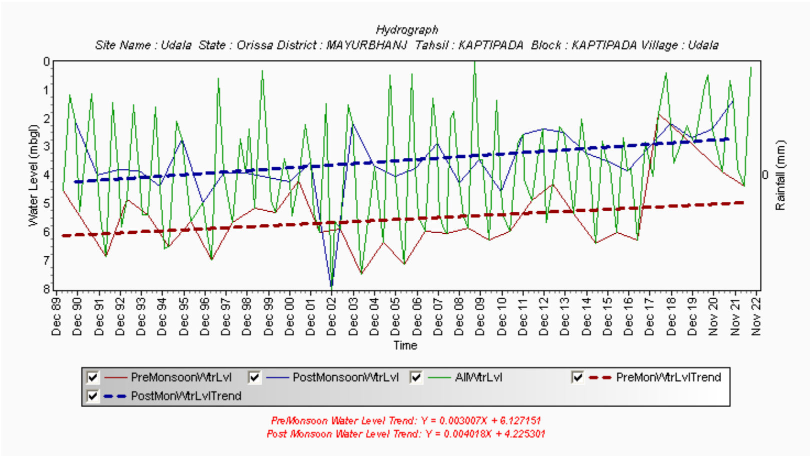

Hydrograph
Site Name : Bisoi State : Orissa District : MAYURBHANJ Tahsil : BISOI Block : BISOI Village : Bisoi
Water Level (mbgl)
Rainfall (mm)
Time
PreMonsoonWtrLvl
PostMonsoonWtrLvl
AllWtrLvl
PreMonWtrLvlTrend
PostMonWtrLvlTrend
Missing Values
PreMonsoon Water Level Trend: Y = 0.007058X + 12.179972
Post Monsoon Water Level Trend: Y = 0.001503X + 5.200254

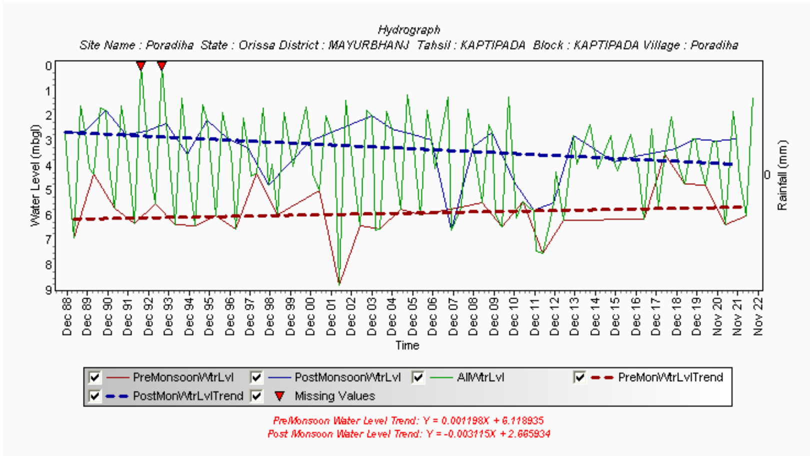

Hydrograph
ite Name : Similibandh State : Orissa District : MAYURBHANJ Tahsil : GOPA BANDHU NAGAR Block : GOPA BANDHU NAGAR Village : Similiband
Water Level (mbgl)
Rainfall (mm)
Time
PreMonsoonWtrLvl
PostMonsoonWtrLvl
AllWtrLvl
PreMonWtrLvlTrend
PostMonWtrLvlTrend
PreMonsoon Water Level Trend: Y = -0.000700X + 6.099931
Post Monsoon Water Level Trend: Y = -0.002484X + 2.513351

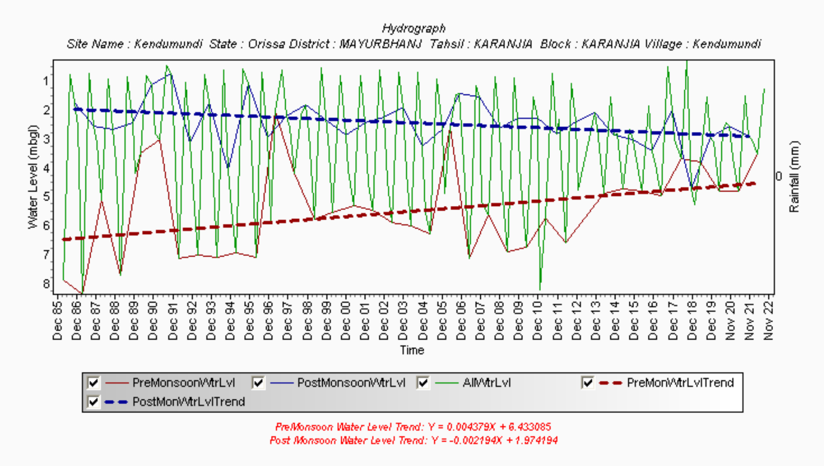

Hydrograph
Site Name : Khunta State : Orissa District : MAYURBHANJ Tahsil : GOPA BANDHU NAGAR Block : GOPA BANDHU NAGAR Village : Khunta
Water Level (mbgl)
Rainfall (mm)
Time
PreMonsoonWtrLvl
PostMonsoonWtrLvl
AllWtrLvl
PreMonWtrLvlTrend
PostMonWtrLvlTrend
PreMonsoon Water Level Trend: Y = 0.007802X + 8.979719
Post Monsoon Water Level Trend: Y = 0.002569X + 4.648348

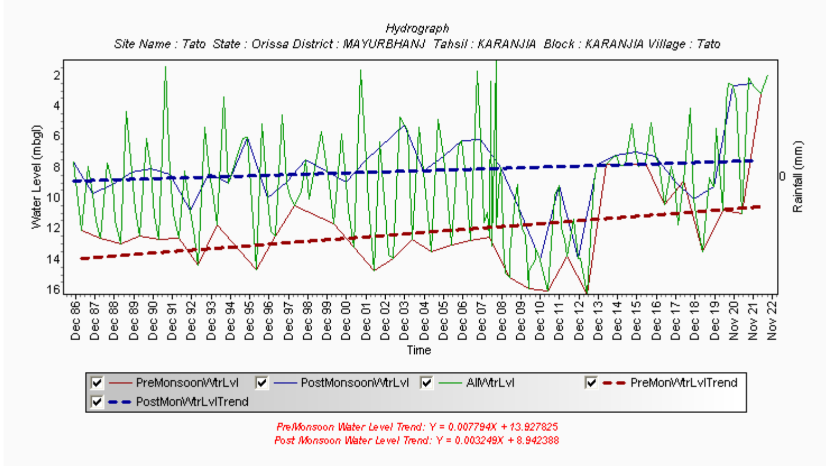

Hydrograph
Site Name : Jamda State : Orissa District : MAYURBHANJ Tahsil : JAMDA Block : JAMDA Village : Jamda
Water Level (mbgl)
Rainfall (mm)
Time
PreMonsoonWtrLvl
PostMonsoonWtrLvl
AllWtrLvl
PreMonWtrLvlTrend
PostMonWtrLvlTrend
PreMonsoon Water Level Trend: Y = 0.001928X + 7.466090
Post Monsoon Water Level Trend: Y = 0.000728X + 3.345644

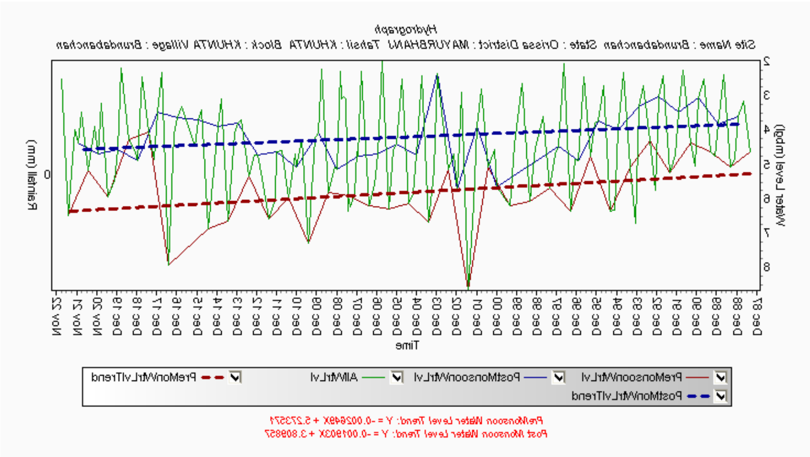

Hydrograph
Site Name : Matigarh State : Orissa District : MAYURBHANJ Tahsil : JASHIPUR Block : JASHIPUR Village : Matigarh
Water Level (mbgl)
Rainfall (mm)
Time
PreMonsoonWtrLvl
PostMonsoonWtrLvl
AllWtrLvl
PreMonWtrLvlTrend
PostMonWtrLvlTrend
PreMonsoon Water Level Trend: Y = 0.009584X + 6.881602
Post Monsoon Water Level Trend: Y = 0.006788X + 6.528767

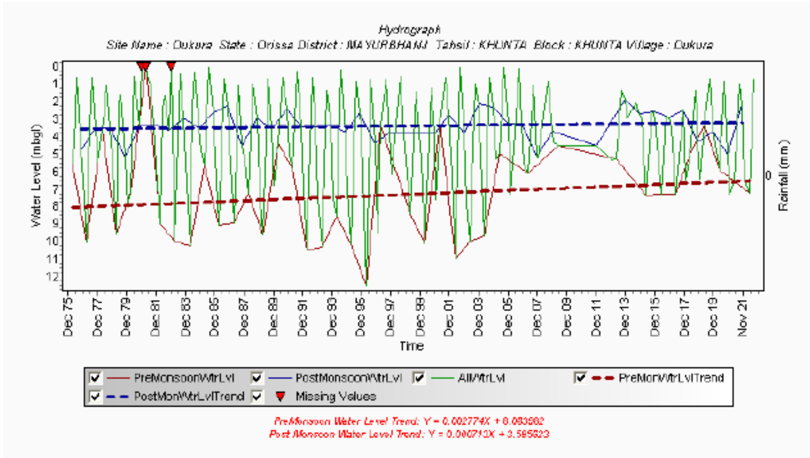

Hydrograph
Site Name : Udala State : Orissa District : MAYURBHANJ Tahsil : KAPTIPADA Block : KAPTIPADA Village : Udala
Water Level (mbgl)
Rainfall (mm)
Time
PreMonsoonWtrLvl
PostMonsoonWtrLvl
AllWtrLvl
PreMonWtrLvlTrend
PostMonWtrLvlTrend
PreMonsoon Water Level Trend: Y = 0.003007X + 6.127151
Post Monsoon Water Level Trend: Y = 0.004018X + 4.225301

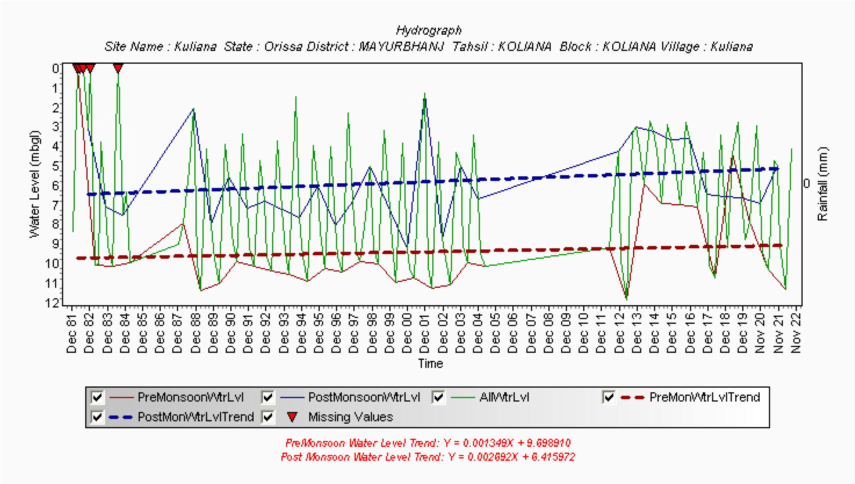

Hydrograph
Site Name : Poradiha State : Orissa District : MAYURBHANJ Tahsil : KAPTIPADA Block : KAPTIPADA Village : Poradiha
Water Level (mbgl)
Rainfall (mm)
Time
PreMonsoonWtrLvl
PostMonsoonWtrLvl
AllWtrLvl
PreMonWtrLvlTrend
PostMonWtrLvlTrend
Missing Values
PreMonsoon Water Level Trend: Y = 0.001198X + 6.118935
Post Monsoon Water Level Trend: Y = -0.003115X + 2.665934

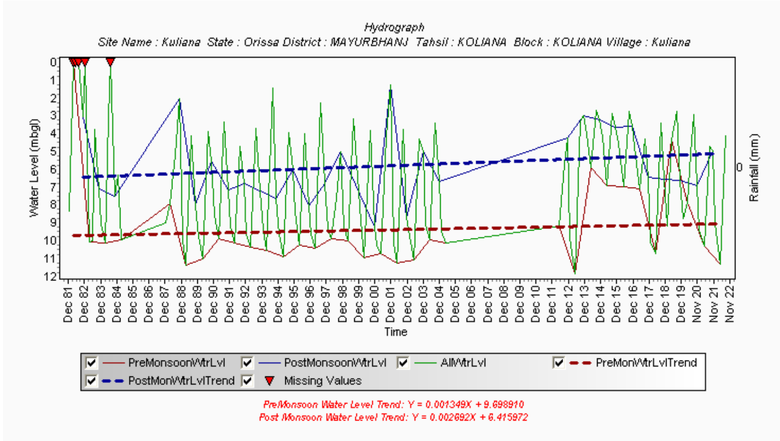

Hydrograph
Site Name : Kendumundi State : Orissa District : MAYURBHANJ Tahsil : KARANJIA Block : KARANJIA Village : Kendumundi
Water Level (mbgl)
Rainfall (mm)
Time
PreMonsoonWtrLvl
PostMonsoonWtrLvl
AllWtrLvl
PreMonWtrLvlTrend
PostMonWtrLvlTrend
PreMonsoon Water Level Trend: Y = 0.004379X + 6.433085
Post Monsoon Water Level Trend: Y = -0.002194X + 1.974194

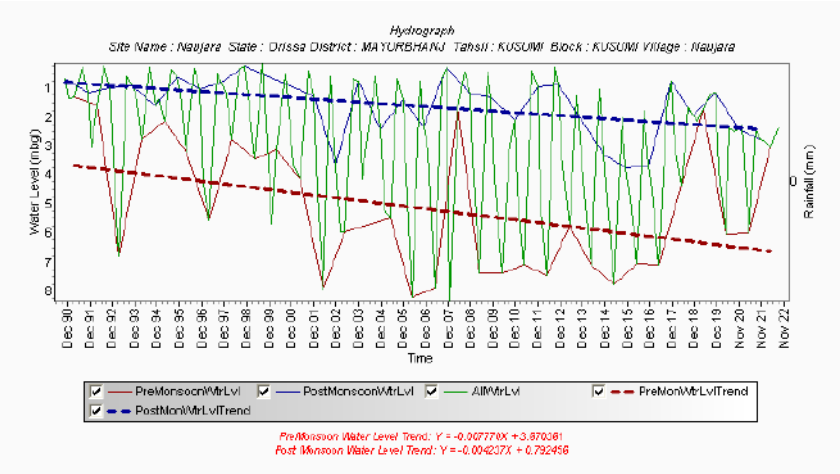

Hydrograph
Site Name : Tato State : Orissa District : MAYURBHANJ Tahsil : KARANJIA Block : KARANJIA Village : Tato
Water Level (mbgl)
Rainfall (mm)
Time
PreMonsoonWtrLvl
PostMonsoonWtrLvl
AllWtrLvl
PreMonWtrLvlTrend
PostMonWtrLvlTrend
PreMonsoon Water Level Trend: Y = 0.007794X + 13.927825
Post Monsoon Water Level Trend: Y = 0.003249X + 8.942388

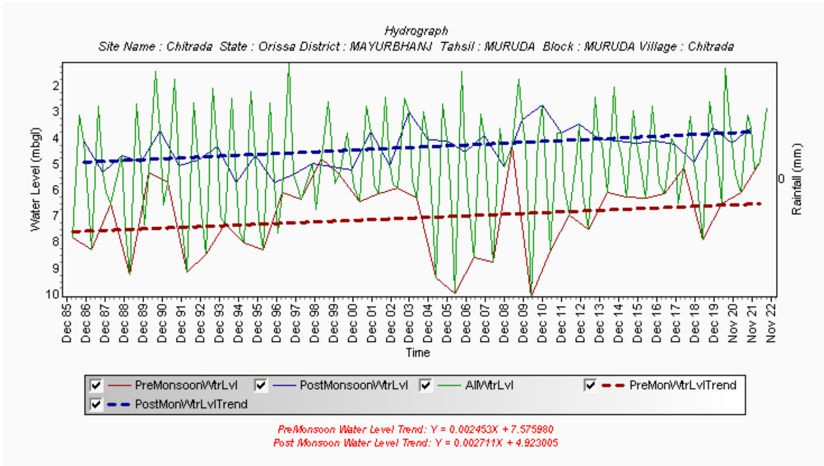


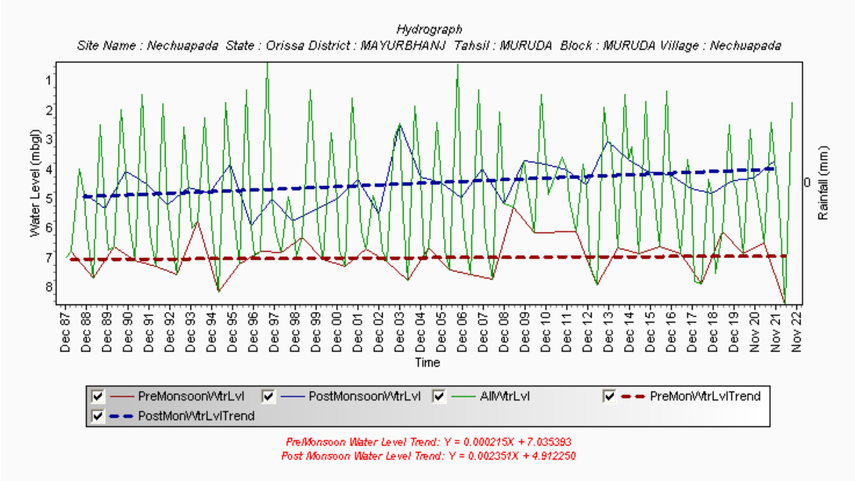

Hydrograph
Site Name : Dukura State : Orissa District : MAYURBHANJ Tahsil : KHUNTA Block : KHUNTA Village : Dukura
Water Level (mbgl)
Rainfall (mm)
Time
PreMonsoonWtrLvl
PostMonsoonWtrLvl
AllWtrLvl
PreMonWtrLvlTrend
PostMonWtrLvlTrend
Missing Values

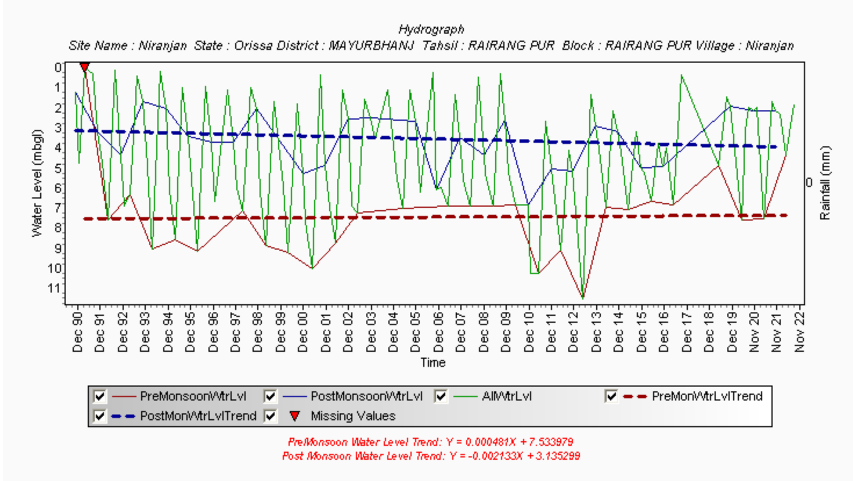

Hydrograph
Site Name : Kuliana State : Orissa District : MAYURBHANJ Tahsil : KOLIANA Block : KOLIANA Village : Kuliana
Water Level (mbgl)
Rainfall (mm)
Time
PreMonsoonWtrLvl
PostMonsoonWtrLvl
AllWtrLvl
PreMonWtrLvlTrend
PostMonWtrLvlTrend
Missing Values
PreMonsoon Water Level Trend: Y = 0.001349X + 9.698910
Post Monsoon Water Level Trend: Y = 0.002692X + 6.415972

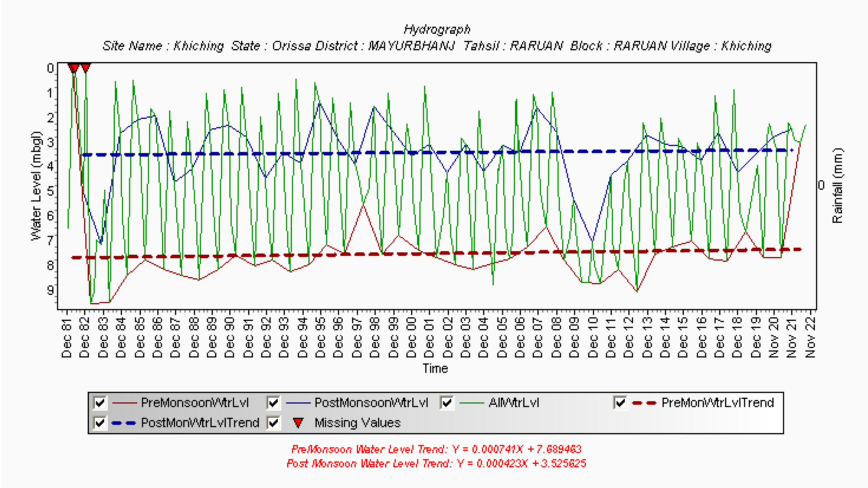

Hydrograph
Site Name : Kuliana State : Orissa District : MAYURBHANJ Tahsil : KOLIANA Block : KOLIANA Village : Kuliana
Water Level (mbgl)
Rainfall (mm)
Time
PreMonsoonWtrLvl
PostMonsoonWtrLvl
AllWtrLvl
PreMonWtrLvlTrend
PostMonWtrLvlTrend
Missing Values
PreMonsoon Water Level Trend: Y = 0.001349X + 9.698910
Post Monsoon Water Level Trend: Y = 0.002692X + 6.415972

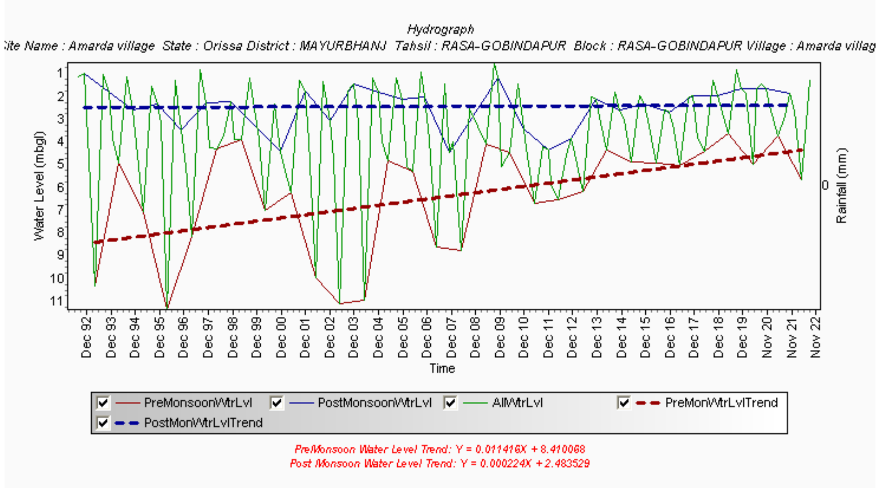

Hydrograph
Site Name : Naujara State : Orissa District : MAYURBHANJ Tahsil : KUSUMI Block : KUSUMI Village : Naujara
Water Level (mbgl)
Rainfall (mm)
Time
PreMonsoonWtrLvl
PostMonsoonWtrLvl
AllWtrLvl
PreMonWtrLvlTrend
PostMonWtrLvlTrend
PreMonsoon Water Level Trend: Y = -0.007770X +3.870361
Post Monsoon Water Level Trend: Y = -0.004237X + 0.792456

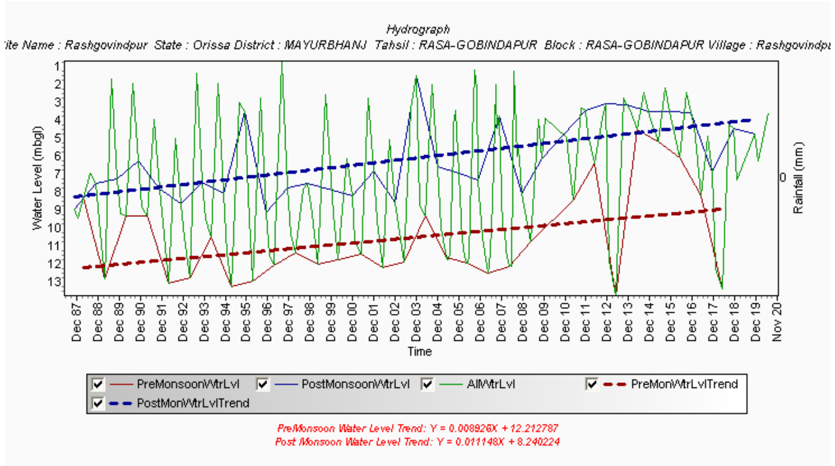

Hydrograph
Site Name : Chitrada State : Orissa District : MAYURBHANJ Tahsil : MURUDA Block : MURUDA Village : Chitrada
Water Level (mbgl)
Rainfall (mm)
Time
PreMonsoonWtrLvl
PostMonsoonWtrLvl
AllWtrLvl
PreMonWtrLvlTrend
PostMonWtrLvlTrend
PreMonsoon Water Level Trend: Y = 0.002453X + 7.575980
Post Monsoon Water Level Trend: Y = 0.002711X + 4.923005

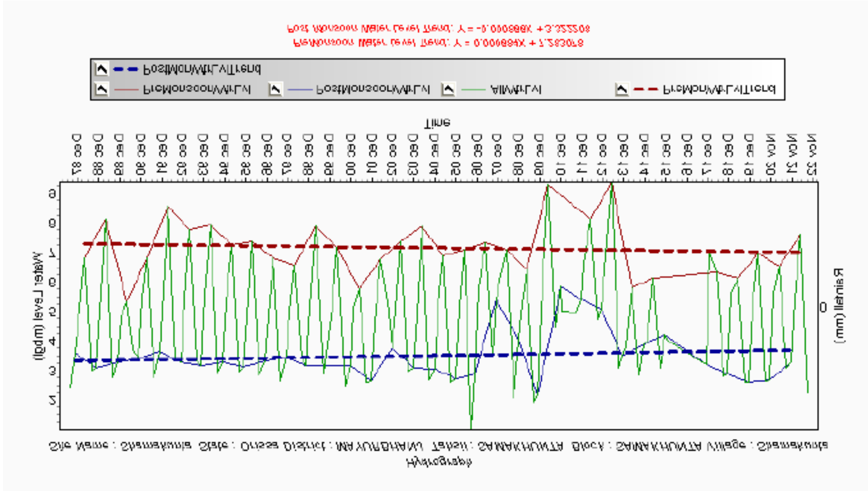

Hydrograph
Site Name : Nechuapada State : Orissa District : MAYURBHANJ Tahsil : MURUDA Block : MURUDA Village : Nechuapada
Water Level (mbgl)
Rainfall (mm)
Time
PreMonsoonWtrLvl
PostMonsoonWtrLvl
AllWtrLvl
PreMonWtrLvlTrend
PostMonWtrLvlTrend
PreMonsoon Water Level Trend: Y = 0.000215X + 7.035393
Post Monsoon Water Level Trend: Y = 0.002351X + 4.912250

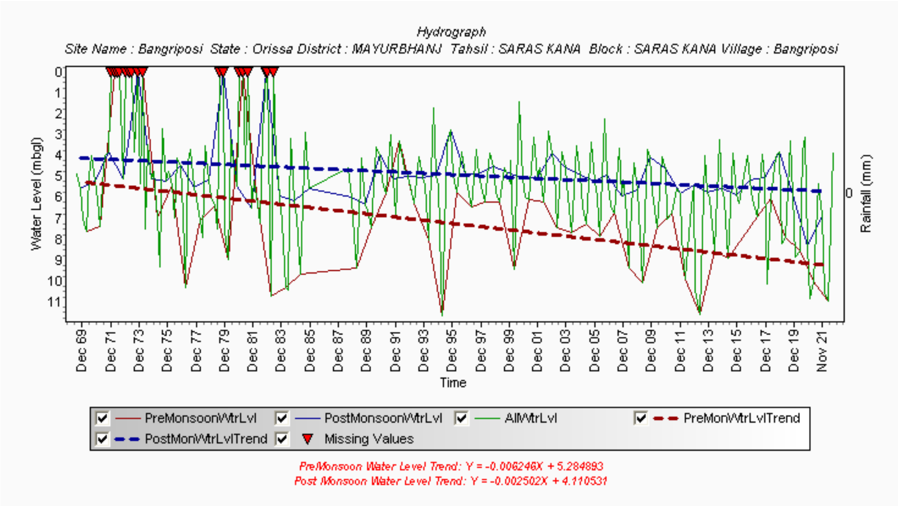

Hydrograph
Site Name : Niranjan State : Orissa District : MAYURBHANJ Tahsil : RAIRANG PUR Block : RAIRANG PUR Village : Niranjan
Water Level (mbgl)
Rainfall (mm)
Time
PreMonsoonWtrLvl
PostMonsoonWtrLvl
AllWtrLvl
PreMonWtrLvlTrend
PostMonWtrLvlTrend
Missing Values
PreMonsoon Water Level Trend: Y = 0.000481X + 7.533979
Post Monsoon Water Level Trend: Y = -0.002133X + 3.135299

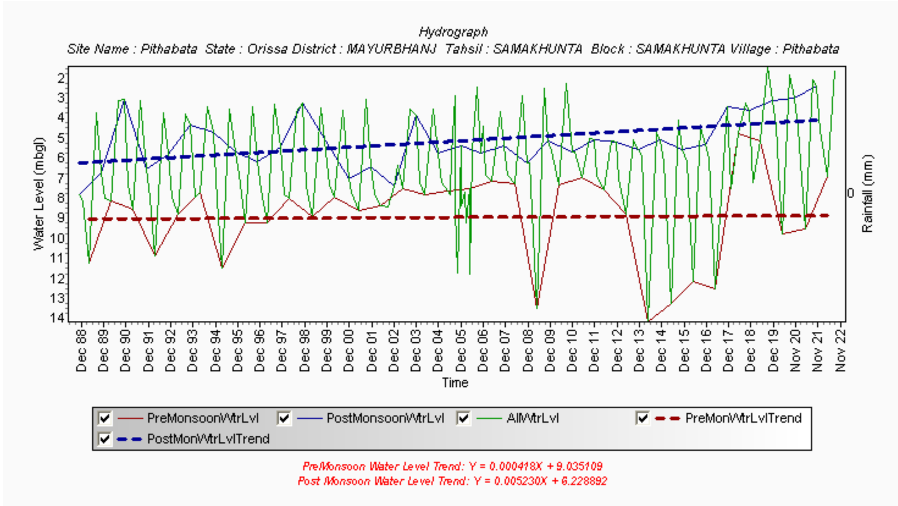

Hydrograph
Site Name : Khiching State : Orissa District : MAYURBHANJ Tahsil : RARUAN Block : RARUAN Village : Khiching
Water Level (mbgl)
Rainfall (mm)
Time
PreMonsoonWtrLvl
PostMonsoonWtrLvl
AllWtrLvl
PreMonWtrLvlTrend
PostMonWtrLvlTrend
Missing Values
PreMonsoon Water Level Trend: Y = 0.000741X + 7.689463
Post Monsoon Water Level Trend: Y = 0.000423X + 3.525625

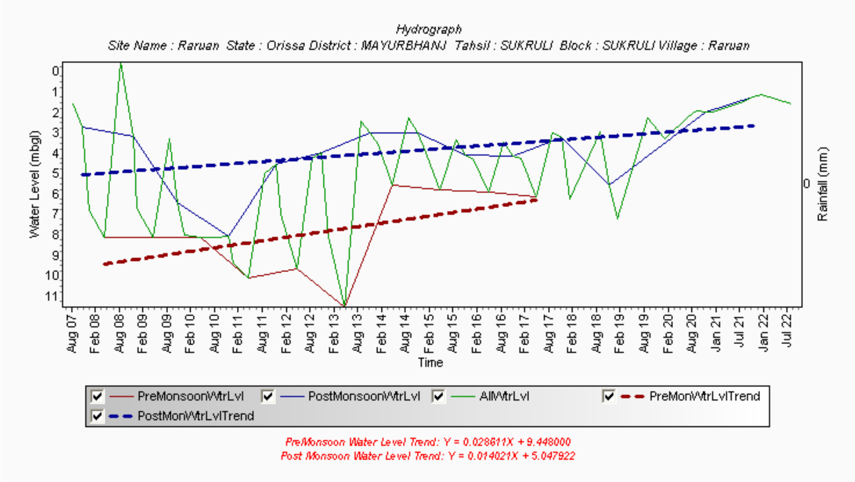

Hydrograph
Site Name : Amarda village State : Orissa District : MAYURBHANJ Tahsil : RASA-GOBINDAPUR Block : RASA-GOBINDAPUR Village : Amarda villag
Water Level (mbgl)
Rainfall (mm)
Time
PreMonsoonWtrLvl
PostMonsoonWtrLvl
AllWtrLvl
PreMonWtrLvlTrend
PostMonWtrLvlTrend
PreMonsoon Water Level Trend: Y = 0.011416X + 8.410068
Post Monsoon Water Level Trend: Y = 0.000224X + 2.483529

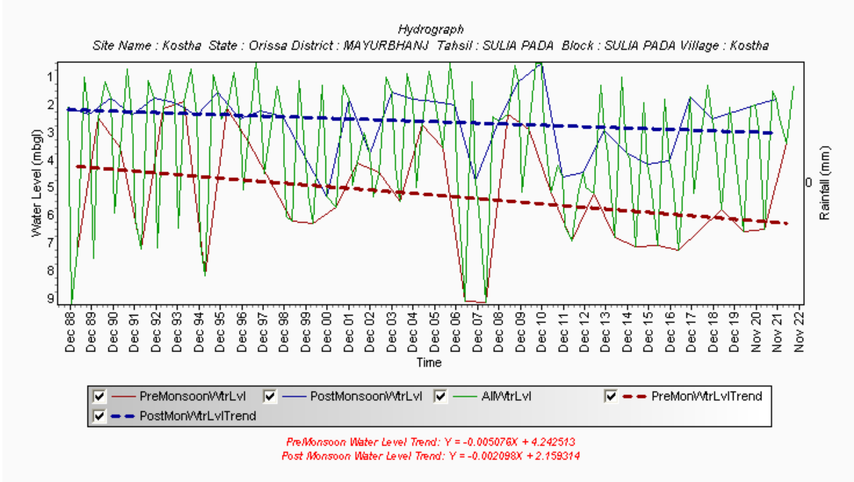

Hydrograph
ite Name : Rashgovindpur State : Orissa District : MAYURBHANJ Tahsil : RASA-GOBINDAPUR Block : RASA-GOBINDAPUR Village : Rashgovindpu
Water Level (mbgl)
Rainfall (mm)
Time
PreMonsoonWtrLvl
PostMonsoonWtrLvl
AllWtrLvl
PreMonWtrLvlTrend
PostMonWtrLvlTrend
PreMonsoon Water Level Trend: Y = 0.008826X + 12.212787
Post Monsoon Water Level Trend: Y = 0.011148X + 8.240224

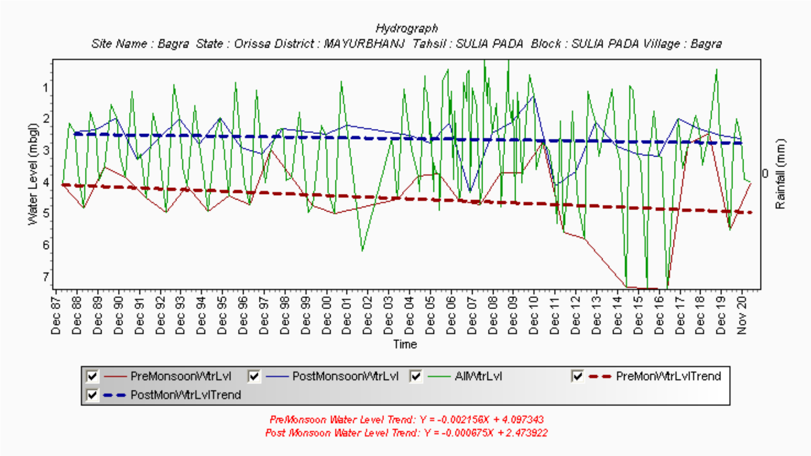


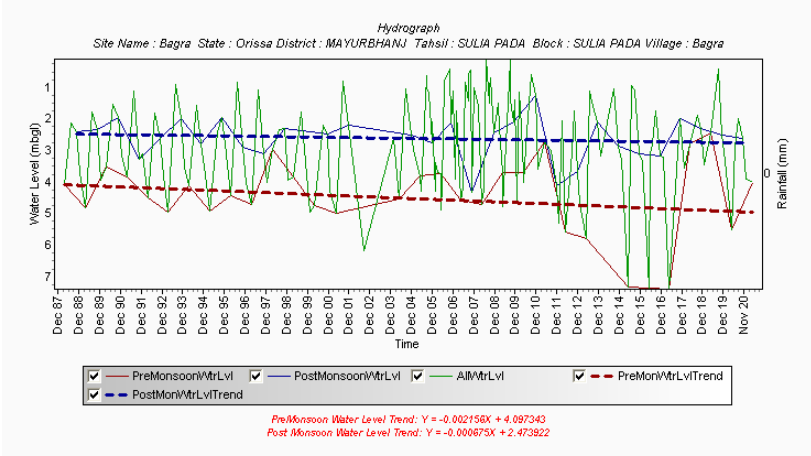

Hydrograph
Site Name : Bangriposi State : Orissa District : MAYURBHANJ Tahsil : SARAS KANA Block : SARAS KANA Village : Bangriposi
Water Level (mbgl)
Rainfall (mm)
Time
PreMonsoonWtrLvl
PostMonsoonWtrLvl
AllWtrLvl
PreMonWtrLvlTrend
PostMonWtrLvlTrend
Missing Values
PreMonsoon Water Level Trend: Y = -0.006246X + 5.284893
Post Monsoon Water Level Trend: Y = -0.002502X + 4.110531

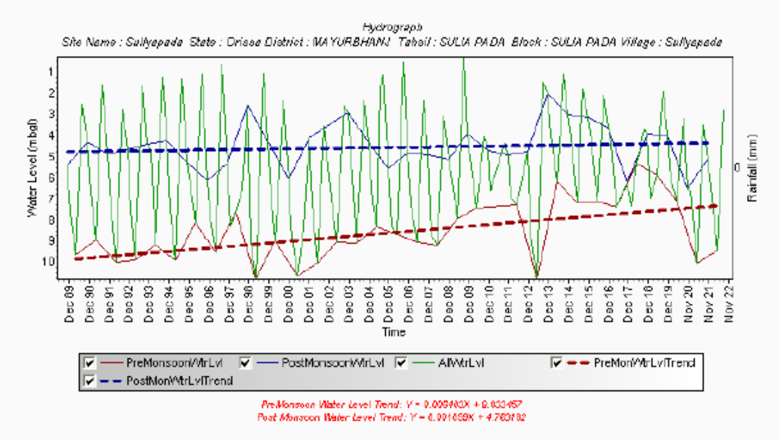

Hydrograph
Site Name : Pithabata State : Orissa District : MAYURBHANJ Tahsil : SAMAKHUNTA Block : SAMAKHUNTA Village : Pithabata
Water Level (mbgl)
Rainfall (mm)
Time
PreMonsoonWtrLvl
PostMonsoonWtrLvl
AllWtrLvl
PreMonWtrLvlTrend
PostMonWtrLvlTrend
PreMonsoon Water Level Trend: Y = 0.000418X + 9.035109
Post Monsoon Water Level Trend: Y = 0.005230X + 6.228892


Hydrograph
Site Name : Raruan State : Orissa District : MAYURBHANJ Tahsil : SUKRULI Block : SUKRULI Village : Raruan
Water Level (mbgl)
Rainfall (mm)
Time
PreMonsoonWtrLvl
PostMonsoonWtrLvl
AllWtrLvl
PreMonWtrLvlTrend
PostMonWtrLvlTrend
PreMonsoon Water Level Trend: Y = 0.028611X + 9.448000
Post Monsoon Water Level Trend: Y = 0.014021X + 5.047922

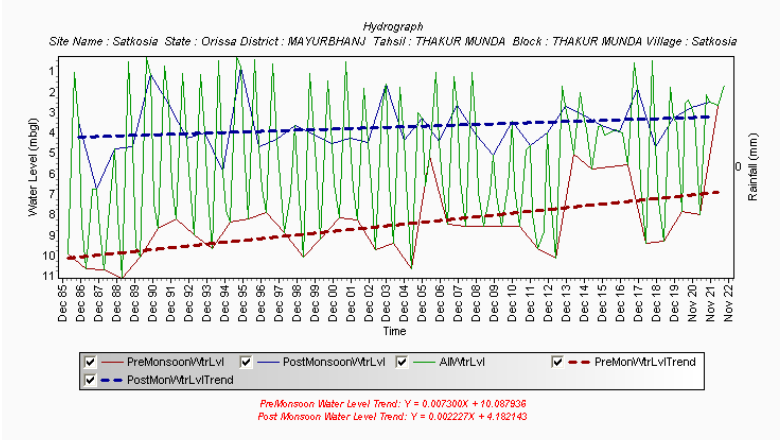

Hydrograph
Site Name : Kostha State : Orissa District : MAYURBHANJ Tahsil : SULIA PADA Block : SULIA PADA Village : Kostha
Water Level (mbgl)
Rainfall (mm)
Time
PreMonsoonWtrLvl
PostMonsoonWtrLvl
AllWtrLvl
PreMonWtrLvlTrend
PostMonWtrLvlTrend
PreMonsoon Water Level Trend: Y = -0.005076X + 4.242513
Post Monsoon Water Level Trend: Y = -0.002098X + 2.159314


Hydrograph
Site Name : Bagra State : Orissa District : MAYURBHANJ Tahsil : SULIA PADA Block : SULIA PADA Village : Bagra
Water Level (mbgl)
Rainfall (mm)
Time
PreMonsoonWtrLvl
PostMonsoonWtrLvl
AllWtrLvl
PreMonWtrLvlTrend
PostMonWtrLvlTrend
PreMonsoon Water Level Trend: Y = -0.002156X + 4.097343
Post Monsoon Water Level Trend: Y = -0.000675X + 2.473922

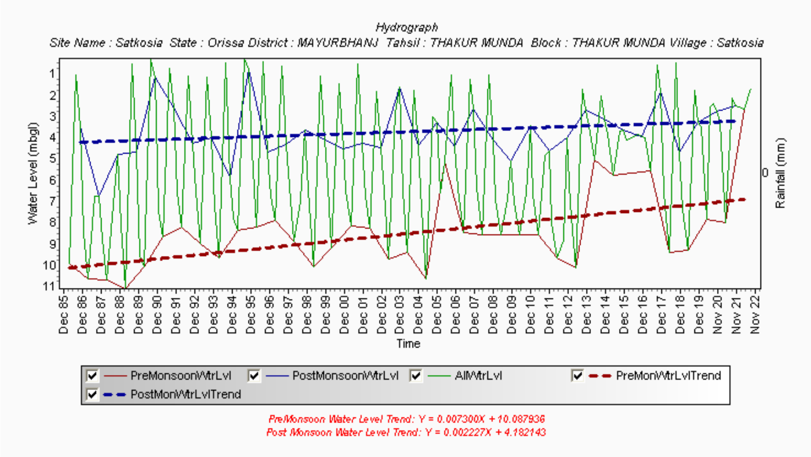

Hydrograph
Site Name : Bagra State : Orissa District : MAYURBHANJ Tahsil : SULIA PADA Block : SULIA PADA Village : Bagra
Water Level (mbgl)
Rainfall (mm)
Time
PreMonsoonWtrLvl
PostMonsoonWtrLvl
AllWtrLvl
PreMonWtrLvlTrend
PostMonWtrLvlTrend
PreMonsoon Water Level Trend: Y = -0.002156X + 4.097343
Post Monsoon Water Level Trend: Y = -0.000675X + 2.473922



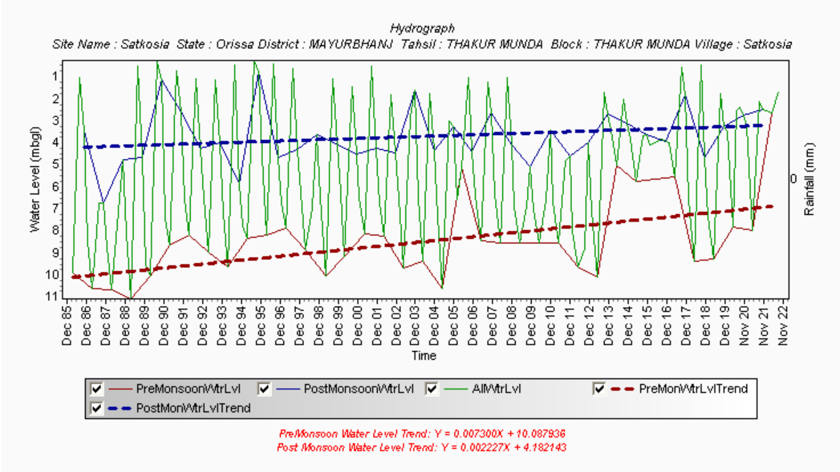
Hydrograph
Site Name : Sullyapada State : Orissa District : MAYURBHANJ Tahsil : SULIA PADA Block : SULIA PADA Village : Sullyapada
Water Level (mbgl)
Rainfall (mm)
Time
PreMonsoonWtrLvl
PostMonsoonWtrLvl
AllWtrLvl
PreMonWtrLvlTrend
PostMonWtrLvlTrend
PreMonsoon Water Level Trend: Y = 0.006403X + 9.933457
Post Monsoon Water Level Trend: Y = 0.001659X + 4.763182



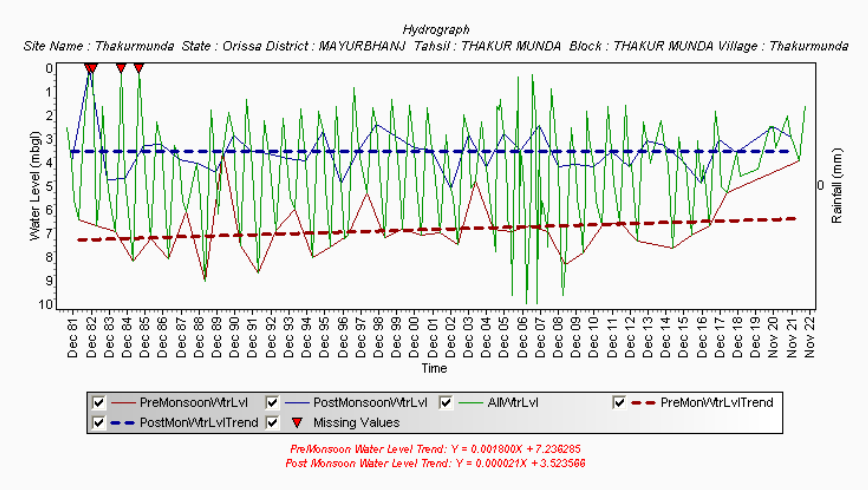
Hydrograph
Site Name : Satkosia State : Orissa District : MAYURBHANJ Tahsil : THAKUR MUNDA Block : THAKUR MUNDA Village : Satkosia
Water Level (mbgl)
Rainfall (mm)
Time
PreMonsoonWtrLvl
PostMonsoonWtrLvl
AllWtrLvl
PreMonWtrLvlTrend
PostMonWtrLvlTrend
PreMonsoon Water Level Trend: Y = 0.007300X + 10.087936
Post Monsoon Water Level Trend: Y = 0.002227X + 4.182143

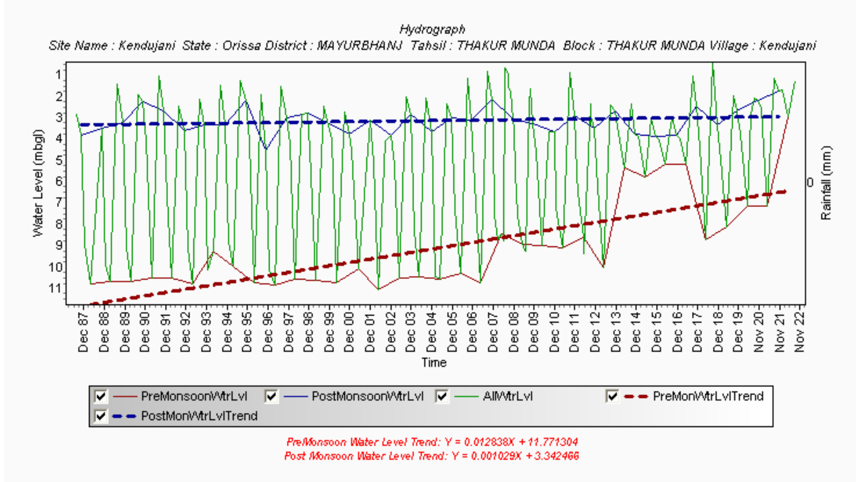


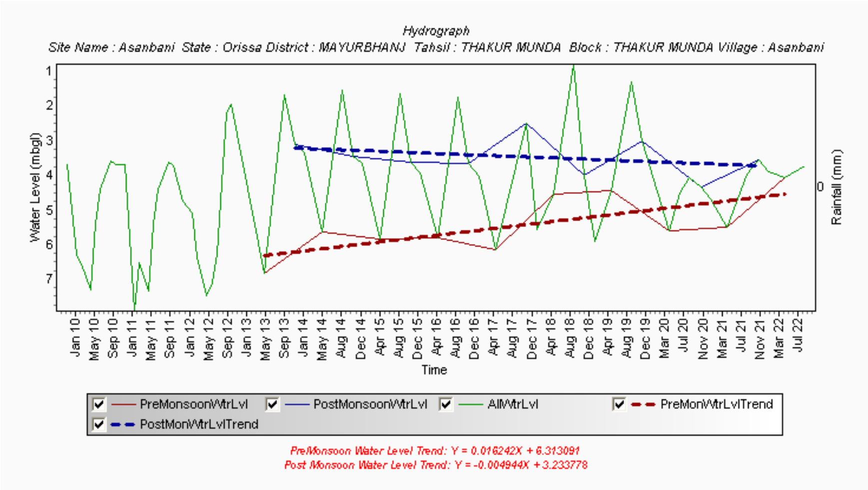
Hydrograph
Site Name : Satkosia State : Orissa District : MAYURBHANJ Tahsil : THAKUR MUNDA Block : THAKUR MUNDA Village : Satkosia
Water Level (mbgl)
Rainfall (mm)
Time
PreMonsoonWtrLvl
PostMonsoonWtrLvl
AllWtrLvl
PreMonWtrLvlTrend
PostMonWtrLvlTrend
PreMonsoon Water Level Trend: Y = 0.007300X + 10.087936
Post Monsoon Water Level Trend: Y = 0.002227X + 4.182143

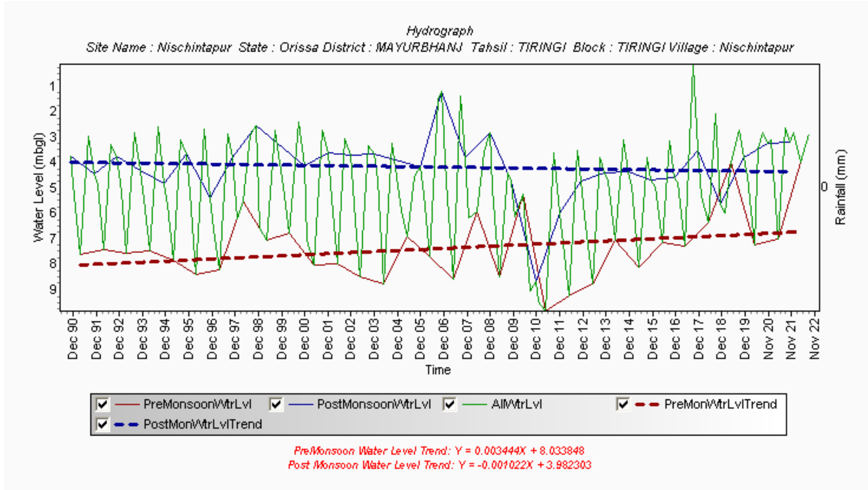


Hydrograph
Site Name : Satkosia State : Orissa District : MAYURBHANJ Tahsil : THAKUR MUNDA Block : THAKUR MUNDA Village : Satkosia
Water Level (mbgl)
Rainfall (mm)
Time
PreMonsoonWtrLvl
PostMonsoonWtrLvl
AllWtrLvl
PreMonWtrLvlTrend
PostMonWtrLvlTrend
PreMonsoon Water Level Trend: Y = 0.007300X + 10.087936
Post Monsoon Water Level Trend: Y = 0.002227X + 4.182143


Hydrograph
Site Name : Thakurmunda State : Orissa District : MAYURBHANJ Tahsil : THAKUR MUNDA Block : THAKUR MUNDA Village : Thakurmunda
Water Level (mbgl)
Rainfall (mm)
Time
PreMonsoonWtrLvl
PostMonsoonWtrLvl
AllWtrLvl
PreMonWtrLvlTrend
PostMonWtrLvlTrend
Missing Values
PreMonsoon Water Level Trend: Y = 0.001800X + 7.236285
Post Monsoon Water Level Trend: Y = 0.000021X + 3.523566


Hydrograph
Site Name : Kendujani State : Orissa District : MAYURBHANJ Tahsil : THAKUR MUNDA Block : THAKUR MUNDA Village : Kendujani
Water Level (mbgl)
Rainfall (mm)
Time
PreMonsoonWtrLvl
PostMonsoonWtrLvl
AllWtrLvl
PreMonWtrLvlTrend
PostMonWtrLvlTrend
PreMonsoon Water Level Trend: Y = 0.012838X + 11.771304
Post Monsoon Water Level Trend: Y = 0.001029X + 3.342466


Hydrograph
Site Name : Asanbani State : Orissa District : MAYURBHANJ Tahsil : THAKUR MUNDA Block : THAKUR MUNDA Village : Asanbani
Water Level (mbgl)
Rainfall (mm)
Time
PreMonsoonWtrLvl
PostMonsoonWtrLvl
AllWtrLvl
PreMonWtrLvlTrend
PostMonWtrLvlTrend
PreMonsoon Water Level Trend: Y = 0.016242X + 6.313091
Post Monsoon Water Level Trend: Y = -0.004944X + 3.233778


Hydrograph
Site Name : Nischintapur State : Orissa District : MAYURBHANJ Tahsil : TIRINGI Block : TIRINGI Village : Nischintapur
Water Level (mbgl)
Rainfall (mm)
Time
PreMonsoonWtrLvl
PostMonsoonWtrLvl
AllWtrLvl
PreMonWtrLvlTrend
PostMonWtrLvlTrend
PreMonsoon Water Level Trend: Y = 0.003444X + 8.033848
Post Monsoon Water Level Trend: Y = -0.001022X + 3.982303

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We are highly indebted to Dr. B. K Sahoo, Scientist E and TS to Regional Director for his constant guidance and supervision throughout the year for the assigned work. His scientific insight was very much helpful in understanding and resolving various queries raised during the study.

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We express our gratitude to all the technical officers and young professionals from CGWB-SER for their valuable suggestion and contributions during the preparations of the report.

We would like to acknowledge all the Central and State Government Organizations who have contributed in providing valuable data required during the study.

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CGWB-NER

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