भारत सरकार
जल शक्ति मंत्रालय
जल संसाधन, नदी विकास व गंगा संरक्षण विभाग
केंद्रीय भूमिजल बोर्ड

GOVERNMENT OF INDIA
MINISTRY OF JALSHAKTI
DEPT OF WATER RESOURCES, RIVER DEVELOPMENT & GANGA REJUVENATION
CENTRAL GROUND WATER BOARD

वार्षिक भूजल पुस्तिका

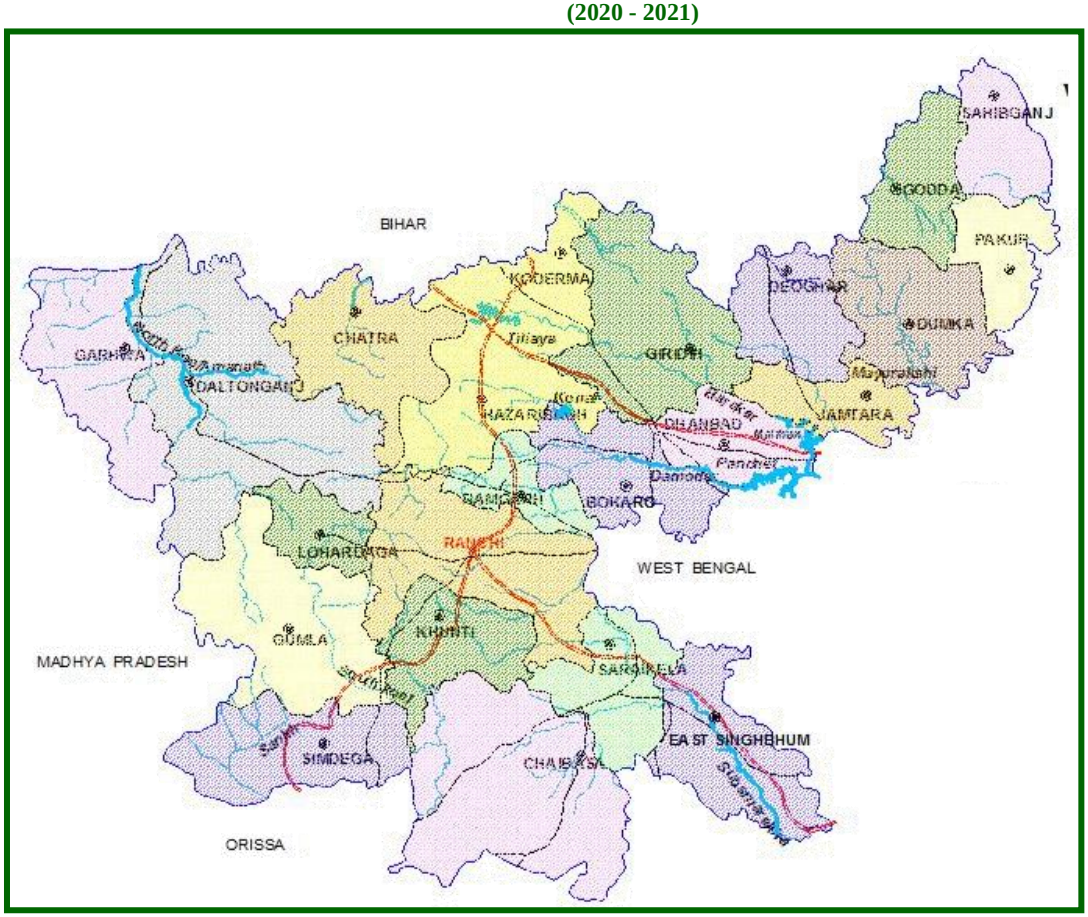
झारखण्ड

(2020 - 2021)

GROUND WATER YEAR BOOK

JHARKHAND

(2020 - 2021)



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January, 2022

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GROUND WATER YEAR BOOK
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FOREWORD

To understand the groundwater situations in diverse hydrogeological environments, changes in various facets of ground water, like variation in water level and water quality are to be monitored. A regular monitoring of ground water regime through a network of observation wells i.e. Ground water Monitoring Well (GWMW) is being carried out by Central Ground Water Board, MER Patna for the state of Jharkhand. Initially the task was taken up with the help of a few GWMW but gradually the numbers of stations were increased, which is now totals 474 GWMW (as on March 2021) which represents all 24 districts and almost all blocks of the state.

This is an attempt to make a presentation in the form of a report for Jharkhand State where the scenarios of water levels for the year 2020-2021 has been produced. The comparisons with decadal mean, seasonal & annual fluctuations, chemical quality of ground water, different maps along with data have been incorporated.

Periodic water level measurements were taken 4 times in a year in 2020-2021, (i.e. in the months of May, 2020, August, 2020, November, 2020 and January, 2021). Water samples from the GWMW were collected during the month of May-2020 to study the changes in hydrochemical regime.

The scientific officers and technical personnel of the state unit office Ranchi of Jharkhand, systematically collected field data from the GWMW as required for monitoring purposes and collected water samples during the pre-monsoon period which were analysed in the chemical lab of this region.

The compilation and analyzing data, its retrieval, evaluation, preparation of suitable maps and their reproduction in the form of present report has been carried out by **Dr.Anukaran kujur, Scientist-B, Mrs Sulekha Bhaya, Scientist-B & Dr Sudhanshu Shekhar, Scientist-D**, in supervision of Shri B.K.Oraon, Scientist-D & Officer-in-Charge, CGWB, SUO, Ranchi.

It is sincerely hoped that the appended write up, maps and basic information in this report would be very useful to the Planners and concerned beneficiaries in Jharkhand State

(A.K.Agrawal)
Regional Director

GROUND WATER YEAR BOOK-JHARKHAND 2020-21

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EXECUTIVE SUMMARY

In Jharkhand state ground water levels of 474 Ground Water Monitoring Wells (GWMW) were monitored four times in the year 2020 - 2021 as a part of regime monitoring of phreatic aquifer in different hydrogeological and agro-climatic zones. The water level monitoring was carried out in the months of May'20, August'20, November'20 and January'2021 and ground water samples were collected in pre-monsoon period (May, 2020) for chemical analysis. In the state the phreatic aquifer consists of weathered mantle and saprolite zone. Over 78% area of the state is underlain by rocks of Chotanagpur Granitic Gneissic Complex (CGGC) suit. Hence, most of the GWMW represented water level in weathered CGGC. A few GWMW represented water level of phreatic aquifer of Gondwana Super Group, Basalts, Limestones, Tertiary Formation and recent alluvium.

The observed water level data had been grouped into four categories viz. 0 -2m, 2-5m, 5-10m and >10m. Thematic maps depicting ground water levels measured in different periods have been prepared. The water levels have been further analysed to study its change with respect to measurement of pre-monsoon period of the same year, previous year water level data of corresponding period, and decadal mean water level data of the corresponding period. The fluctuations have been shown under rise and fall categories. In each category there are three groups viz. 0-2 m, 2-4 m and >4 m. Thematic maps have been prepared for each category.

The depth to water level data of all the Ground Water Monitoring Wells collected during the four measurements are also presented along with the general well information. The water samples were collected during May, 2020 chemical analysis report is under progress.

During pre-monsoon 2020-21, the water level measured in seven districts the ranges between 0.60 to 11.10 mbgl. The minimum and the maximum depth to water levels during pre-monsoon period have been recorded as 0.60 m bgl and 11.10 m bgl at Gumla and Ranchi. In general the water level throughout the State varies in the range of 5 – 10 m bgl. During Post-monsoon season minimum and the maximum depth to water levels have been recorded as 0.90 mbgl and 14.05 m bgl in Pakur and East singhbhum district respectively and in general the water level throughout the State varies in the range of 2 – 5 m bgl.

Fluctuation in water level for November, 2020 compared with May, 2020 shows rise in water level (85%) and (15%) fall for the state of Jharkhand. which is a normal phenomenon due to recharge of ground water, as a result of onset of monsoon and rapid recharge due to moderate to steep slope in undulating tracts. A fall in water level is recorded in 11 wells out of 82 wells of the state which is mainly due to temporal withdrawal of ground water in those areas.

The fluctuation of water level of May, 2020 with respect to decadal mean water level of May 2019 indicate that the fall (5%) as well as rise (61%) in water level in the range of 0 – 2 m shows variation in almost the entire state. However the higher magnitude (2-4m) of fall also recorded in 2wells in one district which may be due to temporal higher withdrawal of ground water on that area.

The fluctuation of water level of November 2020 with respect to decadal mean water level of November 2019 indicate the fall (17%) as well as rise (58%) in water level in the range of 0 – 2 m. However, overall regional fluctuation of water level in the entire state is mainly restricted within 2 m only which is normal phenomenon and no abnormal rise or fall in water level is observed except in few localized well.

GROUND WATER YEAR BOOK OF JHARKHAND

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JHARKHAND AT A GLANCE

Geographical Area (sq. km.)	79714
Population (Census 2011)	3,29,66,238
Population density(Persons/Sqkm)	413
Male Population(Million)	16.93
Female Population(Million)	16.03
Decadal Growth (2001-2011)	22.3%
Literacy Rate	67.63%
Sex ratio	947 females to 1000 males
No. of Districts	24
No. of Blocks	260
Normal Annual Rainfall (mm)	1251.2
Net sown area (in hectare)-2014-15	13,84515
Area under forest (in hectare) -2014-15	2339481
Barren and uncultivated area (in hectare)-2014-15	568009
Cultivable waste land (in hectare)-2014-15	352871
Cropping intensity(%) – 2011	114 %
Annual Replenishable Ground Water Resource in BCM (2020)	6.15
Net ground water availability in BCM (2020)	5.64
Annual Ground Water Draft For Domestic & Industrial use in BCM	0.78
Gross annual ground water draft in BCM (2020)	1.58
Stage of ground water development (in %) (2020)	27.73
Number of over-exploited blocks (As on 2020)	3
Number of critical blocks (As on 2020)	2
Number of semi critical blocks (As on 2020)	10
Number of Safe block (As on March-2020)	245
Ground Water Quality	In general chemical Constituents are within permissible limit except fluoride Contamination in parts of Palamu, Garhwa, Koderma, Pakur Districts and Arsenic contamination in parts of Sahebganj district

GROUND WATER YEAR BOOK OF JHARKHAND

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1.0 INTRODUCTION:

Jharkhand state, was created on 15th November, 2000, consists of districts falling on Chotanagpur Plateau of erstwhile Bihar on the birthday of legendary tribal freedom fighter Birsa Munda. Presently it consists of 24 districts and 260 administrative blocks. The capital of the state is Ranchi. The state spreads over 79714 sq km, between Latitude 21º 55' 00" and 25º 15' 00" and Longitude 83º 15' 00"and 87º 55' 00". The state is bounded by Bihar in the north and by West Bengal in the east. The other two sides, west and south, are bounded by Chhattisgarh and Orissa states respectively (Plate-I).

The population of the state as per 2011 census is 03.30 crore. The population density is 414 person/km^2. The urban population is 7.912 million and the rural population is 25.05 million. The tribal population constitutes about 28% of total population. The state is moderately urbanized with Ranchi as its capital city. Nearly 24% of total population of the state lives in urban areas. Important urban centers are in the state are Jamshedpur, Dhanbad, Hazaribagh, Daltonganj, Dumka and Deoghar.

To acquire a detailed knowledge vis–a–vis scenario of ground water level with respect to behaviour, availability and quality, Ground Water monitoring is essential in time and space. Thus, the data so collected during monitoring gives an important input for ground water management. Periodical monitoring of ground water regime covering different geomorphic, hydrogeological units is an effort to get information on the behaviour of ground water levels and chemical quality of formation water through representative sampling. Monitoring of ground water regime includes:

(a) Monitoring of ground water levels
(b) Monitoring of ground water quality and
(c) Temperature of ground water.

Monitoring is being carried out by establishing suitable *Ground Water Monitoring Well* (GWMW) based on Geomorphology, Geology, Hydrogeology and status of ground water resource of the area with a view to observe the trend of water level and change of chemical quality with time and space. It is also very useful to estimate the dynamic ground water resources and to demarcate the water logged as well as drought prone areas.

2.0 BACKGROUND:

The Central Ground Water Board, State Unit office, Ranchi, is at present monitoring 474 GWMW (Ground water monitoring wells) to delineate the behaviour of ground water level with time and space covering 24 districts in the State of Jharkhand (Plate-I) four times a year, viz January (from 1st to 10th), May (from 20th to 30th), August (from 20th to 30th) and November (from 1st to 10th). The locations of GWMW are shown in Plate - II.

The district-wise status of GWMW in Jharkhand during the period from May, 2020 to January, 2021 is given in Table 1. The district-wise water level data of GWMW for the period May, 2020, August, 2020, November, 2020 and January, 2021 are given in Annexure- I. The Trend of ground water level data (2011 to 2020) is presented in Annexure-II. The results of chemical analysis of water samples collected during May, 2020 and analytical data is under progress.

3.0 GEOLOGY AND HYDROGEOLOGY:

The generalized geological succession of Jharkhand state is given Table 1 - Generalized geological succession of Jharkhand state.

Table 1. General Stratigraphic sequences of geological formations in Jharkhand State

Age	Formation	Broad Lithology
Quaternary	Alluvial deposits	Sand, clay, silt and occasional gravel
Tertiary	Dhalbhumgarh Gravel beds	Sandstone, conglomerate, clay-stone, gravel
Upper Jurassic to Lower Cretaceous	Rajmahal Volcanics	Basalt flows with inter-trappean sedimentary beds
Upper Jurassic to Carboniferous	Gondwana Supergroup	Sandstone, shale, clay, conglomerate with coal beds
Lower Cambrian to Proterozoic	Vindhyan Supergroup	Sandstone, dolomite, chart, shale *etc*.
Proterozoic	Rocks of Singhbhum-Greenstone-Granite domain, basic volcanics and Chhotanagpur Gneiss Granulite Complex including BMB	Granites, granite-gneiss, schists, phyllites, dolomites, basic and ultrabasic lavas, amphibolites
Archaean	Older Metamorphic Gneiss, Older Metamorphic Tonalite Gneiss	Gneiss, schists, arenites, amphibolites

GRANITE - GNEISS, SCHIST, PHYLLITE, AND OTHER ROCKS BELONGING TO CGGC

It covers nearly 85 % of the geographical area of the state. The phreatic aquifer in this formation consists of weathered mantle and underlying secondary porosities like fractures, joints and fissures. In general, the thickness of weathered zone varies between 10 and 25 m, however in localized patches it is > 35 m. The weathered zone is the main repository of ground water. Exploratory wells of CGWB reveal that the fractures underlying the weathered zones form the potential aquifer. The fracture zones (generally beyond 100 m depth) are exploited particularly in urban areas. In general 2-5 sets of fractures have been encountered within 150 m bgl. In a few wells, fractures have been encountered beyond 150 m depth. The ground water occurs under semi-confined to confined condition in the fractures situated at a deeper level. In this formation discharge from negligible to 30 lps has been recorded from the bore wells.

VINDHYAN SUPERGROUP

The rocks of this group are exposed in Palamu and Garhwa districts over a limited aerial extent, in the south of the river Son. The sandstones are hard and compact. The ground water occurs within the secondary porosities like fractures and joints. The fractured sandstone has good ground water potential in comparison to the shale. The ground water occurs under unconfined condition in weathered zone. The yield potential of sandstone is poorer than granite gneiss.

VOLCANIC ROCKS

The volcanic rocks occur mainly in the northeastern part of the state in Sahebganj, Pakur, Dumka and Godda districts as Rajmahal Traps and in southeastern part of the state in East & West Singhbhum, and Saraikela districts as other volcanics. The Rajmahal trap is a series of basaltic flows horizontally disposed. In an individual flow, the lower part is massive and the upper part is vesicular. In some cases, vesicles are filled with secondary material. Partially filled interconnected vesicles form the potential aquifers. Thin inter-trappean beds are also observed between the flows. The ground water occurs under unconfined conditions in upper vesicular flows, which are exposed generally at the ground level. In the vesicular layers disposed at deeper levels the ground water occurs under semi-confined to confined condition.

GONDWANA SUPERGROUP

The Gondwana Super Group ranging in age from Upper Carboniferous to Cretaceous is considered as semi-consolidated formation. Ground water occurs within inter-granular space as well as within the secondary porosities like fractures and joints. Rocks of this unit are exposed as patches in the districts of Hazaribagh, Dhanbad, Giridih, Bokaro, Ranchi, Dumka, Jamtara, Latehar, Godda and Garhwa districts. The sandstones form repository of ground water. The exploratory drilling of CGWB and other agencies indicate that ground water occur in semi-confined to confined condition

in aquifers situated at deeper level, and under unconfined condition at shallow level. At few places, the piezometric head rises above the ground level to give rise to auto flow condition.

LATERITES AND TERTIARY SEDIMENTS

The Dhalbhumgarh Formation of Tertiary age occur in Chakulia- Bahragora-Dhalbhumgarh tract of East Singhbhum district. Exploration to a depth of 120 m indicates presence of 2 to 4 sedimentary layers. Laterite formations also occur as cappings in some parts of the state. These sedimentary layers are repository of ground water, which occurs under unconfined condition in aquifers disposed at shallow level and under confined to semi-confined condition in aquifers situated at deeper levels.

YOUNGER ALLUVIUM

The Younger Alluvium deposits are confined mainly to the bordering area of the state and occur in patches in the districts of Godda, Sahebganj and Pakur in the northeast and in Latehar, Palamu, Deoghar and Garhwa districts. In the bordering areas alluvial patches is extension of the Gangetic Plain. There is a patch of alluvial deposit in Ranchi district also. The ground water occurs under unconfined condition in aquifer disposed at shallow level. The depth of dug wells ranges between 10 –15 m in general while the depth of shallow tube well ranges between 20 - 30 m. The hydrogeological map & Geological map of Jharkhand is given in Plate III & IV.

4.0 GROUND WATER SCENARIO

4.1 DEPTH TO WATER LEVELS IN JHARKHAND DURING 2020 - 2021

May 2020

Water levels during May, 2020 were monitored from 91 wells (out of 474 existing wells). The district-wise status of distribution of Ground Water Monitoring Wells with different ranges of depth to water level is presented in *Table-2*

The minimum and the maximum depth to water levels have been recorded as 0.60 m bgl in Gumla district and 11.10 m bgl in Ranchi district. In general the water level throughout the State varies in the range of 5 – 10 m bgl and has been observed in the 47 wells (51%) out of 91 analysed wells. Secondly, water level >10 m bgl has been observed in the 8 wells (9%). The water level in the range of 2– 5 m bgl has been observed in the 29 wells (32%). The water level below 2 m has been observed only in 7 wells, out of which 3 wells located in Ranchi 2 well in Gumla 1 well in Bokaro and 1 well in Hazaribagh districts.

August 2020

Water levels during August, 2020 were monitored from 109 Dug wells. The district-wise status of distribution of Ground Water Monitoring Wells with different ranges of depth to water level is presented in Table 3**.**

The minimum and the maximum depth to water levels have been recorded as 0.20 m bgl in Hazaribagh district and 08.50m bgl in Gumla and Hazaribagh District. About 48% of wells have water level ranging between 0-2 mbgl. In general the water level in six districts in the State varies in the range of 0-2 (48%) m bgl from 109 analysed wells. Secondly, the water level in the range of 5 – 10 m bgl has been observed in the 11 % of the wells. Water level >10m bgl has not been observed in districts.

November 2020

A total of 279 GWMW has been monitored during post-monsoon period in November 2020, five groupings were made based on the range of water level data viz. 0-2, 2-5, 5-10, 10-20 and 20-40 m bgl. The district-wise status of distribution of network hydrograph stations with different ranges of depth to water level is presented *in Table 4.*

Minimum and the maximum depth to water levels have been recorded as 0.32 m bgl and 14.05 m bgl in Ranchi and Purbi_Singhbhum district respectively. Out of 279 wells 171 (61%) of GWMW, water level ranges 2 - 5 m bgl which covers almost entire Jharkhand State. The water level in the range of 5-10 m bgl has been observed in the 44 wells (15%).Ground water level of 0 – 2 m bgl depth range has been observed only in 61 wells (22%) at different locations. Only 3 wells (1%) have shown water level more than 10 m bgl**. (**Plate V).

January 2021

To study the water levels of recession period data were collected during January, 2021 from 236 wells. The district-wise status of distribution of network hydrograph stations with different ranges of depth to water level is presented *in Table 5.*

The minimum and the maximum depth to water levels in the State have been recorded 1.20 m bgl in Gumla district and 14.05 m bgl in Purbi-Singhbhum district. The water level in the range of 2 - 5 m bgl has been observed in the 96 wells (41%) covered almost entire State. And 5-10 m ranges in 112 wells about 47% . Water level range from 10 to 20 m bgl has been observed. 8 wells about 3% . The water level below 2 m has been observed in 20 wells Plate VI.

4.2 SCENARIO OF ANNUAL FLUCTUATIONS IN JHARKHAND DURING 2019-20 TO 2020-21

The annual fluctuation in water levels for the periods of (1) May 2019 and May 2020, (2) August 2019 and August 2020, (3) November 2019 and November 2020 and (4) January 2020 and January 2021 have been analysed to study the net status of ground water conditions during the previous and current year.

May 2019 & May 2020

The annual fluctuation in water level between May, 2019 and May, 2020 indicates the net status of ground water condition during the previous year and current pre-monsoon measurement. The district wise statement of frequency of distribution of ground water monitoring wells falling in different ranges of water level fluctuation is presented in *Table-6.*

Only Seven District in the State water level have been analysed. The major part of the analysed districts show rise in water level (90%) and fall in water level (8%) and (2%) no change. Total 41wells (48%) out of 84 analysed wells, comes under 0-2 m rise zone category, on the other hand 5 wells (6%) show fall within 2 m, which may indicate that the regional fluctuation of the state (54%) is mainly restricted within 2 m. The next higher magnitude of fluctuation is of 2 -4 mbgl rises in water level in the state 27% is observed and 2% fall in some part of the state. The highest magnitude of >4 mbgl rise has been observed in only 13% of wells.

Overall the seven districts in the State is covered under rising and falling zone category (75 and 7 wells out of 84 analysed well), which may indicate the slightly moderate rainfall (2020).

August 2019 and August 2020

The annual fluctuation in water level between Aug, 2019 and Aug, 2020 indicates the status of ground water condition during the previous year and current monsoon measurement The district wise statement of frequency of distribution of network hydrograph stations falling in different ranges of water level fluctuation is presented in Table 7.

A general fall in water level (20%) has been found in major part of the seven district whereas rise in (80%). Water level rise is recorded in 42% of wells and fall in 15% within 2 m, 24% rise and 3% fall within 2-4m and 12% rise and 2% fall has been observed in >4 mbgl.

Overall the seven districts in the State is covered under the category of 80% rise and 20 % fall which may be due to moderate to high rain fall during previous year.

November 2019 And November 2020

The Annual fluctuation in water level between November 2019 and November 2020 indicates the net status of ground water conditions during the previous and current post-monsoon year and the same is presented in Plate VII. The district-wise statement of distribution of network hydrograph stations in different ranges of water level fluctuation is presented in *Table 8.*

The comparison of fluctuation in water level between November 2019 and November 2020 shows fall in 54% GWMW as well as rise in 46% GWMW of the total 248 analysed wells during the period. The major part of the state shows a general fall in water level within 2.00 m. Out of 248 wells fall of water levels are observed, 111 wells (44%) water level ranges 0 - 2m, 2 wells (6%) 2 – 4 m

and 6 wells (2%) > 4 m. 113 wells (46%) wells are observed rise in water level. In which 86 wells (35%) ranges 0-2m, 16 wells (6%) 2-4 m and 6 wells (2%) > 4m during the period.

January 2020 And January 2021

The annual fluctuation in water level between January, 2020 and January, 2021 indicates the status of ground water condition during the previous year and current measurement and the same is presented in Plate VIII. The district wise statement of frequency of distribution of network hydrograph stations falling in different ranges of water level fluctuation is presented in *Table 9.*

The major part of the state shows general fall (61%) and rise (38%) and no change in 1%. in water level. Out of 209 well 60 wells (28%) are observed water level rise 0 - 2 m, 13 wells (6%) 2-4m and 6 wells more than 4m. Fall of water level range is observed in 109 wells (52%) 0-2m, 14 2-4m and 4 wells more than 4m.

4.3 SCENARIO OF SEASONAL FLUCTUATIONS IN JHARKHAND DURING THE GROUND WATER YEAR 2020 – 2021:

An attempt has been made to compare the pre-monsoon water levels of May, 2020 with water levels of August 2020, November 2020 and January 2021 to delineate the impact of rainfall as well as ground water development on ground water regime in the state during the above period.

May 2020 and August 2020

The fluctuation in water level between May 2020 and August 2020 indicates the change in water level from pre-monsoon measurement to monsoon measurement. The district wise statement of frequency distribution of network hydrograph stations falling in different ranges of water level fluctuation is presented in *Table 10.*

During this period only seven district in the state of Jharkhand has been analysed and show a general rise in water level, which is mainly due to recharging of ground water on onset of monsoon from June 2020. However 3 wells show fall in water level which may be mainly due to temporal withdrawal of ground water and less rainfall in those areas.

May 2020 and November 2020

The seasonal fluctuation in water level between May 2020 and November 2020 indicates the change in water level from pre-monsoon measurement to post-monsoon measurement. The district-wise statement of distribution of network hydrograph stations in different ranges of water level fluctuation is presented in *Table 11*.

Fluctuation in water level for November 2020 compared with May 2020 shows rise in water level (85%) for the seven districts in state of Jharkhand. Out of 82 wells analysed, in the tune of 0.00 - 2.00 m (34%), 2.00 - 4.00 m (32%) and above 4 m (30%) during the period, which is a normal

phenomenon due to recharge of ground water, as a result of onset of monsoon and rapid recharge due to moderate to steep slope in undulating tracts. A fall in water level is recorded in 11 wells out of 82 wells of the state which is mainly due to temporal withdrawal of ground water in those areas.

May 2020 and January 2021

The fluctuation in water level between May 2020 and January 2021 indicates the change in water level from pre-monsoon measurement to January measurement. Fluctuation in water level maps for May 2020 and January 2021 have been retrieved from 50 analyzed wells. The district wise statement of frequency distribution of network hydrograph stations falling in different ranges of water level fluctuation is presented in *Table 12.*

During the period the entire state of Jharkhand shows a general rise (38 wells) in water level, in the range of 0.00 to 2.00 m (52%), 2.00 to 4.00 m (18%) and > 4 mbgl (6%) which is mainly due to recharge on ground water for onset monsoon from June 2020 and rainfall during July - October 2020. However, 12 wells of the state shows fall in water level which may be due to temporal withdrawal of ground water at that area.

4.4 SCENARIO OF DECADAL WATER LEVEL FLUCTUATIONS WITH THE GROUND WATER YEAR 2020 – 2021

Decadal Mean and May 2020

Water level fluctuation has been compared the water level data of 89 wells for May Mean (2010-2019) with the depth to water level data May 2020. The district wise statement of frequency distribution of ground water monitoring wells falling in different ranges of water level fluctuation is presented in *Table 13.*

The fall (7%) as well as rise (92%) in water level in the range of 0 – 2 m shows variation in almost the districts in the state. However, the higher magnitude (>4m) of fall not recorded.

Decadal Mean and August 2020

Water level fluctuation has been compared the water level data of 109 wells for May Mean (2010-2019) with the depth to water level data August 2020. with the depth to water level data August 2020. The district wise statement of frequency distribution of network hydrograph stations falling in different ranges of water level fluctuation is presented in *Table 14.*

The rise (84%) as well and fall (16%) in water level in the range of 0 – 2 m shows variation almost in the seven district in the state. Rise in water level in the range of 2 – 4 m bgl is recorded in 24% wells. Fall in water level in the range of 2 – 4 m bgl is recorded in 4% wells.

However, overall regional fluctuation of water level in the entire state is mainly restricted within 2 m only which is normal phenomenon and no abnormal rise or fall in water level is observed except in few localized well. Fall > 2 mbgl may be due to irregularities of rainfall during last 3 to 4 years.

Decadal Mean and November 2020

The fluctuation map of water level between November Mean and November 2020 (Plate IX) has been prepared on the basis of available Mean water level data (276 wells) of November for last 10 years (2010-2019) with the present water level data for Jharkhand. The district-wise statement of distribution of network hydrograph stations in different ranges of water level fluctuation is presented in *Table 15.*

The fluctuation of water level of November 2020 with respect to decadal mean water level of November, 2019 indicate the fall (20%) as well as rise (80%) in water level in the range of 0 – 2 m. Fluctuation in water level 2-4 m has been recorded fall in 2 % of the wells and rise in 15 % of the wells. Fluctuation more than 4m fall 1% wells and 6% rise in water level of wells are recorded.

However, overall regional fluctuation of water level in the entire state is mainly restricted within 2 m only which is normal phenomenon and no abnormal rise or fall in water level is observed except in few localized well.

Decadal Mean and January 2021

Water level fluctuation map (Plate X) has been prepared by comparing the water level data (234 wells) for January Mean (2011-2020) with the depth to water level data January, 2021. The district wise statement of frequency distribution of network hydrograph stations falling in different ranges of water level fluctuation is presented in *Table 16.*

The fluctuation of water level of January, 2021 with respect to decadal mean water level of January, 2020 indicates 38 % fall and 62% rise in the range of 0 – 2 m has been observed in almost entire state. Out of 234 wells analysed 3 % wells have shown fall and 10% wells rise in water level in the range of 2-4m and 5 wells fall and 10 wellsl rise have been shown > 4 mbgl.

However, overall (76%) regional fluctuation of water level in the entire state is mainly restricted within 2 m only which is normal phenomenon and no abnormal rise or fall in water level is observed except in few localized well.

4.5 TREND OF GROUND WATER LEVEL

The Trend of ground water level data is presented **in Annexure-II.**

The observation shows the rising trend of ground water level in 119 wells and falling trend in 80 wells. The trend of ground water level of the entire state is mainly restricted within 0.5 m only which is normal phenomenon and no abnormal rise or fall in water level is observed in the well of the state.

5.0 HYDROCHEMESTRY:

The chemical quality of groundwater is dependent on the source of water and on the course over which it flow. Ground water carries a higher mineral content than surface water due to the slow circulation and longer period of contact with the rocks formation. In order to assess the chemical quality of ground water of phreatic aquifers of Jharkhand state ground water samples have been analysed for major 15 parameters viz. EC, pH, HCO_3, CO_3, Cl, TH, Ca, Mg, K, Na, F, SiO_2, PO_4 and NO_3. The chemical analysis data of ground water samples collected (390) during the period May 2018.

Ground water samples throughout the state found to be slightly alkaline in nature as the pH mostly varies between 6.20-8.60. The quality of ground water in most of part of the state is potable with low mineral contents having electrical conductance varying from 84.20 (recorded at Kudri, Khunti) to 2450 (at Chandankiyari, Bokaro) µS/cm at 25^0c. The samples found to be suitable for drinking and irrigation purposes. Only 3 samples are having electrical conductivity greater than 2000 µS/cm, which can be treated as brackish water. Spatially in major part of the state EC rested in the range of 400-1000 µS/cm. In most of the samples the concentration of chloride is within the desirable limit of drinking water (250 mg/l). Concentration of chloride in ground water >250 mg/l is recorded in 14 number of samples in Dumka, Giridih, Sahibganj, Jamtara, Khunti, Saraikela, Dhanbad, palamau, Hazaribagh, Pakur West singhbhum districts.

Thus it is observed that the quality of ground water in shallow aquifers in the entire state is suitable for drinking, irrigation and industrial purposes except in arsenic & fluoride infested areas.

Table - 1

DISTRICT-WISE STATUS OF NHNS FOR THE STATE OF JHARKHAND FOR 2020 – 2021

Sl. No.	District	No. of GWMW as on March 31.03.2018			No. of GWMW abandoned during the year 2019			No. of GWMW established during the year 2019			No. of GWMW as on 31.03. 2020		
		DW	PZ	Total	DW	PZ	Total	DW	PZ	Total	DW	P Z	Total
1	Bokaro	22	-	22	3	-	-	-		-	19	-	19
2	Chatra	10	-	10	-	-	-	1		-	11	-	11
3	Deoghar	11	-	11	-	-	-	-		-	11	-	11
4	Dhanbad	24	-	24	-	-	-	-		-	24	-	24
5	Dumka	16	-	16	-	-	-	-		-	17	-	17
6	Garhwa	10	-	10	-	-	-	-		-	11	-	11
7	Giridih	17	-	17	-	-	-	-		-	17	-	17
8	Godda	17	-	17	-	-	-	2		-	17	-	12
9	Gumla	15	-	15	-	-	-	-		-	15	-	15
10	Hazaribag	30	-	30	1	-	-	-		-	29	-	29
11	Jamtara	10	-	10	-	-	-	-		-	10	-	10
12	Khunti	36	1	36	-	-	-	-		-	36	1	36
13	Kodarma	7	-	7	-	-	-	-		-	7		8
14	Latehar	11	-	11	-	-	-	1		-	12	-	12
15	Lohardaga	11	-	11	-	-	-	-		-	11	-	11
16	Pakaur	13	-	13	-	-	-	1		-	14	-	14
17	Palamu	19	-	19	-	-	-	-		-	19	-	19
18	W Singhbhum	18	-	18	-	-	-	-		-	18	-	18
19	E Singbhum	31	-	31	-	-	-	-		-	31	-	31
20	Ramgarh	17	4	21	-	-	-	-		-	17	4	21
21	Ranchi	56	17	73	-	3	3	-		-	56	16	72
22	Sahebganj	19	-	19	-	-	-	6		-	24	-	25
23	Saraikela-Kharswan	12	-	12	-	-	-	-		-	12	-	12
24	Simdega	15		15	-	-	-	-		-	15	-	15
	Total	**447**	**22**	**468**	**13**	**-**	**17**	**18**	**0**	**13**	**453**	**21**	**474**

Depth to Water Table
Distribution of Percentage of Observation Wells

2020/May

State : Jharkhand

District	No. of Wells Analysed	Depth to Water Table (mbgl)		No. / Percentage of Wells Showing Depth to Water Table (mbgl) in the Range of					
		Min	Max	0.0 - 2.0	2.0 - 5.0	5.0 - 10.0	10.0 - 20.0	20.0 - 40.0	> 40.0
BOKARO	4	1.08	9.00	1 25.00%	1 25.00%	2 50.00%	0	0	0
GUMLA	14	0.60	8.20	2 14.29%	3 21.43%	9 64.29%	0	0	0
HAZARIBAG	17	1.10	10.45	1 5.88%	6 35.29%	8 47.06%	2 11.76 %	0	0
LOHARDAGA	10	4.60	10.91	0	1 10.00%	6 60.00%	3 30.00 %	0	0
PALAMU	3	7.60	10.60	0	0	2 66.67%	1 33.33 %	0	0
RANCHI	43	1.35	11.10	3 6.98%	18 41.86%	20 46.51%	2 4.65 %	0	0
Total	91	0.60	11.10	7	29	47	8	0	0

Depth to Water Table
Distribution of Percentage of Observation Wells
2020/Aug

State : Jharkhand

District	No. of Wells Analysed	Depth to Water Table (mbgl)		No. / Percentage of Wells Showing Depth to Water Table (mbgl) in the Range of					
		Min	Max	0.0 - 2.0	2.0 - 5.0	5.0 - 10.0	10.0 - 20.0	20.0 - 40.0	> 40.0
BOKARO	10	0.35	8.50	3 30.00%	3 30.00%	4 40.00%	0	0	0
CHATRA	4	0.90	7.75	1 25.00%	1 25.00%	2 50.00%	0	0	0
GUMLA	13	0.20	3.90	5 38.46%	8 61.54%	0	0	0	0
HAZARIBAG	19	0.60	8.00	7 36.84%	11 57.89%	1 5.26%	0	0	0
KODARMA	4	0.26	5.60	1 25.00%	1 25.00%	2 50.00%	0	0	0
LOHARDAGA	10	0.80	6.80	4 40.00%	4 40.00%	2 20.00%	0	0	0
PALAMU	3	1.69	6.75	1 33.33%	1 33.33%	1 33.33%	0	0	0
RANCHI	46	0.40	5.40	31 67.39%	14 30.43%	1 2.17%	0	0	0
Total	109	0.20	8.50	53	43	13	0	0	0

Depth to Water Table
Distribution of Percentage of Observation Wells
2020/Nov

State : Jharkhand

District	No. of Wells Analysed	Depth to Water Table (mbgl)		No. / Percentage of Wells Showing Depth to Water Table (mbgl) in the Range of					
		Min	Max	0.0 - 2.0	2.0 - 5.0	5.0 - 10.0	10.0 - 20.0	20.0 - 40.0	> 40.0
BOKARO	11	1.73	7.78	2 18.18%	6 54.55%	3 27.27%	0	0	0
CHATRA	8	3.50	9.10	0	3 37.50%	5 62.50%	0	0	0
DEOGHAR	5	1.60	3.79	1 20.00%	4 80.00%	0	0	0	0
DHANBAD	11	-0.60	6.65	5 45.45%	5 45.45%	1 9.09%	0	0	0
DUMKA	25	1.40	6.00	1 4.00%	23 92.00%	1 4.00%	0	0	0
GARHWA	6	2.18	6.30	0	4 66.67%	2 33.33%	0	0	0
GIRIDIH	17	1.27	7.50	6 35.29%	9 52.94%	2 11.76%	0	0	0
GODDA	11	1.05	4.66	3 27.27%	8 72.73%	0	0	0	0
GUMLA	22	0.65	6.10	4 18.18%	13 59.09%	5 22.73%	0	0	0
HAZARIBAG	24	1.60	10.20	1 4.17%	19 79.17%	3 12.50%	1 4.17 %	0	0
KODARMA	4	1.90	5.60	1 25.00%	2 50.00%	1 25.00%	0	0	0
LOHARDAGA	10	2.05	6.80	0	7 70.00%	3 30.00%	0	0	0
PAKAUR	11	-0.90	7.18	7 63.64%	2 18.18%	2 18.18%	0	0	0
PALAMU	25	1.50	7.80	2 8.00%	18 72.00%	5 20.00%	0	0	0
PASHCHIMI SING	24	-0.70	7.81	11 45.83%	11 45.83%	2 8.33%	0	0	0
PURBI SINGHBHU	10	0.85	14.05	5 50.00%	2 20.00%	2 20.00%	1 10.00 %	0	0
RANCHI	40	0.32	11.07	7 17.50%	25 62.50%	7 17.50%	1 2.50 %	0	0
SAHIBGANJ	15	-0.73	4.80	5 33.33%	10 66.67%	0	0	0	0
Total	279	-0.90	14.05	61	171	44	3	0	0

Table 4: *District wise categorisation of depth to water level – November, 2020*

Table 5: ***District wise categorisation of depth to water level – January, 2021***

Depth to Water Table
Distribution of Percentage of Observation Wells
2021/Jan

State : Jharkhand

District	No. of Wells Analysed	Depth to Water Table (mbgl)		No. / Percentage of Wells Showing Depth to Water Table (mbgl) in the Range of					
		Min	Max	0.0 - 2.0	2.0 - 5.0	5.0 - 10.0	10.0 - 20.0	20.0 - 40.0	> 40.0
BOKARO	10	2.61	8.65	0	5 50.00%	5 50.00%	0	0	0
CHATRA	8	5.20	10.70	0	0	7 87.50%	1 12.50 %	0	0
DEOGHAR	6	3.85	8.41	0	2 33.33%	4 66.67%	0	0	0
DHANBAD	10	1.82	10.45	2 20.00%	6 60.00%	1 10.00%	1 10.00 %	0	0
DUMKA	24	-0.52	7.25	3 12.50%	6 25.00%	15 62.50%	0	0	0
GARHWA	5	4.10	8.40	0	3 60.00%	2 40.00%	0	0	0
GIRIDIH	8	2.37	7.66	0	4 50.00%	4 50.00%	0	0	0
GODDA	14	-0.67	7.69	2 14.29%	8 57.14%	4 28.57%	0	0	0
GUMLA	22	1.20	7.15	1 4.55%	11 50.00%	10 45.45%	0	0	0
HAZARIBAG	22	-0.82	9.90	8 36.36%	8 36.36%	6 27.27%	0	0	0
KODARMA	5	2.80	11.70	0	2 40.00%	2 40.00%	1 20.00 %	0	0
LOHARDAGA	11	3.50	7.45	0	5 45.45%	6 54.55%	0	0	0
PAKAUR	10	2.45	9.12	0	4 40.00%	6 60.00%	0	0	0
PALAMU	25	2.80	12.40	0	8 32.00%	15 60.00%	2 8.00 %	0	0
PASHCHIMI SING	22	1.85	9.95	1 4.55%	9 40.91%	12 54.55%	0	0	0
PURBI SINGHBHU	10	2.00	14.05	1 10.00%	5 50.00%	2 20.00%	2 20.00 %	0	0
RANCHI	8	1.80	5.70	1 12.50%	4 50.00%	3 37.50%	0	0	0
SAHIBGANJ	16	-0.70	11.50	1 6.25%	6 37.50%	8 50.00%	1 6.25 %	0	0
Total	236	-0.82	14.05	20	96	112	8	0	0

Table 6: ***District wise categorisation of fluctuation (Annual) in water level and frequency Distribution between May, 2019 – May, 2020***

District Wise - Fluctuation and Frequency Distribution From Different Ranges from One Period to Other

From Year: 2019/May - **To Year:** 2020/May

State : Jharkhand

District Name	No. of Wells	Range of Fluctuation (m)				No. of Wells/Percentage Showing Fluctuation						Total No. of Wells	
		Rise		Fall		Rise			Fall			Rise	Fall
		Min	Max	Min	Max	0 to 2	2 to 4	>4	0 to 2	2 to 4	>4		
BOKARO	4	2.10	3.45	-	-	0	4 100.0 %	0	0	0	0	4	0
GUMLA	12	1.05	7.15	-	-	8 66.67%	3 25.00 %	1 8.33%	0	0	0	12	0
HAZARIBAG	14	0.67	8.84	0.05	0.05	4 28.57%	4 28.57 %	4 28.57%	1 7.14%	0	0	12	1
LOHARDAGA	10	0.20	2.53	3.05	3.60	6 60.00%	2 20.00 %	0	0	2 20.00%	0	8	2
PALAMU	3	2.10	2.60	1.75	1.75	0	2 66.67 %	0	1 33.33%	0	0	2	1
RANCHI	41	0.10	5.90	0.60	0.95	23 56.10%	8 19.51 %	6 14.63%	3 7.32%	0	0	37	3
Total	84	2.10	2.53	0.00	3.60	41	23	11	5	2	0	75	7

Table 7: ***District wise categorisation of fluctuation (Annual) in water level and frequency Distribution between August, 2019 – August, 2020***

District Wise - Fluctuation and Frequency Distribution From Different Ranges from One Period to Other

From Year: 2019/Aug - **To Year:** 2020/Aug

State : Jharkhand

District Name	No. of Wells	Range of Fluctuation (m)				No. of Wells/Percentage Showing Fluctuation						Total No. of Wells	
		Rise		Fall		Rise			Fall			Rise	Fall
		Min	Max	Min	Max	0 to 2	2 to 4	>4	0 to 2	2 to 4	>4		
BOKARO	9	1.49	4.15	0.16	2.10	4 44.44%	0	1 11.11%	3 33.33%	1 11.11%	0	5	4
CHATRA	4	2.90	6.20	-	-	0	2 50.00 %	2 50.00%	0	0	0	4	0
GUMLA	13	0.20	4.95	0.55	0.55	5 38.46%	5 38.46 %	2 15.38%	1 7.69%	0	0	12	1
HAZARIBAG	17	0.48	8.49	0.34	4.48	5 29.41%	4 23.53 %	3 17.65%	3 17.65%	0	2 11.76%	12	5
KODARMA	3	0.30	0.74	-	-	3 100.00%	0	0	0	0	0	3	0
LOHARDAGA	10	1.35	6.02	1.70	2.40	4 40.00%	3 30.00 %	1 10.00%	1 10.00%	1 10.00%	0	8	2
PALAMU	3	2.30	8.66	-	-	0	2 66.67 %	1 33.33%	0	0	0	3	0
RANCHI	39	0.05	6.74	0.10	2.05	21 53.85%	8 20.51 %	2 5.13%	7 17.95%	1 2.56%	0	31	8
Total	98	2.90	0.74	0.00	4.48	42	24	12	15	3	2	78	20

District Wise - Fluctuation and Frequency Distribution From Different Ranges from One Period to Other

From Year: 2019/Nov - **To Year:** 2020/Nov

State : Jharkhand

District Name	No. of Wells	Range of Fluctuation (m)				No. of Wells/Percentage Showing Fluctuation						Total No. of Wells	
		Rise		Fall		Rise			Fall			Rise	Fall
		Min	Max	Min	Max	0 to 2	2 to 4	>4	0 to 2	2 to 4	>4		
BOKARO	11	0.13	1.81	0.31	0.90	7 63.64%	0	0	4 36.36%	0	0	7	4
CHATRA	8	0.30	2.70	0.25	4.20	3 37.50%	2 25.00 %	0	2 25.00%	0	1 12.50%	5	3
DEOGHAR	5	0.35	0.85	0.15	0.75	2 40.00%	0	0	3 60.00%	0	0	2	3
DHANBAD	9	0.07	3.19	0.20	0.54	5 55.56%	1 11.11 %	0	2 22.22%	0	0	6	2
DUMKA	23	0.35	3.10	0.15	2.30	5 21.74%	1 4.35 %	0	16 69.57%	1 4.35%	0	6	17
GIRIDIH	16	0.07	3.69	0.03	1.24	3 18.75%	2 12.50 %	0	11 68.75%	0	0	5	11
GODDA	8	0.15	4.06	-	-	5 62.50%	1 12.50 %	1 12.50%	0	0	0	7	0
GUMLA	22	0.15	1.32	0.35	3.30	2 9.09%	0	0	13 59.09%	7 31.82%	0	2	20
HAZARIBAG	20	0.10	6.28	0.13	4.65	5 25.00%	1 5.00 %	2 10.00%	10 50.00%	1 5.00%	1 5.00%	8	12
KODARMA	4	2.10	2.10	0.40	0.68	0	1 25.00 %	0	3 75.00%	0	0	1	3
LOHARDAGA	9	0.05	3.10	0.15	1.20	5 55.56%	2 22.22 %	0	2 22.22%	0	0	7	2
PAKAUR	10	0.06	4.95	0.20	1.20	3 30.00%	0	1 10.00%	6 60.00%	0	0	4	6
PALAMU	23	0.05	7.60	0.35	2.30	11 47.83%	2 8.70 %	3 13.04%	6 26.09%	1 4.35%	0	16	7
PASHCHIMI SINGHBHUM	19	0.15	8.60	0.22	4.91	9 47.37%	2 10.53 %	2 10.53%	4 21.05%	1 5.26%	1 5.26%	13	6
PURBI SINGHBHUM	8	0.20	0.95	0.18	8.15	4 50.00%	0	0	2 25.00%	0	2 25.00%	4	4
RANCHI	39	0.05	0.95	0.10	8.97	13 33.33%	0	0	21 53.85%	4 10.26%	1 2.56%	13	26
SAHIBGANJ	14	0.18	7.05	0.10	2.15	4 28.57%	1 7.14 %	2 14.29%	6 42.86%	1 7.14%	0	7	7
Total	248	2.10	0.85	0.00	8.97	86	16	11	111	16	6	113	133

Table 8: ***District wise categorisation of fluctuation (Annual) in water level and frequency Distribution between November, 2019 – November, 2020***

Table 9: ***District wise categorisation of fluctuation (Annual) in water level and frequency Distribution between January, 2020– January, 2021***

District Wise - Fluctuation and Frequency Distribution From Different Ranges from One Period to Other

From Year: 2020/Jan - **To Year:** 2021/Jan

State : Jharkhand

District Name	No. of Wells	Range of Fluctuation (m)				No. of Wells/Percentage Showing Fluctuation						Total No. of Wells	
		Rise		Fall		Rise			Fall			Rise	Fall
		Min	Max	Min	Max	0 to 2	2 to 4	>4	0 to 2	2 to 4	>4		
BOKARO	7	0.06	0.65	0.14	1.46	3 42.86%	0	0	4 57.14%	0	0	3	4
CHATRA	8	0.35	0.35	0.20	4.10	1 12.50%	0	0	5 62.50%	1 12.50%	1 12.50%	1	7
DEOGHAR	6	-	-	0.10	3.00	0	0	0	4 66.67%	1 16.67%	0	0	5
DHANBAD	8	0.08	0.43	0.07	0.41	6 75.00%	0	0	2 25.00%	0	0	6	2
DUMKA	22	0.10	5.07	0.01	3.23	4 18.18%	1 4.55 %	1 4.55%	15 68.18%	1 4.55%	0	6	16
GARHWA	5	0.04	0.04	0.10	0.90	1 20.00%	0	0	4 80.00%	0	0	1	4
GIRIDIH	8	1.28	2.74	0.28	1.53	3 37.50%	1 12.50 %	0	4 50.00%	0	0	4	4
GODDA	10	1.66	3.95	0.10	0.55	1 10.00%	3 30.00 %	0	5 50.00%	0	0	4	5
GUMLA	22	0.02	0.85	0.35	2.78	5 22.73%	0	0	15 68.18%	2 9.09%	0	5	17
HAZARIBAG	16	0.20	8.50	0.10	2.75	3 18.75%	3 18.75 %	4 25.00%	2 12.50%	3 18.75%	0	10	5
KODARMA	3	1.80	2.40	1.50	1.50	1 33.33%	1 33.33 %	0	1 33.33%	0	0	2	1
LOHARDAGA	11	0.15	1.40	0.22	0.65	5 45.45%	0	0	6 54.55%	0	0	5	6
PAKAUR	10	0.03	0.70	0.20	1.00	3 30.00%	0	0	7 70.00%	0	0	3	7
PALAMU	23	0.10	3.74	0.30	7.96	9 39.13%	4 17.39 %	0	5 21.74%	3 13.04%	2 8.70%	13	10
PASHCHIMI SINGHBHUM	20	0.05	0.50	0.30	5.15	6 30.00%	0	0	12 60.00%	1 5.00%	1 5.00%	6	14
PURBI SINGHBHUM	8	0.05	0.95	0.20	3.50	3 37.50%	0	0	4 50.00%	1 12.50%	0	3	5
RANCHI	7	0.15	0.15	0.45	2.60	1 14.29%	0	0	5 71.43%	1 14.29%	0	1	6
SAHIBGANJ	15	0.05	6.65	0.10	1.95	5 33.33%	0	1 6.67%	9 60.00%	0	0	6	9
Total	209	1.80	0.04	0.01	7.96	60	13	6	109	14	4	79	127

Table 10: ***District wise categorisation of fluctuation (Seasonal) in water level and frequency Distribution, May, 2020 - August, 2020***

District Wise - Fluctuation and Frequency Distribution From Different Ranges from One Period to Other

From Year: 2020/May - **To Year:** 2020/Aug

State : Jharkhand

District Name	No. of Wells	Range of Fluctuation (m)				No. of Wells/Percentage Showing Fluctuation						Total No. of Wells	
		Rise		Fall		Rise			Fall			Rise	Fall
		Min	Max	Min	Max	0 to 2	2 to 4	>4	0 to 2	2 to 4	>4		
BOKARO	4	0.60	1.70	0.12	0.85	2 50.00%	0	0	2 50.00%	0	0	2	2
GUMLA	13	0.40	5.45	-	-	4 30.77%	6 46.15 %	3 23.08%	0	0	0	13	0
HAZARIBAG	16	0.12	7.00	0.17	0.17	5 31.25%	4 25.00 %	6 37.50%	1 6.25%	0	0	15	1
LOHARDAGA	10	2.45	6.55	-	-	0	4 40.00 %	6 60.00%	0	0	0	10	0
PALAMU	3	3.00	6.65	-	-	0	2 66.67 %	1 33.33%	0	0	0	3	0
RANCHI	42	0.15	9.50	-	-	8 19.05%	15 35.71 %	18 42.86%	0	0	0	41	0
Total	88	3.00	1.70			19	31	34	3	0	0	84	3

Table 11: *District wise categorisation of fluctuation (Seasonal) in water level and frequency Distribution, May, 2020 - November, 2020*

District Wise - Fluctuation and Frequency Distribution From Different Ranges from One Period to Other

From Year: 2020/May - **To Year:** 2020/Nov

State : Jharkhand

District Name	No. of Wells	Range of Fluctuation (m)				No. of Wells/Percentage Showing Fluctuation						Total No. of Wells	
		Rise		Fall		Rise			Fall			Rise	Fall
		Min	Max	Min	Max	0 to 2	2 to 4	>4	0 to 2	2 to 4	>4		
BOKARO	4	2.05	2.55	1.09	1.09	0	3 75.00 %	0	1 25.00%	0	0	3	1
GUMLA	14	0.10	4.42	0.05	1.20	6 42.86%	3 21.43 %	1 7.14%	3 21.43%	0	0	10	3
HAZARIBAG	15	0.10	8.30	0.05	1.30	2 13.33%	8 53.33 %	1 6.67%	4 26.67%	0	0	11	4
LOHARDAGA	9	2.00	8.05	-	-	1 11.11%	4 44.44 %	4 44.44%	0	0	0	9	0
PALAMU	3	5.00	6.50	-	-	0	0	3 100.00%	0	0	0	3	0
RANCHI	37	0.18	6.18	0.20	4.17	19 51.35%	9 24.32 %	6 16.22%	1 2.70%	1 2.70%	1 2.70%	34	3
Total	82	5.00	2.55	0.00	4.17	28	27	15	9	1	1	70	11

Table 12: ***District wise categorisation of fluctuation (Seasonal) in water level and frequency Distribution, May, 2020 - January, 2021***

District Wise - Fluctuation and Frequency Distribution From Different Ranges from One Period to Other

From Year: 2020/May - **To Year:** 2021/Jan

State : Jharkhand

District Name	No. of Wells	Range of Fluctuation (m)				No. of Wells/Percentage Showing Fluctuation						Total No. of Wells	
		Rise		Fall		Rise			Fall			Rise	Fall
		Min	Max	Min	Max	0 to 2	2 to 4	>4	0 to 2	2 to 4	>4		
BOKARO	4	0.02	1.27	2.09	2.09	3 75.00%	0	0	0	1 25.00%	0	3	1
GUMLA	14	0.40	2.75	0.60	2.28	8 57.14%	1 7.14 %	0	4 28.57%	1 7.14%	0	9	5
HAZARIBAG	12	0.55	7.91	0.98	2.40	5 41.67%	3 25.00 %	1 8.33%	1 8.33%	2 16.67%	0	9	3
LOHARDAGA	10	0.95	6.95	-	-	6 60.00%	2 20.00 %	2 20.00%	0	0	0	10	0
PALAMU	3	1.20	3.44	-	-	1 33.33%	2 66.67 %	0	0	0	0	3	0
RANCHI	7	0.25	2.35	0.05	4.20	3 42.86%	1 14.29 %	0	2 28.57%	0	1 14.29%	4	3
Total	50	1.20	1.27	0.00	4.20	26	9	3	7	4	1	38	12

Table 13: ***District wise categorisation of fluctuation (Decadal) in water level and frequency Distribution between May (2010-2019 mean) - May, 2020***

District Wise - Fluctuation of Water Level with Mean and Selected Period

10 Years Mean (2010 May - 2019 May) - 2020/May

State : Jharkhand

District Name	No. of Wells	Range of Fluctuation				No. of Wells/Percentage Showing Fluctuation						Total No. of Wells	
		Rise (m)		Fall (m)		Rise (m)			Fall (m)			Rise	Fall
		Min	Max	Min	Max	0 to 2	2 to 4	>4	0 to 2	2 to 4	>4		
BOKARO	4	1.67	6.32	-	-	3 75.00 %	0	1 25.00%	0	0	0	4	0
GUMLA	14	0.01	4.67	-	-	11 78.57 %	2 14.29%	1 7.14%	0	0	0	14	0
HAZARIBAG	16	0.23	5.37	0.30	0.30	10 62.50 %	2 12.50%	3 18.75%	1 6.25%	0	0	15	1
LOHARDAGA	10	0.02	2.02	3.83	3.91	7 70.00 %	1 10.00%	0	0	2 20.00 %	0	8	2
PALAMU	3	0.33	1.45	-	-	3 100.0 %	0	0	0	0	0	3	0
RANCHI	42	0.07	4.90	0.16	0.90	21 50.00 %	12 28.57%	5 11.90%	4 9.52%	0	0	38	4
Total	89	1.45	1.67	0.00	3.91	55	17	10	5	2	0	82	7

Table 14: ***District wise categorisation of fluctuation (Decadal) in water level and frequency Distribution between August (2010-2019 mean) - August, 2020***

District Wise - Fluctuation of Water Level with Mean and Selected Period

10 Years Mean (2010 Aug - 2019 Aug) - 2020/Aug

State : Jharkhand

District Name	No. of Wells	Range of Fluctuation				No. of Wells/Percentage Showing Fluctuation						Total No. of Wells	
		Rise (m)		Fall (m)		Rise (m)			Fall (m)			Rise	Fall
		Min	Max	Min	Max	0 to 2	2 to 4	>4	0 to 2	2 to 4	>4		
BOKARO	10	0.49	1.39	0.23	2.93	5 50.00 %	0	0	4 40.00%	1 10.00 %	0	5	5
CHATRA	4	0.62	3.70	-	-	1 25.00 %	3 75.00%	0	0	0	0	4	0
GUMLA	13	0.24	3.13	-	-	10 76.92 %	3 23.08%	0	0	0	0	13	0
HAZARIBAG	19	0.07	3.29	0.00	2.79	8 42.11 %	5 26.32%	0	5 26.32%	1 5.26 %	0	13	6
KODARMA	4	0.96	0.98	0.10	0.99	2 50.00 %	0	0	2 50.00%	0	0	2	2
LOHARDAGA	10	0.58	2.77	2.57	3.26	7 70.00 %	1 10.00%	0	0	2 20.00 %	0	8	2
PALAMU	3	0.43	2.80	-	-	2 66.67 %	1 33.33%	0	0	0	0	3	0
RANCHI	46	0.12	3.99	0.23	0.58	29 63.04 %	14 30.43%	0	3 6.52%	0	0	43	3
Total	109	0.98	0.96	0.00	3.26	64	27	0	14	4	0	91	18

District Wise - Fluctuation of Water Level with Mean and Selected Period

10 Years Mean (2010 Nov - 2019 Nov) - 2020/Nov

State : Jharkhand

District Name	No. of Wells	Range of Fluctuation				No. of Wells/Percentage Showing Fluctuation						Total No. of Wells	
		Rise (m)		Fall (m)		Rise (m)			Fall (m)			Rise	Fall
		Min	Max	Min	Max	0 to 2	2 to 4	>4	0 to 2	2 to 4	>4		
BOKARO	11	0.37	2.31	-	-	10 90.91 %	1 9.09%	0	0	0	0	11	0
CHATRA	8	0.13	2.71	0.38	1.80	3 37.50 %	3 37.50%	0	2 25.00%	0	0	6	2
DEOGHAR	5	1.66	3.68	-	-	3 60.00 %	2 40.00%	0	0	0	0	5	0
DHANBAD	11	0.19	5.19	0.38	0.38	7 63.64 %	2 18.18%	1 9.09%	1 9.09%	0	0	10	1
DUMKA	25	0.17	3.62	0.32	0.51	18 72.00 %	5 20.00%	0	2 8.00%	0	0	23	2
GARHWA	6	0.76	2.73	-	-	3 50.00 %	3 50.00%	0	0	0	0	6	0
GIRIDIH	17	0.13	4.21	0.05	0.18	11 64.71 %	3 17.65%	1 5.88%	2 11.76%	0	0	15	2
GODDA	11	0.57	5.09	-	-	4 36.36 %	3 27.27%	4 36.36%	0	0	0	11	0
GUMLA	22	0.13	2.08	0.04	2.29	11 50.00 %	1 4.55%	0	9 40.91%	1 4.55 %	0	12	10
HAZARIBAG	24	0.28	4.67	0.11	2.68	12 50.00 %	5 20.83%	1 4.17%	5 20.83%	1 4.17 %	0	18	6
KODARMA	4	0.39	2.48	-	-	3 75.00 %	1 25.00%	0	0	0	0	4	0
LOHARDAGA	9	0.14	1.76	-	-	9 100.0 %	0	0	0	0	0	9	0
PAKAUR	11	0.50	7.62	0.01	0.36	5 45.45 %	0	2 18.18%	4 36.36%	0	0	7	4
PALAMU	25	0.13	4.85	0.06	1.86	16 64.00 %	5 20.00%	1 4.00%	3 12.00%	0	0	22	3
PASHCHIMI SINGHBHUM	22	0.07	9.01	0.08	3.44	10 45.45 %	3 13.64%	4 18.18%	3 13.64%	2 9.09 %	0	17	5
PURBI SINGHBHUM	10	0.43	2.31	0.94	2.67	5 50.00 %	2 20.00%	0	2 20.00%	1 10.00 %	0	7	3
RANCHI	40	0.01	3.86	0.01	4.38	21 52.50 %	3 7.50%	0	15 37.50%	0	1 2.50%	24	16
SAHIBGANJ	15	0.05	6.75	0.70	0.70	11 73.33 %	0	3 20.00%	1 6.67%	0	0	14	1
Total	276	1.76	1.66	0.00	4.38	162	42	17	49	5	1	221	55

Table 15: ***District wise categorisation of fluctuation (Decadal) in water level and frequency Distribution between November (2010-2019 mean) - November, 2020***

District Wise - Fluctuation of Water Level with Mean and Selected Period

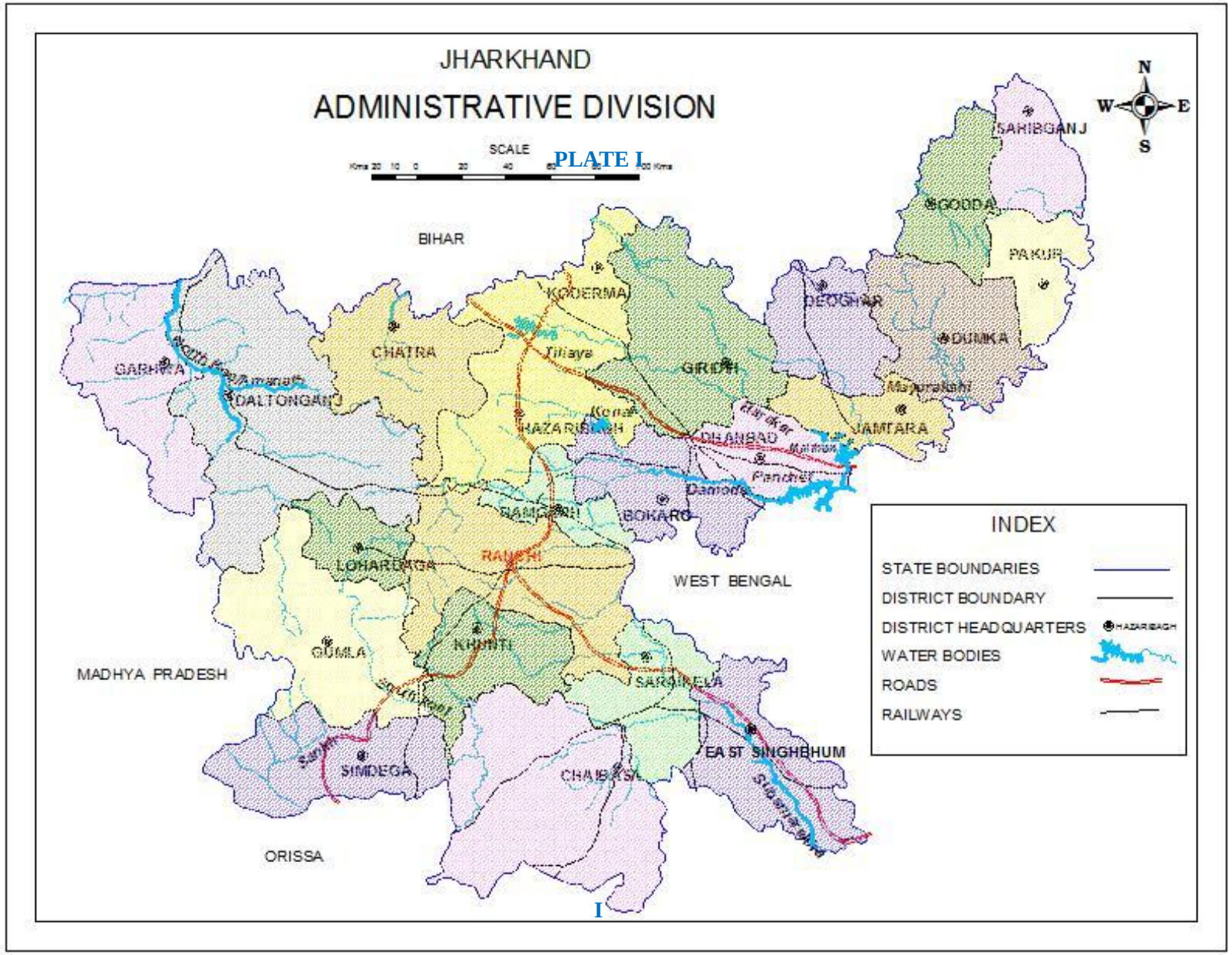
10 Years Mean (2011 Jan - 2020 Jan) - 2021/Jan

State : Jharkhand

District Name	No. of Wells	Range of Fluctuation				No. of Wells/Percentage Showing Fluctuation						Total No. of Wells	
		Rise (m)		Fall (m)		Rise (m)			Fall (m)			Rise	Fall
		Min	Max	Min	Max	0 to 2	2 to 4	>4	0 to 2	2 to 4	>4		
BOKARO	10	0.15	2.26	0.38	1.00	5 50.00 %	1 10.00%	0	4 40.00%	0	0	6	4
CHATRA	8	0.02	1.10	0.14	1.58	5 62.50 %	0	0	3 37.50%	0	0	5	3
DEOGHAR	6	0.38	3.77	2.91	2.91	4 66.67 %	1 16.67%	0	0	1 16.67 %	0	5	1
DHANBAD	9	0.22	2.06	0.01	0.34	6 66.67 %	1 11.11%	0	2 22.22%	0	0	7	2
DUMKA	24	0.23	6.21	0.01	3.04	14 58.33 %	1 4.17%	1 4.17%	6 25.00%	2 8.33 %	0	16	8
GARHWA	5	0.71	1.51	0.16	0.51	3 60.00 %	0	0	2 40.00%	0	0	3	2
GIRIDIH	8	0.15	3.11	0.21	2.51	5 62.50 %	1 12.50%	0	1 12.50%	1 12.50 %	0	6	2
GODDA	13	0.56	4.96	0.02	0.18	2 15.38 %	5 38.46%	1 7.69%	5 38.46%	0	0	8	5
GUMLA	22	0.26	1.62	0.08	1.89	9 40.91 %	0	0	13 59.09%	0	0	9	13
HAZARIBAG	22	0.02	7.33	0.30	1.08	6 27.27 %	6 27.27%	6 27.27%	4 18.18%	0	0	18	4
KODARMA	5	0.13	2.85	0.03	4.77	1 20.00 %	1 20.00%	0	2 40.00%	0	1 20.00%	2	3
LOHARDAGA	11	0.04	1.70	0.07	0.62	8 72.73 %	0	0	3 27.27%	0	0	8	3
PAKAUR	10	0.01	1.25	0.68	4.00	3 30.00 %	0	0	6 60.00%	1 10.00 %	0	3	7
PALAMU	25	0.13	3.43	0.06	4.13	16 64.00 %	2 8.00%	0	5 20.00%	1 4.00 %	1 4.00%	18	7
PASHCHIMI SINGHBHUM	22	0.25	4.09	0.05	4.79	7 31.82 %	2 9.09%	1 4.55%	9 40.91%	1 4.55 %	2 9.09%	10	12
PURBI SINGHBHUM	10	0.26	3.11	0.13	0.79	5 50.00 %	3 30.00%	0	2 20.00%	0	0	8	2
RANCHI	8	0.50	0.95	0.10	1.35	5 62.50 %	0	0	2 25.00%	0	0	5	2
SAHIBGANJ	16	0.19	6.29	0.03	7.27	6 37.50 %	0	1 6.25%	8 50.00%	0	1 6.25%	7	9
Total	234	0.95	0.71	0.01	7.27	110	24	10	77	7	5	144	89

Table 16: ***District wise categorisation of fluctuation (Decadal) in water level and frequency Distribution between January (2011-2020 mean) - January, 2021***

PLATE I


JHARKHAND
ADMINISTRATIVE DIVISION
SCALE
PLATE I
N
W
E
S
BIHAR
SAHIBGANJ
GODDA
PAKUR
KODERMA
DEOGHAR
DUMKA
CHATRA
GIRIDH
GARHWA
DALTONGANJ
HAZARIBAGH
DHANBAD
JAMTARA
BOKARO
RAMGARH
RANCHI
LOHARDAGA
WEST BENGAL
GUMLA
KHUNTI
SARAIKELA
MADHYA PRADESH
SIMDEGA
CHAIBASA
EAST SINGHBHUM
ORISSA
INDEX
STATE BOUNDARIES
DISTRICT BOUNDARY
DISTRICT HEADQUARTERS
HAZARIBAGH
WATER BODIES
ROADS
RAILWAYS

I

PLATE II

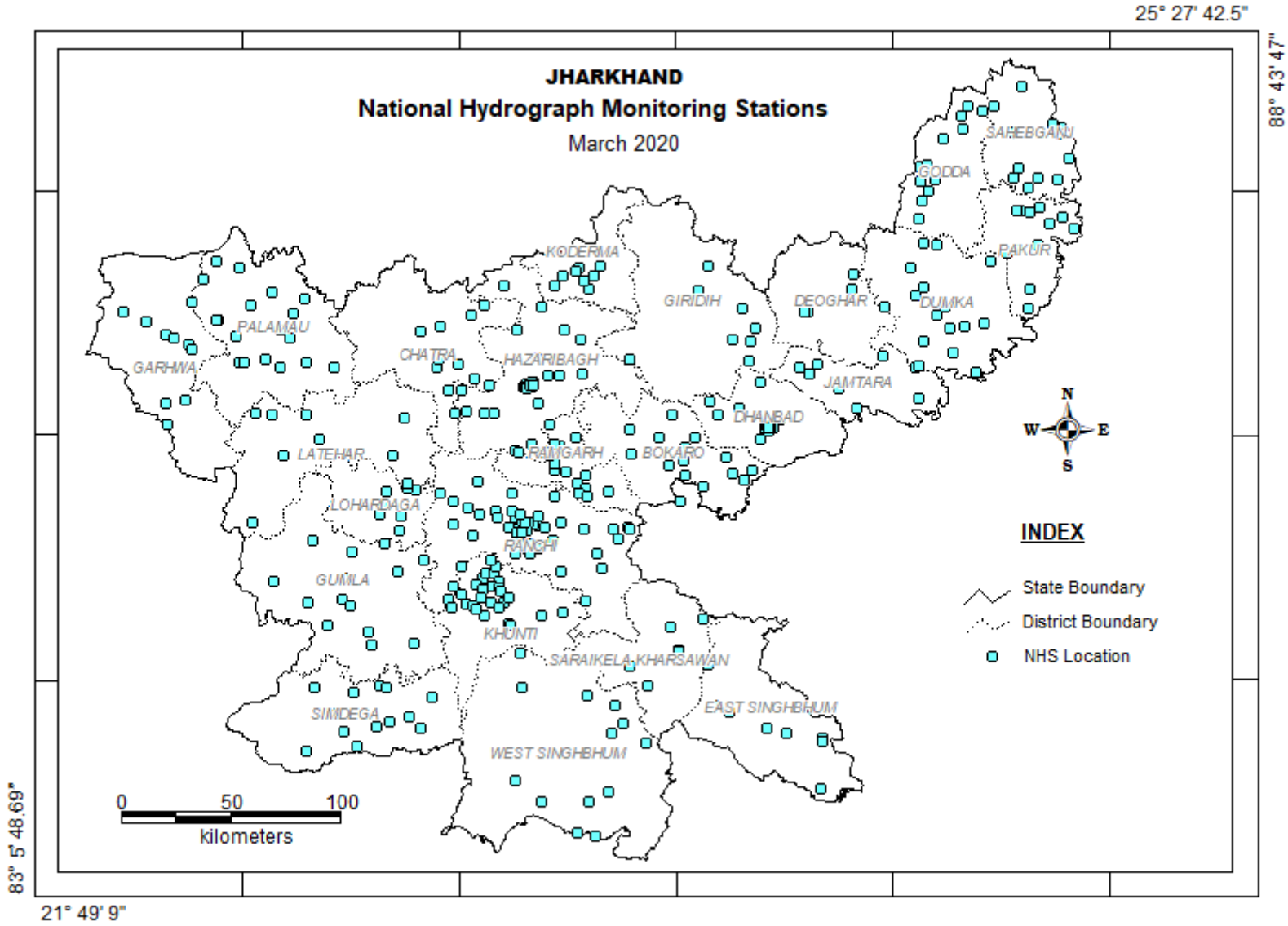
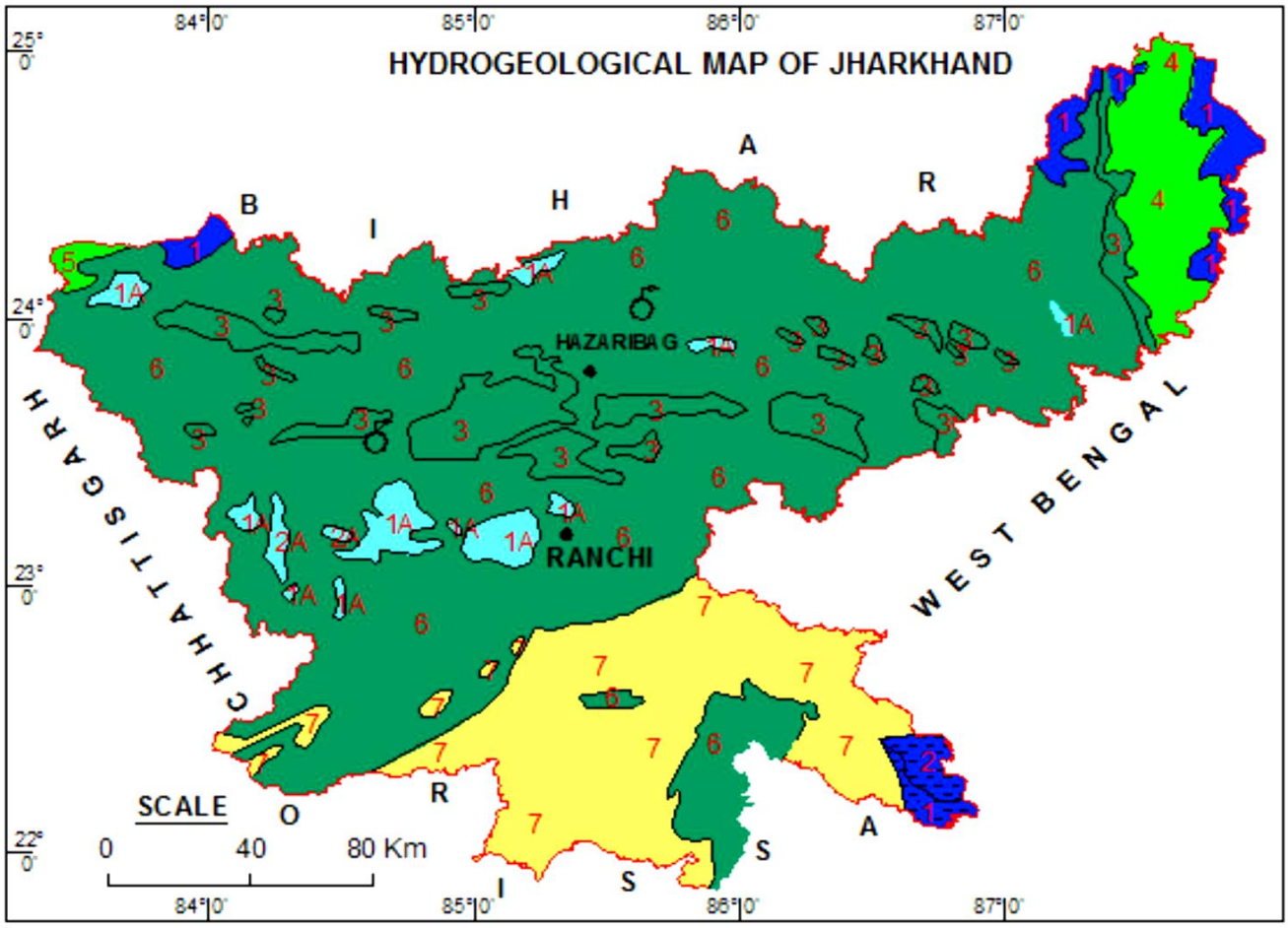

25° 27' 42.5"
88° 43' 47"
83° 5' 48.69"
21° 49' 9"
JHARKHAND
National Hydrograph Monitoring Stations
March 2020
SAHEBGANJ
GODDA
PAKUR
KODERMA
GIRIDIH
DEOGHAR
DUMKA
PALAMAU
CHATRA
HAZARIBAGH
GARHWA
JAMTARA
DHANBAD
LATEHAR
RAMGARH
BOKARO
LOHARDAGA
RANCHI
GUMLA
KHUNTI
SARAIKELA-KHARSAWAN
EAST SINGHBHUM
SIMDEGA
WEST SINGHBHUM
N
W
E
S
INDEX
State Boundary
District Boundary
NHS Location
0
50
100
kilometers

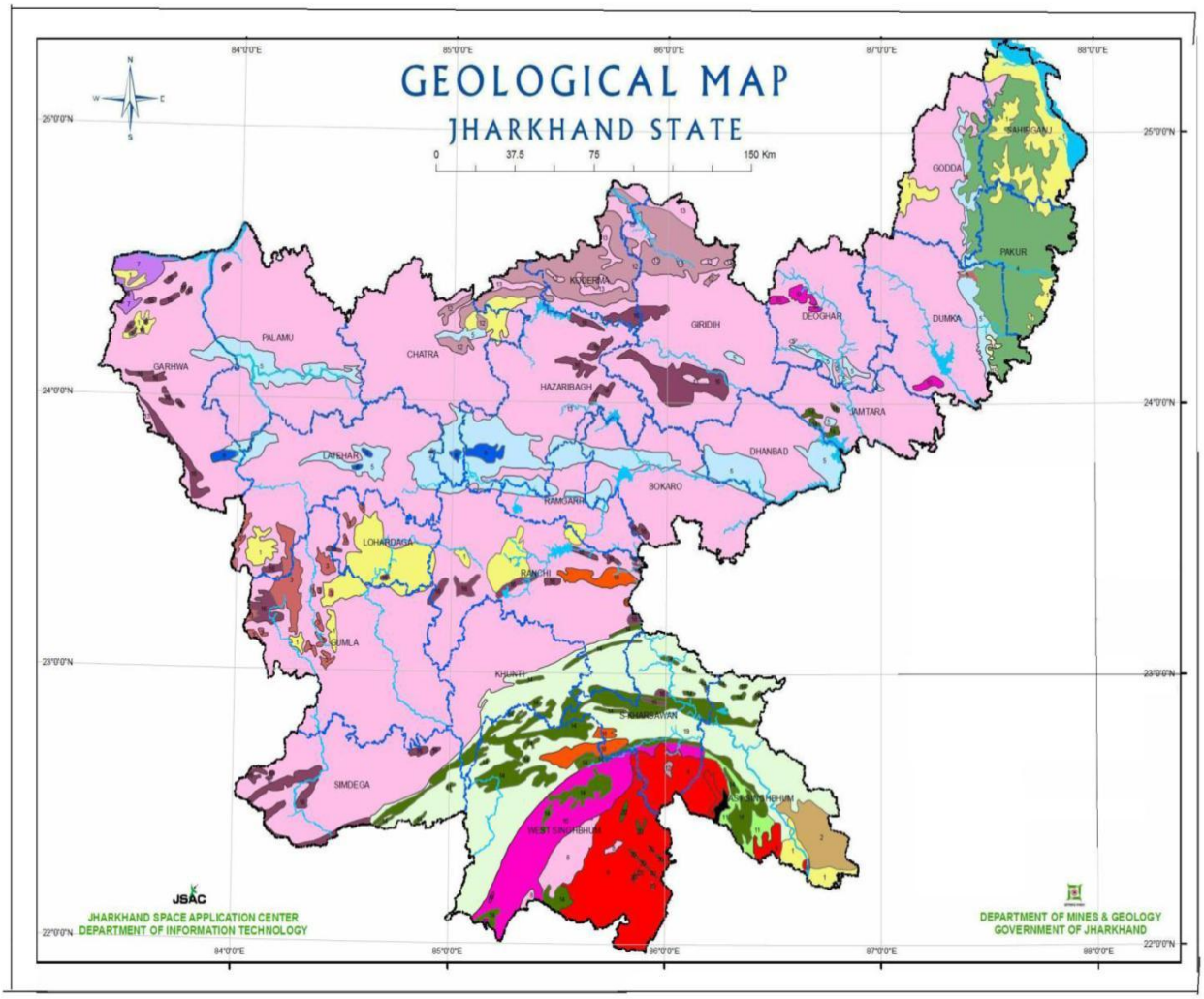
PLATE III



FISSURED & SEMI-CONSOLIDATED FORMATIONS

UNITS	AGE GROUP	FORMATION	COLOUR	LITHOLOGY	GROUN WATER POTENTIAL
1	QUATERNARY	ALLUVIUM		CLAY, SILT, GRAVEL, PEBBLES & CALC	>40 m³/hr
1A	QUATERNARY	ALLUVIUM		CLAY, SILT & SAND	1-10 m³/hr
2	PLEISTOCENE TERTIARY	LATERITES		LATERITES & LITHOMARGE	1-10 m³/hr
2A	PLEISTOCENE TERTIARY	TERTIARY		SAND, SILT, CLAY, PABLE & GRAVEL	10-40 m³/hr
3	CARBONIFEROUS E CRETACEOUS	GONDWANA		CLAY, SILT, GRIT, SANDSTONE & SHALE	1->25 m³/hr
4	L JURASSIC E CRETACEOUS	RAJMAHAL BASALT		BASALT FLOWS WITH INTERTRAPPEANS	1-25 m³/hr
5	PROTEROZOIC E CAMBRIAN	VINDHYAN		QUARTZITE, LIMESTONE, SANDSTONE, DOLOMITE & SHALE	1-25 m³/hr
6	PROTEROZOIC ARCHEAN	CHHOTNAGPUR GNEISSC COMPLEX		GNEISSES & GRANITES	1->25 m³/hr
7	PROTEROZOIC ARCHEAN	VOLCANO-SEDIMENTARY		SCHISTS, PHYLLITES, BASIC & ACIDIC INTRUSIVES	1-15 m³/hr

PLATE IV



INDEX

1, Alluvium, Soil/Boulder Conglomerate, Older Alluvium & Laterite
2, Tertiary Gravels
3, Laterite
4, Rajmahal Trap/Intertrappean Beds/Trap Dykes
5, Lower Gondwana System/Carbonaceous Shale/Sandstone/Coal Seams
6, Upper Godwana System/Sandstone/Red Clay
7, Lower Vindhyan System/Limestone/Shale
8, Kolhan Series/Limestone/Sandstone/Quartzite
9, Singhbhum Granite
10, BHQ/BHJ/Metavolcanics/Metasedimentary
11, Dhanjori Quartzite and Conglomerate
12, Micaschist, Phyllite, Quartzite/Metamorphic of Chhotanagpur
13, Chhotanagpur Gneiss & Granophyre
14, Dhanjori Lava/Dalma Lava/ Basic rocks
15, Sandstone, Shale (Dubrajpur Formation)
16, Basic & Ultrabasic
17, Gabbro -Anorthosite
18, Granite
19, Volcanogenic Meta-sediments and Metasedimentary rocks
20, Newer Dolerite
River/Water Body
District Boundary
State Boundary

PLATE V

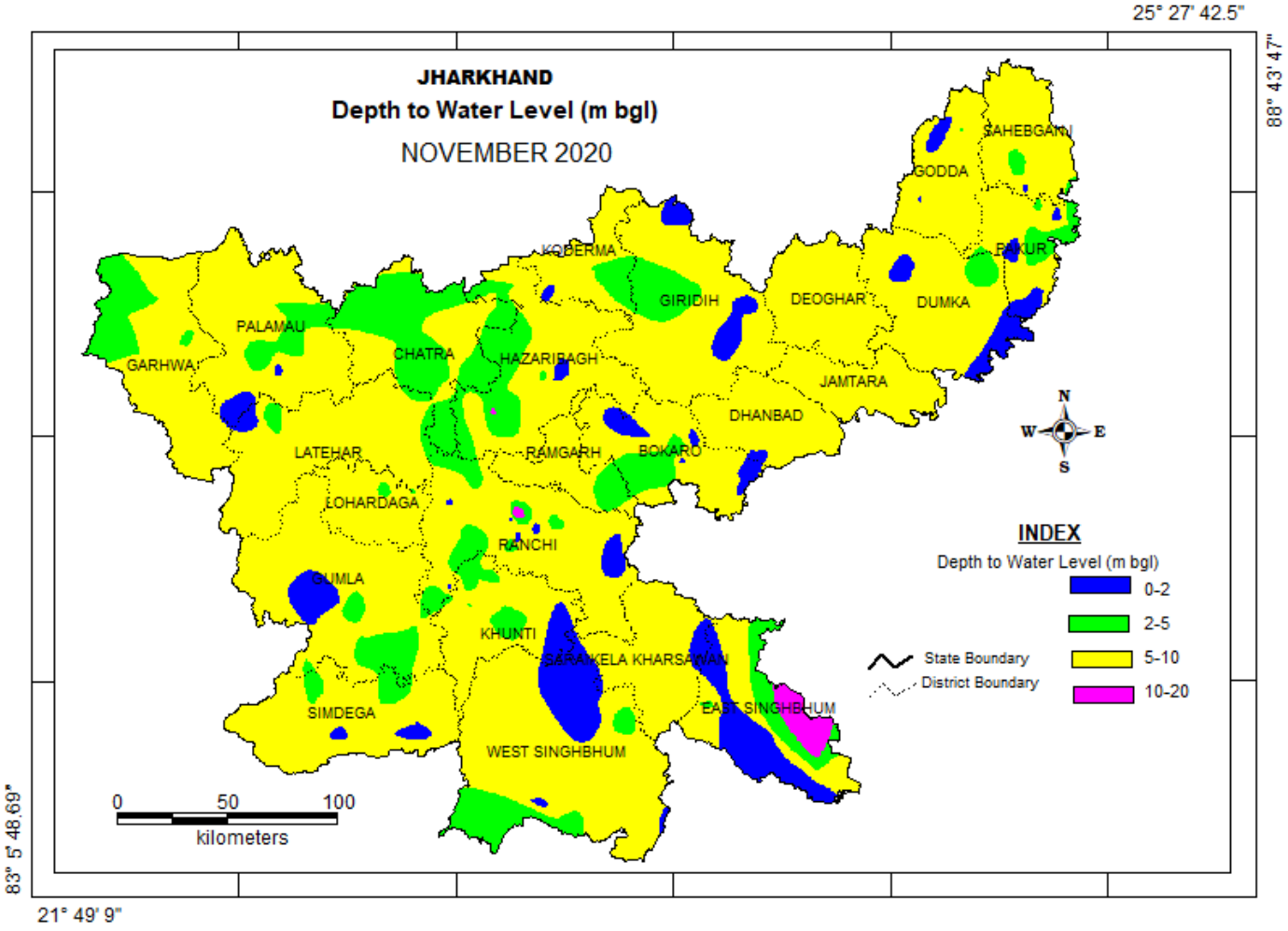

25° 27' 42.5"
88° 43' 47"
JHARKHAND
Depth to Water Level (m bgl)
NOVEMBER 2020
SAHEBGANJ
GODDA
PAKUR
KODERMA
GIRIDIH
DEOGHAR
DUMKA
PALAMAU
GARHWA
CHATRA
HAZARIBAGH
JAMTARA
DHANBAD
LATEHAR
RAMGARH
BOKARO
LOHARDAGA
RANCHI
GUMLA
KHUNTI
SARAIKELA KHARSAWAN
EAST SINGHBHUM
SIMDEGA
WEST SINGHBHUM
N
W
E
S
INDEX
Depth to Water Level (m bgl)
0-2
2-5
5-10
10-20
State Boundary
District Boundary
0
50
100
kilometers
83° 5' 48.69"
21° 49' 9"

PLATE VI

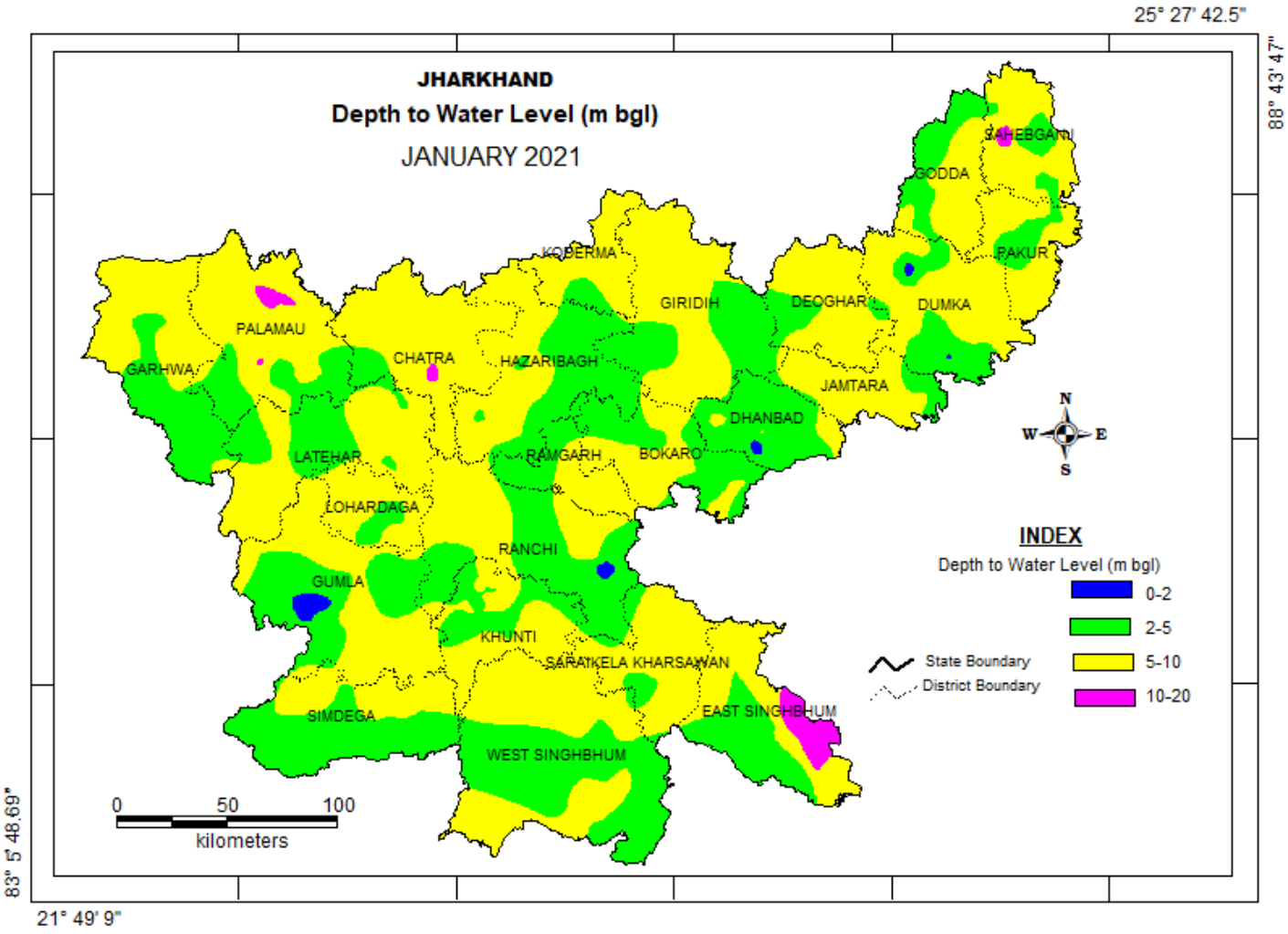

25° 27' 42.5"
88° 43' 47"
83° 5' 48.69"
21° 49' 9"
JHARKHAND
Depth to Water Level (m bgl)
JANUARY 2021
SAHEBGANJ
GODDA
PAKUR
KODERMA
GIRIDIH
DEOGHAR
DUMKA
PALAMAU
GARHWA
CHATRA
HAZARIBAGH
JAMTARA
DHANBAD
LATEHAR
RAMGARH
BOKARO
LOHARDAGA
RANCHI
GUMLA
KHUNTI
SARAIKELA KHARSAWAN
EAST SINGHBHUM
SIMDEGA
WEST SINGHBHUM
N
W
E
S
INDEX
Depth to Water Level (m bgl)
0-2
2-5
5-10
10-20
State Boundary
District Boundary
0
50
100
kilometers

PLATE VII

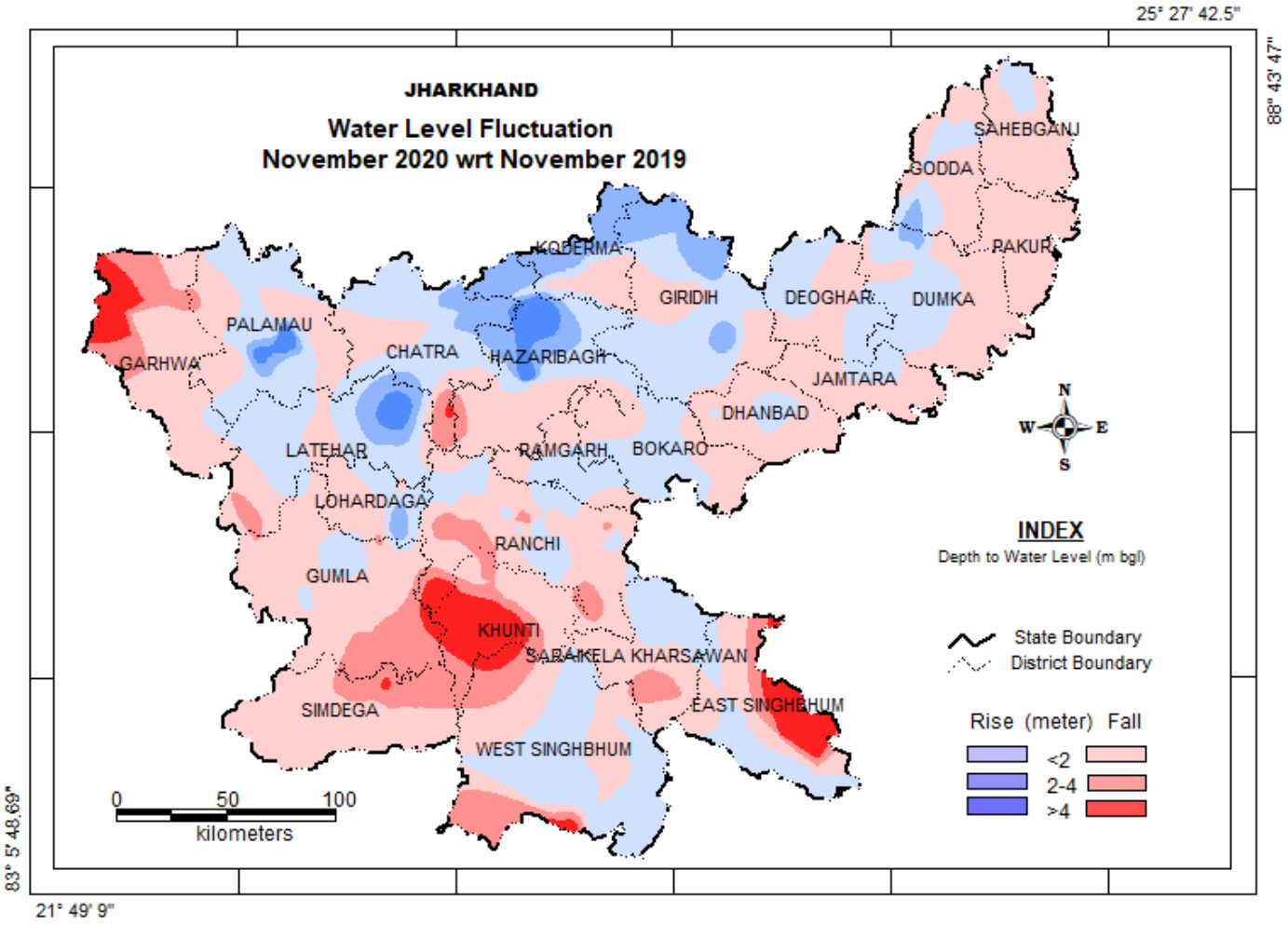

25° 27' 42.5"
88° 43' 47"
83° 5' 48.69"
21° 49' 9"
JHARKHAND
Water Level Fluctuation
November 2020 wrt November 2019
SAHEBGANJ
GODDA
PAKUR
KODERMA
GIRIDH
DEOGHAR
DUMKA
PALAMAU
GARHWA
CHATRA
HAZARIBAGH
JAMTARA
DHANBAD
LATEHAR
RAMGARH
BOKARO
LOHARDAGA
RANCHI
GUMLA
KHUNTI
SARAIKELA KHARSAWAN
SIMDEGA
EAST SINGHBHUM
WEST SINGHBHUM
N
W
E
S
INDEX
Depth to Water Level (m bgl)
State Boundary
District Boundary
Rise (meter) Fall
<2
2-4
>4
0
50
100
kilometers

PLATE VIII

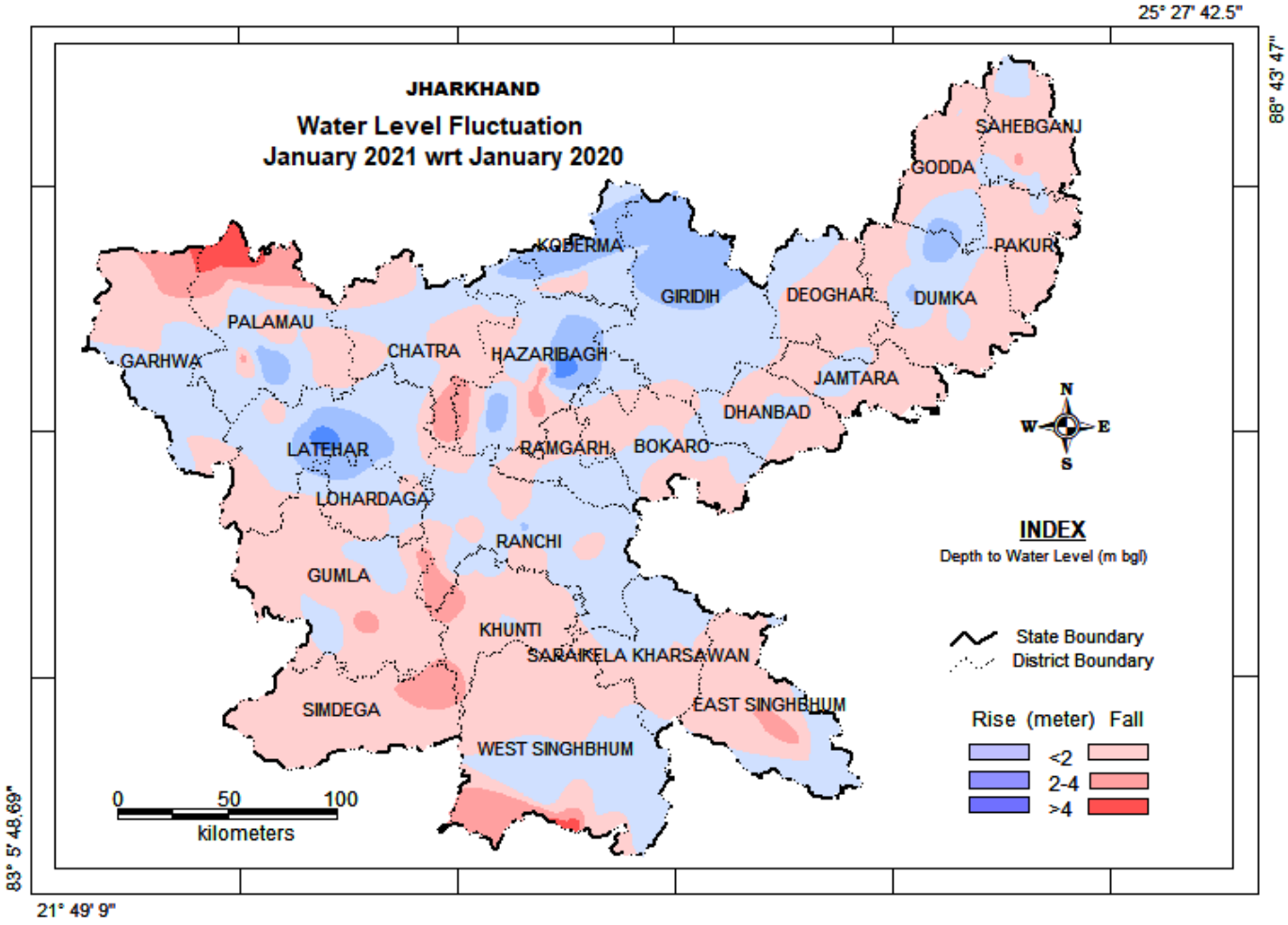

25° 27' 42.5"
88° 43' 47"
83° 5' 48.69"
21° 49' 9"
JHARKHAND
Water Level Fluctuation
January 2021 wrt January 2020
SAHEBGANJ
GODDA
PAKUR
KODERMA
GIRIDH
DEOGHAR
DUMKA
PALAMAU
GARHWA
CHATRA
HAZARIBAGH
JAMTARA
DHANBAD
LATEHAR
RAMGARH
BOKARO
LOHARDAGA
RANCHI
GUMLA
KHUNTI
SARAIKELA KHARSAWAN
EAST SINGHBHUM
SIMDEGA
WEST SINGHBHUM
N
W
E
S
INDEX
Depth to Water Level (m bgl)
State Boundary
District Boundary
Rise (meter) Fall
<2
2-4
>4
0
50
100
kilometers

PLATE IX

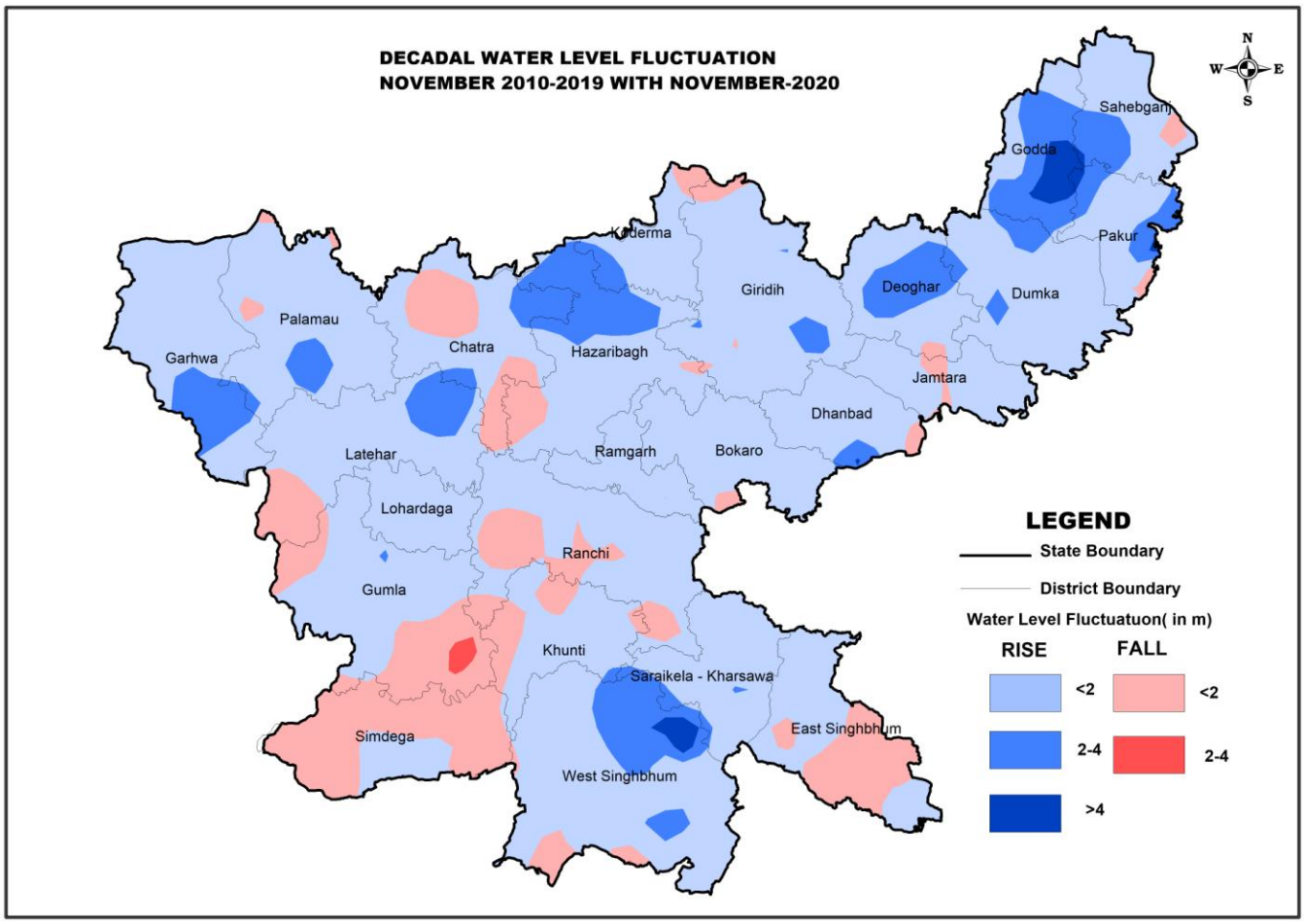
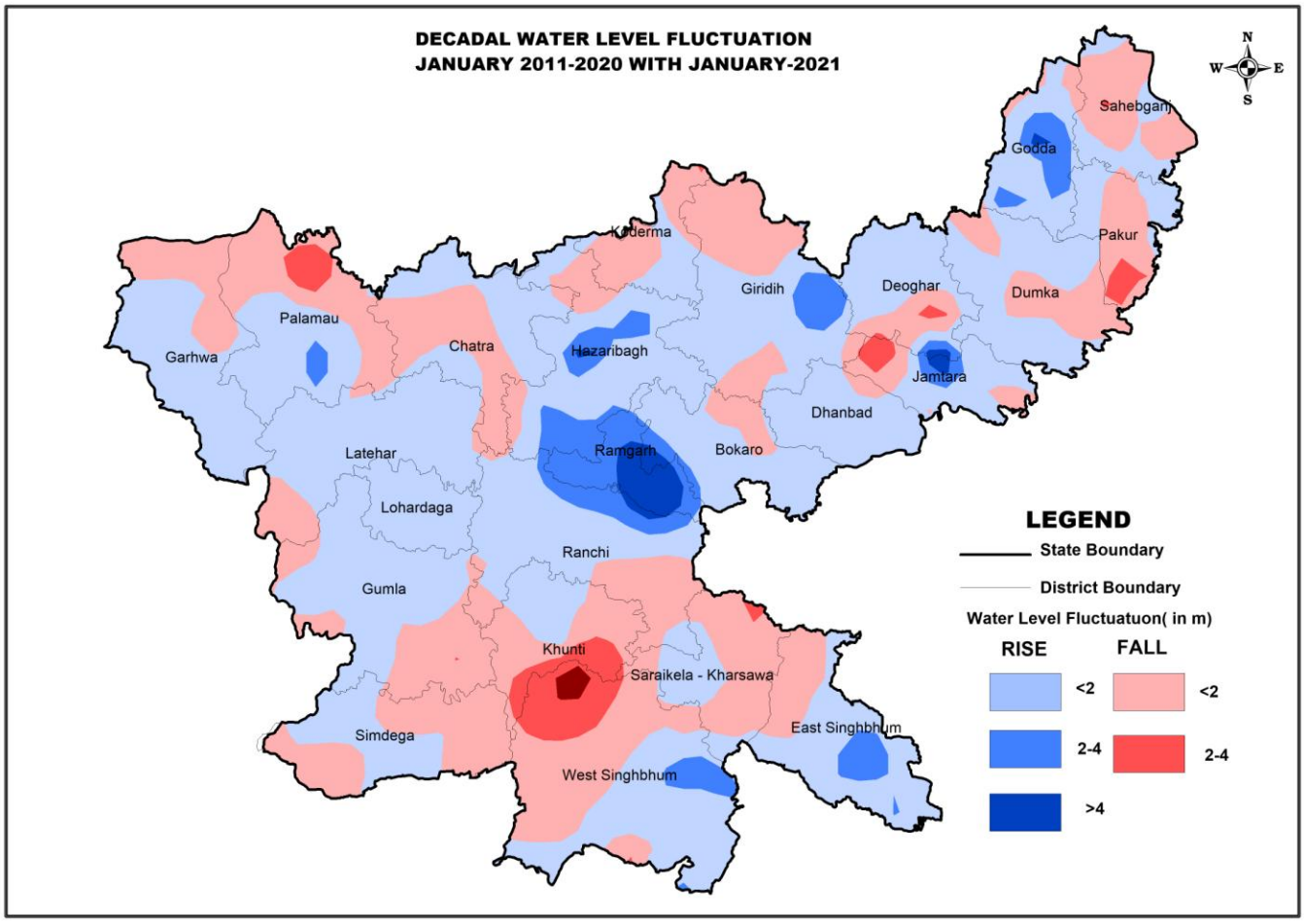

DECADAL WATER LEVEL FLUCTUATION
NOVEMBER 2010-2019 WITH NOVEMBER-2020
N
W
E
S
Sahebganj
Godda
Pakur
Koderma
Giridih
Deoghar
Dumka
Palamau
Garhwa
Chatra
Hazaribagh
Jamtara
Dhanbad
Latehar
Ramgarh
Bokaro
Lohardaga
Ranchi
Gumla
Khunti
Saraikela - Kharsawa
Simdega
East Singhbhum
West Singhbhum
LEGEND
State Boundary
District Boundary
Water Level Fluctuatuon(in m)
RISE
FALL
<2
<2
2-4
2-4
>4

PLATE-X


DECADAL WATER LEVEL FLUCTUATION
JANUARY 2011-2020 WITH JANUARY-2021
N
W
E
S
Sahebganj
Godda
Pakur
Koderma
Giridih
Deoghar
Dumka
Palamau
Garhwa
Chatra
Hazaribagh
Jamtara
Dhanbad
Latehar
Ramgarh
Bokaro
Lohardaga
Ranchi
Gumla
Khunti
Saraikela - Kharsawa
East Singhbhum
Simdega
West Singhbhum
LEGEND
State Boundary
District Boundary
Water Level Fluctuatuon(in m)
RISE
FALL
<2
<2
2-4
2-4
>4

ANNEXURE-I

WATER LEVEL DATA OF NETWORK STATIONS MEASURED BY CGWB, SUO, RANCHI, JHARKHAND

SN	District	Block	Location	WL data (m bgl)			
				2020			2021
				May	August	November	January
1	Bokaro	Chas	Pachaura Sersadih			3.15	4.26
2	Bokaro	Chas	Chas		8.5	7.78	
3	Bokaro	Chas	Jaina More	9.65	8.4	6.95	8.65
4	Bokaro	Chas	Pindrajora		0.35	2.22	3.84
5	Bokaro	Chandankiyari	Chandankiyari		1.55	2.01	5.25
6	Bokaro	Chandankiyari	Laghla			1.75	2.86
7	Bokaro	Chandankiyari	Baramasia			2.79	5.12
8	Bokaro	Chandankiyari	Chandra		2.5	2.15	5.65
9	Bokaro	Peterwar	Chandrapura		2.2	1.73	2.61
10	Bokaro	Gomia	Gomia	1.9	1.2	1.68	3.17
11	Bokaro	Nawadih	Nawadih		3.1	4.11	7.14
12	Bokaro	Paterwar	Peterwar	8.2	6	5.15	7.68
13	Bokaro	Gomia	Tenughat	4.6	5.1	2.17	2.98
14	Bokaro	Chas	Radhagaon Rly Station		4	3.7	4.55
15	Bokaro	Chas	Bokaro Rly Station			1.78	1.89
16	Chatra	Simaria	Bagra		7.75	9.1	10.15
17	Chatra	Simaria	Birhu			6.1	6.2
18	Chatra	Chatra	Chatra		3.2	5.1	4.75
19	Chatra	Itkhori	Itkhori			3.8	6.8
20	Chatra	Itkhori	Pitij			3.5	6.3
21	Chatra	Simaria	Simaria		5.1	6.9	8.98
22	Chatra	Tandwa	Tandwa		0.9	6.3	5.1
23	Chatra	Simaria	Tutilawa			4.6	6
24	Chatra	Chatra	Behra chocha			4.1	5.24
25	Chatra	Simaria	Piri			6.4	8.6
26	Chatra	Tandwa	Teliyadih		1.95	4.3	4.6
27	Deoghar	Mohanpur	Ghormara			3.79	6.19
28	Deoghar	Deoghar	Jasidih			2.95	5.4
29	Deoghar	Madhupur	Madhupur			1.6	3.85
30	Deoghar	Palajori	Palajori			2.9	4.45
31	Deoghar	Sarawan	Sarawan			3.4	5.5
32	Dhanbad	Jharia	Jharia			2.05	1.82
33	Dhanbad	Baghmara	Baghmara			6.65	10.45
34	Dhanbad	Katras	Balajee Mandrir			5.96	6.76
35	Dhanbad	Dhanbad	Basudeopur	5.97			

36	Dhanbad	Dhanbad	Bhuli A block				
37	Dhanbad	Dhanbad	Chragora Hirapur				
38	Dhanbad	Dhanbad	DBI Bunglow	4.9			
39	Dhanbad	Dhanbad	Dhanbad New	4.85		1.74	2.89
40	Dhanbad	Dhanbad	Dhansar MRS	6.15		3.2	3.49
41	Dhanbad	Dhanbad	Godhar Basti	6.6			
42	Dhanbad	Govindpur	Govindpur			2.35	3.1
43	Dhanbad	Jharia	Kandra Madal Basti			3.68	4.86
44	Dhanbad	Baghmara	Mahuda			4.49	5.35
45	Dhanbad	Dhanbad	Matkuria	3.05		3.28	2.79
46	Dhanbad	Nirsa	Nirsa			1.91	2
47	Dhanbad	Dhanbad	Panderpalli				
48	Dhanbad	Dhanbad	P. K. Roy College	3.3		1.25	1.6
49	Dhanbad	Dhanbad	Purandih Jorapol				
50	Dhanbad	Rajganj	Rajganj			3.12	4.48
51	Dhanbad	Jharia	Sindri Gosala More			2.33	2.46
52	Dhanbad	Topchanchi	Topchanchi			3.22	4.36
53	Dhanbad	Tundi	Tundi			2.05	3.47
54	Dumka	Dumka	Chapodia			3.09	6.14
55	Dumka	Dumka	Dumka(db ib)			2.15	4
56	Dumka	Ramgarh	Gamharia			4.15	7.25
57	Dumka	Gopikandar	Gopikandar			6	6.6
58	Dumka	Jama	Jama1			3.9	6.92
59	Dumka	Masalia	Masalia			2.6	4.35
60	Dumka	Raneshwar	Masanjor			2.81	1.96
61	Dumka	Jharmundi	Nunihaat			1.4	1.35
62	Dumka	Jama	Parapalashi			4.22	6.27
63	Dumka	Sikaripara	Patabari			3.39	5.89
64	Dumka	Raneswar	Raneswar			1.95	3.5
65	Dumka	Shikaripara	Sikaripara			2.6	5.6
66	Dumka	Godda	Dhadhakia			3.6	
67	Dumka	Ramgargh	Ramgargh			2.1	0.05
68	Jamtara	Jamtara	Jamtara			3.98	5.65
69	Jamtara	Nala	Nala			2.43	3.58
70	Jamtara	Mihijam	Mihijam			4.78	7.17
71	Jamtara	Kundahit	Kundahit			2.44	4.66
72	Jamtara	Fatehpur	Dhootala			4.01	5.8
73	Jamtara	Narayanpur	Narayanpur			2.26	3.23
74	Jamtara	Karmatarn	Jasaydih			4.5	5.38
75	Jamtara	Fatehpur	Basti Palajori			3.98	5.51
76	Jamtara	Narayanpur	Mohanpur			4.4	6.18
77	Jamtara	Fatehpur	Fatehpur			4.47	7.15

78	E. Singhbhum	Jugsalai/Jamshedpur sadar	Pardih	7.3	1.4		1.2
79	E. Singhbhum	Chakulia	Chakulia		1.3	14.05	13.55
80	E. Singhbhum	Dalbhumgarh	Dhalbhumgarh		0.9	7.9	5.55
81	E. Singhbhum	Ghatsila	Ghatsila		4.4	1.71	3.7
82	E. Singhbhum	Chakulia	Kalapathar		1.7		13.35
83	E. Singhbhum	Potka	Kalikapur			1.6	2.22
84	E. Singhbhum	Mosabani	Mosabani			1.05	-0.5
85	E. Singhbhum	Potka	Potka			5.14	6.49
86	E. Singhbhum	Jugsalai/Jamshedpur sadar	Shitla Mandir Sakchi			1.56	1.78
87	Garhwa	Garhwa	Garhwa			6.3	7.84
88	Garhwa	Manjhian	Manjhian			3.1	4.38
89	Garhwa	Nagar Utari	Nagaruntari			5.7	5.3
90	Garhwa	Ramna	Ramna1	1.55	1.3	2.7	4.1
91	Garhwa	Ranka	Ranka			2.8	3.68
92	Garhwa	Ranka	Godarmana			3.2	3.75
93	Garhwa	Meral	Meral			3.1	4.15
94	Garhwa	Meral	Lagama			2.8	2.5
95	Garhwa	Ranka	Bishrampur (Ranka)			2.8	3.25
96	Garhwa	Garhwa	Obra			2.7	4.6
97	Giridih	Bagodar	Bagodar			4.15	4.52
98	Giridih	Bengabad	Bengabad			1.88	2.37
99	Giridih	Dumri	Dumri			4.01	6.15
100	Giridih	Gandey	Gandey			2.26	
101	Giridih	Giridih	Giridih			1.48	
102	Giridih	Jamua	Jamua			5.21	
103	Giridih	Gandey	Maheshmunda			2.5	
104	Giridih	Gandey	Pandri			2.92	
105	Godda	Boarijore	Boarijore			1.45	3.65
106	Godda	Mehegama	Doi			2.25	3.75
107	Godda	Godda	Jainipaharpur			4	5.65
108	Godda	Mahagama	Lalmatia			5.03	6.73
109	Godda	Pathargama	Maheshpur2			2.8	3.8
110	Godda	Poraiya Haat	Poraiyahaat			2.75	4.6
111	Godda	Godda	Siktia			2.7	4.34
112	Godda	Poreyahat	Raghunathpur			1.83	
113	Godda	Pathergama	Bisaha			2.9	3.3
114	Godda	Godda	Kumardih			2.23	3.38
115	Godda	Godda	Bargacha Hariyari			1.85	4.65
116	Godda	Mahagama	Gobra			2.9	2.77
117	Godda	ThakurGhanti	ThakurGhanti			2.95	4.2
118	Gumla	Ghaghra	Adar			2.65	4.25

119	Gumla	Gumla	Anjam gram			1.75	2.1
120	Gumla	Palkot	Baghma			4.7	5.78
121	Gumla	Basia	Baisia			5.1	5.8
122	Gumla	Bharno	Bharno bdo	4.5	1.15	2.95	5.6
123	Gumla	Bishunpur	Bishnupur	1.45	0.35	5.4	5.6
124	Gumla	Chainpur	Chainpur1	3.5	2.8	3.15	3.85
125	Gumla	Ghagra	Ghagra	5.1	1.65	3.78	5.45
126	Gumla	Gumla	Gumla1	6.05	2.5	6	6.95
127	Gumla	Raidih	Kasir	6.7	1.8	0.65	1.2
128	Gumla	Gumla	Kharke	4.25	2.4	Abandoned	
129	Gumla	Bharno	Nagfeni	8.2	2.75	4.7	5.18
130	Gumla	Palkot	Palkot	6.1	3.9	5.7	6.8
131	Gumla	Raidih	Raidih	0.6	0.2	2.6	3.7
132	Gumla	Sisai	Sisai			3	3.75
133	Simdega	Simdega	Simdega	6.85	3.1	3.05	4.6
134	Simdega	Bano	Bano	7.4	2.95	4.55	5.6
135	Simdega	Thethai Thangar	Thethai Thangar	4.6	0.95	1.58	2.5
136	Simdega	Kolebira	Kolebira	5.7	2.7	6.45	7.15
137	Simdega	Kolebira	Lachara Gargh (Kolebira)			6.1	7.3
138	Simdega	Jaldega	Jaldega			3.15	4.8
139	Simdega	Jaldega	Tengratuku			3.75	4.8
140	Simdega	Simdega	Biru	7.88		3.1	4.5
141	Simdega	Kolebira	Puthritoli			1.4	1.95
142	Simdega	Kolebira PZ I	Kolebira			6.45	7.15
143	Simdega	Jaldega	Baribringa			1.65	2.55
144	Simdega	Jaldega	Lamboi			4.3	4.8
145	Simdega	Thethai Thangar	Kerio	1.95		2.7	3.4
146	Simdega	Bolba	Bolba			2.9	3.2
147	Hazaribagh	Hazaribagh	Amritnagar			3.1	5.56
148	Hazaribagh	Barhi	Barhi			2.1	9.15
149	Hazaribagh	Barkagaon	Barkagaon			10.2	7
150	Hazaribagh	Barkatha	Barkatha			2.4	3.1
151	Hazaribagh	Hazaribagh	Battom Bazar			4.1	8.57
152	Hazaribagh	Hazaribagh	College More		3.4	3.1	5.7
153	Hazaribagh	Churchu	Dari			4.3	4.65
154	Hazaribagh	Daru	Daru		0.71	1.6	3.7
155	Hazaribagh	Keredari	Garrikalan			3.1	4.4
156	Hazaribagh	Hazaribagh	Habib nagar			3.9	6.65
157	Hazaribagh	Hazaribagh	Hatyari			3.6	4.85
158	Hazaribagh	Hazaribagh	Hazaribagh			3.1	7.2
159	Hazaribagh	Hazaribagh	Hirabag		2	3.6	4.58
160	Hazaribagh	Ichak	Ichak more			3.8	4.4

161	Hazaribagh	Hazaribagh	Kanhari Road		0.85	3.4	5.9
162	Hazaribagh	Keredari	Keradari		1.37	5.1	6.65
163	Hazaribagh	Hazaribagh sadar	Korrah Chowk			2.8	9.98
164	Hazaribagh	Hazaribagh sadar	Kud Ashram			5.8	11.9
165	Hazaribagh	Hazaribagh sadar	Masipiri			7.8	8.8
166	Hazaribagh	Hazaribagh	Meru(Silwar)		4.25	5.5	8.8
167	Hazaribagh	Hazaribagh sadar	Old Bus Stand			3.6	7.2
168	Hazaribagh	Padma	Padma			7.8	9.9
169	Hazaribagh	Barkathha	Sakrej		2.57	2.6	3.4
170	Hazaribagh	Hazaribagh sadar	Simra Rest House			2.5	3.15
171	Hazaribagh	Hazaribagh sadar	Sindur			2.1	5.86
172	Hazaribagh	Bishnugarh	Tatijharia			2.4	3.5
173	Hazaribagh	Barkagaon	Urimari		0.6	3.6	
174	Hazaribagh	Chowparan	Chauparan1		0.76	5.2	6.7
175	Ramgarh	Patratu	Bhurkunda				
176	Ramgarh	Mandu	Kuju		0.9		
177	Ramgarh	Mandu	Mandu		1.45		
178	Ramgarh	Ramgarh	Barkakana		5.55		
179	Ramgarh	Gola	Gola				
180	Ramgarh	Ramgarh	Ramgarh	5.9	3.15		
181	Ramgarh	Patratu	Sayal	7.88	3.5		
182	Ramgarh	Mandu	Thakur Gora	3.25	2.15		
183	Ramgarh	Ramgarh	Kaitha		4.5		
184	Ramgarh	Ramgarh	Barlong	4	2.6		
185	Ramgarh	Dulmi	Kusumbha	2.3	2.6		
186	Ramgarh	Dulmi	Dulmi	2.35	2.35		
187	Ramgarh	Chitarpur	Chitarpur	6.25	4.99		
188	Ramgarh	Dulmi	Harhadkander				
189	Ramgarh	Dulmi	Potamdaga	6.7			
190	Ramgarh	Mandu	Barkachumba	2.9	3.45		
191	Ramgarh	Mandu	Kanjgi				
192	Ramgarh	Mandu	Sirka				
193	Khunti	Torpa	Dorma			3.9	4.6
194	Khunti	Lapung	Kakriya			5.6	5.15
195	Khunti	Kerra	Bala			5.6	6.1
196	Khunti	Kerra	Pokta			1.8	3.6
197	Khunti	kerra	Barwadag		1.05	4.6	5.7
198	Khunti	Kerra	Govindpur village		4.2	6.85	6.9
199	Khunti	Kerra	Jariya		3.7	4.12	5.2
200	Khunti	kerra	Malgo		0.45	5	5.75
201	Khunti	Kerra	Masamano		1.5	5.35	5.6
202	Khunti	kerra	Kasira		4.3	4.68	4.95

203	Khunti	Jobra	Jobra		2.9	3	3.45
204	Khunti	Kerra	Satiya		2.45	4.5	5.35
205	Khunti	Torpa	Bala		3.1	5.6	6.1
206	Khunti	Kerra	Kudri		1.65	4.75	5.1
207	Khunti	kerra	Sirka		1.25	4.48	5.78
208	Khunti	Kerra	Binagoan		2.8	5.2	5.55
209	Khunti	kerra	Ghusuli		3.7	7.05	8.4
210	Khunti	Khunti	Guitjora		1.6	5.1	5.6
211	Khunti	Khunti	Jaltanda		2.75	4.2	4.8
212	Khunti	Khunti	Dumardagga		1.9	3.3	4.3
213	Khunti	Khunti	Rewa		3.5	4.35	7.1
214	Khunti	Khunti	Amjora		1.7	4.62	5.35
215	Khunti	Khunti	Kunjala		1.4	4.45	5.2
216	Khunti	murhu	Pelaul		1	4	4.5
217	Khunti	murhu	Murhu		2.1	2.4	2.5
218	Khunti	Khunti	Karapurti		3.4	4.1	4.55
219	Khunti	Khunti	Seringathu		2.3	1.1	1.8
220	Khunti	Karra	Lodhama		2		3.5
221	Khunti	Khunti	Khunti		1.1	4.3	5.7
222	Ranchi	Angara	Angara1		1.15	5.71	5.7
223	Ranchi	Namkom	Hinoo		0.9	0.45	
224	Ranchi	Ratu	Bajra		1.98	3.9	3.8
225	Ranchi	Nagri	Bandhea		1.18	7.82	
226	Ranchi	Angara	Barwadag		4.3	3.38	3.71
227	Ranchi	Chanho	Bijupara Tangar			1.85	2.6
228	Ranchi	Mandar	Bishakhatanga		1.6	3.72	2.27
229	Ranchi	Kanke	Bit More			1.6	3.9
230	Ranchi	Ratu	Brambey		1.05	3.48	
231	Ranchi	Bundu	Bundu		2.3	3.05	5.6
232	Ranchi	Kanke	Bunti		1.2	1.46	1.66
233	Ranchi	Burmoo	Burmoo		1.1	5.16	6.6
234	Ranchi	Itki	Chachgura			4.95	6.75
235	Ranchi	Ormanjhi	Chutupalu		1.1	2.72	5.42
236	Ranchi	Angarha	Gondlipokhar		1.3	3	3.75
237	Ranchi	Kanke	Harmu		2.1	16.88	7.81
238	Ranchi	Kanke	Harmu Hhc		2.5		
239	Ranchi	Namkum	Hatia		1.1	6.15	7.16
240	Ranchi	Ratu	Hurhuri		1.5	2.46	4.68
241	Ranchi	Itki	Itki		1.5	5.85	7.5
242	Ranchi	namkom	Jamchuan Kgbav				
243	Ranchi	Angara	Jonha		1.6	3.5	3.38
244	Ranchi	Kanke	Kanke1		1.4	1.58	2.23

245	Ranchi	Ratu	Khatitanr		1.8	3.05	2.55
246	Ranchi	Silli	Kita			4.8	2.5
247	Ranchi	Namkom	Lowadih		3.1	4.75	3.05
248	Ranchi	Mandar	Mandar		0.7	3.4	2.65
249	Ranchi	Ormanjhi	Ormanji		0.8	3.65	3.6
250	Ranchi	Silli	Patrahatu		1.4	0.32	1.37
251	Ranchi	Kanke	Pithoria		1.3	3.22	3.1
252	Ranchi	Namkom	Rampur		0.6	2.31	3
253	Ranchi	Tamar	Rangamati		2.3	1.55	5.8
254	Ranchi	Silli	Silli		1.2	4.91	4.6
255	Ranchi	Namkom	Siramtoli		1.7	3.75	3.55
256	Ranchi	Sonahatu	Sonahatu		1.1	2.13	2.28
257	Ranchi	Chanho	Sonsbazar		1.6		2.7
258	Ranchi	Bundu	Taimara		2.8	4.56	6.54
259	Ranchi	Tamar	Tamar		2.1	4.8	5.63
260	Ranchi	Ormanjhi	Ukrid		0.4	2.99	3.07
261	Ranchi	Kanke	Daily Market		2.9	5.67	
262	Ranchi	Namkom	Chutiya (Sani Mandir)		2.3	1.05	
263	Ranchi	Namkom	Tati Silway(E.F.)		0.9		4.8
264	Ranchi	Kanke	Hillview		1.2	4.4	0
265	Ranchi	Kanke	Ramkrishna mission Morabadi		2.2	5.2	6.45
266	Ranchi	Kanke	Sukurhutu		0.4	3.32	4.17
267	Ranchi	Namkom	Ladnapiri		1.9		
268	Ranchi	namkom	Pindarcom		2.4		
269	Ranchi	Namkom	Kharsidag		1.4	3.8	
270	Ranchi	Namkom	Mani Tola (Doranda)		1.2	2.2	
271	Ranchi	Namkom	Hanuman Mandir (Near AG.Office)		1.7	5.6	6.8
272	Ranchi	Namkom	Bridge Ford School		1.8	4.6	5.45
273	Ranchi	Kanke	Kanke School (High School)		2.3	15.75	15.95
274	Koderma	Chandwara	Chandwara		1.2	1.9	2.95
275	Koderma	Koderma	Jhumri Tilaiya		2.4	2.8	4.9
276	Koderma	Koderma	Kodarma		0.7	Dry	
277	Koderma	Domchanch	Domchanch			5.6	5.8
278	Koderma	Jainagar	Jainagar		0.26	3.8	3.6
279	Koderma	Koderma	Pathaldiha		1.75	2.2	3.1
280	Koderma	Koderma	Kanobigha		5.6	2.1	2.4
281	Koderma	Tilaya	Buchitar			2.6	3.1
282	Lohardaga	Lohardaga	Lohardaga (Barwatoli Chowk)			3.45	4.15
283	Lohardaga	Bhandara	Bhandara			4.6	6.3
284	Lohardaga	Lohardaga	Hesal (Mangan Toli)		2.15	5.4	7

285	Lohardaga	Kuru	Hinjila			5.1	5.7
286	Lohardaga	Lohardaga	Irgaon	4.78	0.98	3.55	4.5
287	Lohardaga	Kuru	Kuru	7.86	3.06	3.7	5.2
288	Lohardaga	Lohardaga	Lohardaga	7.95	0.78	2.9	3.5
289	Lohardaga	Kuru	Rudh	7.5	4.45	3.1	5.2
290	Pakur	Amrapara	Amrapara	5.89	0.82	1.79	2.69
291	Pakur	Hiranpur	Hiranpur	10.95	4.15	5.35	5.65
292	Pakur	Litipara	Litipara	6.03	0.18	7.18	9.08
293	Pakur	Pakur	Pakur1	10.2	5.25	5.7	9.32
294	Pakur	Pakuria	Pakuria	6.74	1.34	1.19	
295	Pakur	Maheshpur	Salgapara			3	7.35
296	Pakur	Hiranpur	Torai			2.45	6.55
297	Pakur	Maheshpur	Sahargram			8.8	10.15
298	Pakur	Litipara	Litipara 2			2.4	3.6
299	Pakur	Litipara	Kariodih			3.54	5.14
300	Pakur	Pakur	Vikrampur			1.45	4.45
301	Pakur	Amrapara	Pochaibera			0.65	2.45
302	Palamu		Banari				0
303	Palamu	Chainpur	Baraw			3.3	3.5
304	Palamu	Bishrampur	Bishrampur			4.3	4.5
305	Palamu	Chhatarpur	Chhatarpur			Dry	
306	Palamu	Daltonganj	Daltenganj			3.9	7.6
307	Palamu	Haidarnagar/ Husainabad	Haidernagar			2.8	7.25
308	Palamu	Hariharganj	Hariharganj			5.1	4.95
309	Palamu	Husainabad	Japla			4.5	
310	Palamu	Bishrampur	Kajri			7.8	9.8
311	Palamu	Patan	Kanda			4.3	4.32
312	Palamu	Lesliganj	Lesliganj			1.8	2.38
313	Palamu	Patan	Nawadih1			7.4	7.38
314	Palamu	Panki	Panki			3.6	4.15
315	Palamu	Patan	Patan			3.2	5.5
316	Palamu	Bishrampur	Rajhara			4.1	4.5
317	Palamu	Panki	Sagalim			4.2	5.1
318	Palamu	Chhattarpur	Sandha			4.6	5
319	Palamu	Satbarwa	Satbarwa			6.5	6.88
320	Palamu	Bishrampur	Ketat Kala			4.6	5.15
321	Latehar	Chandwa	Chandwa			3	4.24
322	Latehar	Latehar	Latehar			2.8	3.59
323	Latehar	Manika	Manika			2.1	3.72
324	Latehar	Balumath	Balumath			4.1	9.05
325	Latehar	Barwadih	Barwadih			1.5	3.5

326	Latehar	Garu	Garu	7.75		4.1	4.4
327	Latehar	Mahuadanr	Mahuadanr	8.45	1.6	4.6	5.25
328	Sahibganj	Berhait	Barhait			6.56	7.16
329	Sahibganj	Barharwa	Barharwa			4.15	7.95
330	Sahibganj	Borio	Borio	10.45	6.75	3.7	
331	Sahibganj	Rajmahal	Ghat Selumpur			3.2	7.6
332	Sahibganj	Mandro	Mandro			2.4	4.4
333	Sahibganj	Rajlmahal	Rajmahal			3.47	5.12
334	Sahibganj	Pathna	Ranga			2.65	4.85
335	Sahibganj	Sahebganj	Sahebganj1			4.4	7.15
336	Sahibganj	Taljhari	Taljhari1			1.8	2.45
337	Sahibganj	Udhwa	Udhwa			4.8	
338	Sahibganj	Borio	Harinchara Chowk			2.73	4.03
339	Sahibganj	Borio	Maricho			4.17	5.22
340	Sahibganj	Berhait	Chota Kadma			3.92	5.87
341	Sahibganj	Rajmahal	Mangal hat			3.55	4.5
342	Sahibganj	Berhait	Baramasia			3.28	
343	Sahibganj	Barharwa	Kotalpokhar			2.1	4.85
344	Sahibganj	Pathana	Taljhari			1.8	2.47
345	Saraikela		Kandra			3.03	
346	Saraikela		Kharsawan			3.09	
347	Saraikela		Jamdih				
348	Saraikela		Saraikela			3.74	1.44
349	Saraikela		Chandil			3.35	6.8
350	W Singhbhum		Bhandgaon			2.43	
351	W Singhbhum		Bandgaon			7.89	9.54
352	W Singhbhum		Barajamda			0.85	1.45
353	W Singhbhum		Chaibasa			7.85	5.85
354	W Singhbhum		Chakradharpur			0.93	5.45
355	W Singhbhum		Hat Gamhariya			2.32	5.94
356	W Singhbhum		Hesadih			2.24	3.04
357	W Singhbhum		Jagannathpur			4.12	5.7
358	W Singhbhum		Jaitgarh			2.69	3.6
359	W Singhbhum		Keshargaria			5	0
360	W Singhbhum		Sonua				0
361	W Singhbhum		Kereikela			4.45	6.35
362	W Singhbhum		Khuntpani			3.2	6
363	W Singhbhum		Noamundi			2.5	2.2
364	W Singhbhum		Kokcho			3.45	3.5

ANNEXURE-II

Trend of Water Level for last ten years (2011 to 2020)

	BOKARO									
			PreMonsoon			PreMonsoon			Annual	
Sl No.	Location	Data Points	Rise (m/year)	Fall (m/year)	Data Points	Rise (m/year)	Fall (m/year)	Data Points	Rise (m/year)	Fall (m/year)
1	1	Nawadih	6		0.1923	9		34	0.1772	
2	4	Pindarjora new	3			8	0.0756	22		
3	5	Chandankiyari	7	0.2446		8	0.0417	31		0.1985
4	7	Chas	8	0.0718		9		34	0.0906	
5	9	Petarbar	9	0.0531		10		39	0.1402	
6	10	Pupunki	6	0.2115		6		22	0.0844	
7	11	Jaina More	9	0.0922		9		38	0.2603	
8	12	Phusro/Bermo	6		0.8052	7	0.706	25		0.0952
9	14	Tenughat	9		0.0055	10		39	0.1065	
10	15	Chandrapura	7	0.1193		10	0.127	37		0.1623
11	17	Gomia	9	0.7892		10	0.2191	38		0.4294
	CHATRA									
			PreMonsoon			PreMonsoon			Annual	
Sl No.	Location	Data Points	Rise (m/year)	Fall (m/year)	Data Points	Rise (m/year)	Fall (m/year)	Data Points	Rise (m/year)	Fall (m/year)
12	Tandwa	5			8	0.0326		29	0.4074	
13	Birhu	6	0.9138		8	0.39		27	0.3651	
14	Bagra	7	0.0792		10	0.0915		38	0.1539	
15	Tutilawa1	5			7		0.0057	25		0.0564
16	Simaria	7		0.0758	10	0.0005		35	0.1048	
17	Chatra	2			3			12		
18	Chatra1	5			8		0.0087	27		0.0718
19	Pitij	6		0.6315	8	0.1876		28	0.03	
20	Itkhori1	5			8	0.0492		27		0.1227
	DEOGHAR									
			PreMonsoon			PreMonsoon			Annual	
Sl No.	Location	Data Points	Rise (m/year)	Fall (m/year)	Data Points	Rise (m/year)	Fall (m/year)	Data Points	Rise (m/year)	Fall (m/year)
21	Sarath	8		0.3463	7		0.5544	34		0.3484
22	Jasidih	6		0.0262	9	0.3199		33	0.2353	
23	Madhupur1	5			9	0.0319		30		0.0174
24	Palajori	8	0.3927		9	0.2087		37	0.3528	

25	Sarawan	8	0.4665		9	0.578		36	0.6286	
26	Ghormara	7		0.1298	9	0.0249		36		0.0745
	DHANBAD									
			PreMonsoon			**PreMonsoon**			**Annual**	
Sl No.	**Location**	**Data Points**	**Rise (m/year)**	**Fall (m/year)**	**Data Points**	**Rise (m/year)**	**Fall (m/year)**	**Data Points**	**Rise (m/year)**	**Fall (m/year)**
27	Dhanbad New	5			7	0.1434		23		
28	Baghmaranew	4			8	0.2866		21		
29	Govindpur	6		0.2606	9		0.0348	29		0.0945
30	Mahuda	5			6	0.4463		23		
31	Rajganj	8		0.0481	9	0.0317		37		0.0096
32	Topchanchi	8	0.0287		10	0.0835		38	0.1047	
33	Tundi	6		0.1239	10	0.0552		35		0.0348
34	Jharia	6		0.1932	6		0.05	23		
35	Nirsa ecl l.qtr	6	0.2846		8	0.084		29	0.1855	
36	Dhansar MRS	5			6	0.1409		21		
	DUMKA									
			PreMonsoon			**PreMonsoon**			**Annual**	
Sl No.	**Location**	**Data Points**	**Rise (m/year)**	**Fall (m/year)**	**Data Points**	**Rise (m/year)**	**Fall (m/year)**	**Data Points**	**Rise (m/year)**	**Fall (m/year)**
37	51	Nunihaat	4			8	0.063	25		
38	52	Gopikandar	9	0.5206		9	0.2359	36		0.3265
39	53	Gamharia	8		0.0638	7	0.132	24		0.1898
40	54	Hansdiha pwdib	8	0.0867		9		33	0.0174	0.0458
41	55	Mihijam New	5			8		25	0.1198	
42	56	Kundahit	9		0.032	8	0.0731	31		0.1118
43	57	Dhootala	4			7	0.3122	20		
44	58	Jamatara	8	0.0843		8		33	0.0752	
45	59	Raneswar	9	0.1423		7	0.1779	34		0.1258
46	60	Nala	9		0.0255	9	0.0514	33		0.0571
47	61	Masanjor	8	0.0107		9	0.1237	35		0.0406
48	62	Masalia	9	0.2616		9	0.0771	36		0.1524
49	63	Patabari	9		0.0993	9	0.0303	36		
50	64	Sikaripara	5			8	0.3079	27		0.128
51	65	Chikania	7	0.0708		8	0.1842	32		0.144
52	66	Kathikund	8	0.1206		9	0.0255	35		0.1004
53	67	Dumka(db ib)	9	0.5042		9	0.182	34		0.2711
54	68	Jama1	9		0.3014	9		36	0.0257	
55	69	Jarmundi db.ib	9	0.1606		9	0.2565	36		0.2059
	GARHWA									

			PreMonsoon			PreMonsoon			Annual	
Sl No.	Location	Data Points	Rise (m/year)	Fall (m/year)	Data Points	Rise (m/year)	Fall (m/year)	Data Points	Rise (m/year)	Fall (m/year)
56	Ranka	6		0.1588	7	0.3383		30	0.1898	
57	Garhwa	8		0.1877	9		0.0754	34		0.0512
58	Ramna1	5			7	0.4965		25	0.3294	
59	Nagaruntari	8	0.0218		9	0.0619		35	0.0786	
60	Manjhian	6		0.8633	7		0.3505	25		0.2548
61	Bhawanathpur	7		0.0553	6	0.1468		27	0.1159	
	GIRIDIH									
			PreMonsoon			PreMonsoon			Annual	
Sl No.	Location	Data Points	Rise (m/year)	Fall (m/year)	Data Points	Rise (m/year)	Fall (m/year)	Data Points	Rise (m/year)	Fall (m/year)
62	Dumri	9		0.1709	9		0.2306	37		0.1271
63	Dewri	6		0.2307	9	0.1535		31	0.0042	
64	Khijri	6		1.3536	8		0.0156	29		0.4445
65	Tisri	7		0.4811	8	0.0663		28		0.0582
66	Pandri	9		0.248	10	0.108		34	0.0383	
67	Bagodar	9		0.0366	10		0.1175	38		0.076
68	Birini	8		0.0515	9	0.1838		33	0.1057	
69	Dhanwar	8		0.5594	9	0.0022		35		0.1084
70	Gandey1	5			7	0.3848		21		
71	Giridih	9	0.2855		9	0.017		35	0.1948	
72	Saraiya new	6		0.5165	7	0.0356		23		
73	Maheshmunda1	6		0.4421	8	0.0157		24		0.0129
74	Dhanidih	9		0.1183	10	0.0862		37	0.0952	
75	Bengabad	9	0.0005		10	0.1458		38	0.1363	
76	Bandhutanr	8	0.1026		9	0.0221		35	0.0304	
77	Jamua pwd ib	9		0.0474	10	0.0578		37	0.0876	
	GODDA									
			PreMonsoon			PreMonsoon			Annual	
Sl No.	Location	Data Points	Rise (m/year)	Fall (m/year)	Data Points	Rise (m/year)	Fall (m/year)	Data Points	Rise (m/year)	Fall (m/year)
78	Poraiyahaat	4			6	0.2512		21		
79	Sundar Pahari	9		0.2853	9	0.0911		36	0.0018	
80	Godda1	6	0.0756		7		0.1728	28	0.0296	
81	Jainipaharpur	5			7	0.3907		23		
82	Maheshpur2	9	0.0946		7	0.0357		30	0.1661	
83	Pathargama	8		0.0356	7		0.432	29		0.1506
84	Bara borijore	6		0.0131	7	0.0704		27	0.0975	
85	Mahagama1	6		0.0189	7	0.0236		29	0.24	
86	Lalmatia	9	0.1639		9	0.1359		37	0.2044	
87	Doi	8	0.0939		8	0.0426		33	0.0427	

	GUMLA									
			PreMonsoon			PreMonsoon			Annual	
Sl No.	Location	Data Points	Rise (m/year)	Fall (m/year)	Data Points	Rise (m/year)	Fall (m/year)	Data Points	Rise (m/year)	Fall (m/year)
88	Nagfeni	9		0.0215	10	0.0076		39		0.0509
89	Thethai Thangar	8	0.549		10	0.2398		36	0.3347	
90	Biru	5			8	0.0068		26	0.037	
91	Jaldega	8	0.5533		10	0.1575		36	0.3184	
92	Gumla	3			9	0.2516		26		0.0579
93	Lachargarh	6		0.3204	10		0.006	35		0.1212
94	Bano	7	0.1929		9	0.1823		34	0.125	
95	Tengratuku	4			8		0.0824	25		0.1081
96	Bishnupur	6	0.2336		8	0.1144		31	0.2455	
97	Kolebira	8		0.0695	10		0.115	34		0.1008
98	Palkot	9		0.07	10	0.0157		40		0.041
99	Baisia	10		0.3357	10		0.2586	40		0.2239
100	Baghma	5			7	0.003		27		0.0403
102	Raidih	9	0.3655		10	0.2533		39	0.2202	
103	Gumla1	7	0.0148		8	0.1572		33	0.0409	
104	Kasir	6	0.0258		8	0.0017		28		0.0245
105	Anjam gram	9	0.6101		10	0.255		37	0.3746	
106	Chainpur1	5			8	0.2111		29	0.0366	
107	Sisai	6	0.1303		8	0.0912		30		0.0216
108	Bharno bdo	9	0.0226		10		0.0789	39		0.0999
109	Ghagra	7	0.207		9	0.0166		34	0.0984	
	HAZARIBAG									
			PreMonsoon			PreMonsoon			Annual	
Sl No.	Location	Data Points	Rise (m/year)	Fall (m/year)	Data Points	Rise (m/year)	Fall (m/year)	Data Points	Rise (m/year)	Fall (m/year)
110	Mandu	8		0.1488	10	0.0057		33		0.1349
111	Garrikalan	5			6		0.0811	26	0.0397	
112	Barkagaon	6		0.2231	8		0.1868	31		0.1051
113	Keradari	7	0.1847		7		0.0608	30	0.0147	
114	Hatyari	3			6		0.0503	20		
115	Hazaribagh	7	0.295		8	0.0147		33	0.0708	
116	Meru(Silwar)	5			7		0.1294	26		0.2806
117	Tatijharia	3			6	0.1084		19		
118	Ichak more	4			6	0.1371		23		
119	Barkatha	9	0.1984		7	0.0569		36	0.0786	
120	Padma	6		0.1708	7	0.0043		27		0.0572
121	Sakrej	4			6	0.4629		21		
122	Barhi	9	0.0064		8	0.1494		37	0.0561	
123	Gola	6	0.0057		8	0.2283		30	0.1488	
124	Chitarpur	4			7	0.4104		21		
125	Kaitha	4			6	0.4356		18		
126	Barkakhana	9	0.1833		10	0.0533		35	0.1016	

127	Ramgarh2	6	0.2059		2			16		
128	Sirka	4			6	0.5866		21		
129	Kanjgi	4			6	0.3366		19		
130	Sayal	6	0.4662		8	0.3735		26	0.3492	
131	Urimari	5			7	0.4015		22		
132	Kuju	5			8	0.0003		24		0.1056
133	Thakur Gora	1			6		0.0014	15		
	KODARMA									
			PreMonsoon			**PreMonsoon**			**Annual**	
Sl No.	**Location**	**Data Points**	**Rise (m/year)**	**Fall (m/year)**	**Data Points**	**Rise (m/year)**	**Fall (m/year)**	**Data Points**	**Rise (m/year)**	**Fall (m/year)**
134	Kanobigha	3			6	0.3543		19		
135	Kodarma	8		0.2323	7		0.7835	34		0.3059
136	Domchanch	4			6		0.238	18		
137	Chandwara	4			9	0.3751		29	0.2785	
	LOHARDAGA									
			PreMonsoon			**PreMonsoon**			**Annual**	
Sl No.	**Location**	**Data Points**	**Rise (m/year)**	**Fall (m/year)**	**Data Points**	**Rise (m/year)**	**Fall (m/year)**	**Data Points**	**Rise (m/year)**	**Fall (m/year)**
138	Bhandara	9		0.0185	9		0.0552	39		0.027
139	Senha Bdo	8		0.1089	8		0.0254	37		0.0632
140	Irgaon	4			7	0.2946		23		
141	Lohardaga(pwdib	9	0.0929		10	0.1641		40	0.0668	
142	Lohardaga(Patra Toli)	6		0.367	8	0.1954		28		0.0701
143	Hesal	3			7	0.0931		23		
144	Hinjla	8	0.03		10		0.0027	37		0.0087
145	Kuru1	7	0.0411		9	0.2514		33	0.1217	
146	Rudh1	4			8	0.4358		27	0.2546	
	PAKAUR									
			PreMonsoon			**PreMonsoon**			**Annual**	
Sl No.	**Location**	**Data Points**	**Rise (m/year)**	**Fall (m/year)**	**Data Points**	**Rise (m/year)**	**Fall (m/year)**	**Data Points**	**Rise (m/year)**	**Fall (m/year)**
147	Amrapara	7	0.2723		9		0.009	32	0.1536	
148	Pakur1	8	0.071		8	0.0757		33	0.0629	
149	Litipara	9		0.0656	8		0.0417	34		0.0409
150	Hiranpur	7	0.0385		9		0.0508	34	0.0543	
151	Pakuria	7	0.6006		9	0.0796		33	0.0162	
152	Salgapara	8	0.1086		8	0.0273		32		0.0493
	PALAMU									
			PreMonsoon			**PreMonsoon**			**Annual**	

Sl No.	Location	Data Points	Rise (m/year)	Fall (m/year)	Data Points	Rise (m/year)	Fall (m/year)	Data Points	Rise (m/year)	Fall (m/year)
153	Sandha	6		0.2545	8	0.1893		28	0.1767	
154	Haidernagar	3			6	0.1796		19		
155	Balumath	10	0.0395		10	0.249		39	0.1848	
156	Satbarwa	8		0.0062	10	0.0046		38	0.0328	
157	Manika	9		0.1528	10		0.0197	36	0.0415	
158	Barwadih	8	0.0839		7	0.359		29	0.3858	
159	Barjatu	9	0.2767		8	0.1177		36	0.2334	
160	Betla	5			8	0.0651		29		0.0965
161	Lesliganj	8	0.1695		9	0.1689		36	0.1549	
162	Panki	8		0.6011	9	0.1565		35	0.0378	
163	Sagalim	5			7	0.2987		26	0.2119	
164	Daltenganj	9	0.3544		9	0.351		35	0.3381	
165	Baraw	6	0.0198		6	0.0821		26	0.2187	
166	Kajri	8	0.0193		9	0.0061		35		0.0497
167	Nawadih1	7		0.3091	7		0.1369	24	0.0648	
168	Rajhara	8	0.2204		9		0.0314	35	0.1324	
169	Patan	6		0.4095	7	0.1365		28	0.2021	
170	Bishrampur	7	0.2535		10	0.1707		35	0.2565	
171	Hariharganj	7		0.0057	9		0.0466	32	0.0302	
172	Kanda	8	0.1018		9	0.104		36	0.0897	
173	Chhatarpur	9		0.0032	9		0.1561	38		0.088
174	Japla	7		0.0148	4			20		
175	Garu	5			6	0.1312		24	0.1075	
176	Chandwa	10	0.1913		10	0.0041		37	0.1177	
177	Latehar	8	0.1155		10	0.2368		34	0.1367	
	PASHCHIMI SINGHBHUM									
			PreMonsoon			**PreMonsoon**			**Annual**	
Sl No.	**Location**	**Data Points**	**Rise (m/year)**	**Fall (m/year)**	**Data Points**	**Rise (m/year)**	**Fall (m/year)**	**Data Points**	**Rise (m/year)**	**Fall (m/year)**
178	Jaitgarh	5			7	0.4055		25	0.222	
179	Bandgaonnew	4			6		0.3848	20		
180	Barajamda	3			6	0.1065		22		
181	Noamundi	5			7	0.1978		24		0.0111
182	Jagannathpur	5			7	0.6378		25	0.4556	
183	Hat Gamhariya	4			7	0.4569		24		0.0466
184	Keshargaria	8	0.7407		9		0.0681	34	0.2164	
185	Jhinkpani	9	0.0744		10	0.0707		39	0.0971	
186	Kokcho	9	0.0355		10		0.0003	39	0.114	
187	Hesadih	9		0.0415	9	0.0513		37		0.009
188	Chaibasa	9		0.0628	9		0.4936	38		0.1503
189	Rajnagar	6	0.1002		4			16		
190	Khuntpani	8	0.1194		9	0.0192		36	0.0334	
191	Chakradharpur	9	0.1215		10	0.1462		38	0.1221	
192	Saraikela	9	0.4686		9		0.1132	35	0.1061	

193	Kharsawan	9		0.0312	9	0.039		36	0.0571	
194	Bandgaon	8		0.0331	7		0.0238	33		0.231
195	Kereikela	9	0.564		8		0.0018	37	0.1353	
196	Kandra	7	0.1021		9		0.0191	33	0.0509	
197	Chandil	9		0.4731	10		0.3473	36		0.3627
	PURBI SINGHBHUM									
			PreMonsoon			**PreMonsoon**			**Annual**	
Sl No.	**Location**	**Data Points**	**Rise (m/year)**	**Fall (m/year)**	**Data Points**	**Rise (m/year)**	**Fall (m/year)**	**Data Points**	**Rise (m/year)**	**Fall (m/year)**
198	Ghatsila	9	0.1606		9	0.062		38	0.0803	
199	Baharagora	9	0.1452		9		0.0492	37	0.0159	
200	Chakulia	8	0.185		9		0.0825	37		0.2813
201	Pithajudi	6	0.0076		5			22		
202	Dhalbhumgarh	9		0.1108	9		0.4074	38		0.0436
203	Mosabani	6	0.2887		6		0.0069	23		
204	Mosabani1	4			6	0.1247		20		
205	Kalikapur	9	0.2536		10		0.0781	39	0.039	
206	Potka	8	0.1293		10		0.2236	36		0.1238
207	Galudih	7	0.7368		8		0.0935	27	0.2375	
208	Ramgarh1	7	0.1284		6	0.1068		24		0.0503
209	Sundarnagar	6	0.3738		4			20		
	RANCHI									
			PreMonsoon			**PreMonsoon**			**Annual**	
Sl No.	**Location**	**Data Points**	**Rise (m/year)**	**Fall (m/year)**	**Data Points**	**Rise (m/year)**	**Fall (m/year)**	**Data Points**	**Rise (m/year)**	**Fall (m/year)**
210	Rampur	3			6		0.0416	15		
211	Sithipokhartoli	2			6		0.0606	12		
212	Berro	9	0.3171		8		0.0035	34	0.1468	
213	Hatia1	5			9		0.3616	25		0.1778
214	Ormanji	7		0.0885	8		0.1129	28		0.1108
215	Chachgura	9		0.0264	8	0.1362		35	0.0789	
216	Siramtoli	3			6	0.2983		13		
217	Lowadih	3			7		0.2036	17		
218	Kita	5			6		0.053	21		
219	Silli	8		0.0848	8		0.0152	31		0.0011
220	Jonha	8	0.0275		8	0.0177		34		0.0125
221	Rangamati	5			6	0.2907		20		
222	Lalganj	4			6		0.0349	17		
223	Bunti	6		0.0087	8	0.0738		27	0.0243	
224	Angara1	6	0.0253		6		0.0659	25		0.0456
225	Gondlipokhar	5			8	0.0009		23		
226	Kantitanr	7	0.167		6		0	27	0.0413	
227	Kanke1	4			8		0.0105	23		
228	Bit More	6	0.5153		7	0.2994		23		
229	Mandar	8	0.1538		8		0.0637	31	0.0391	
230	Pithoria	6	0.1415		6	0.0129		22		

231	Chutupalu	8		0.1553	7		0.158	30		0.1464
232	Burmoo	6	0.4327		6	0.3951		23		
233	Murhu	8	0.2101		8	0.1703		30	0.1892	
234	Khunti	9	0.3489		9		0.049	34	0.0287	
235	Tamar	8	0.1875		9	0.0285		32	0.2125	
236	Dumardagga	5			6	0.1098		22		
237	Bundu	9	0.1535		9		0.1085	37		0.0906
238	Taimara	7	0.234		7	0.014		24	0.249	
239	Kalimati	7	0.2324		10	0.0836		35	0.0795	
240	Lodma	7	0.2009		6		0.095	25	0.0681	
241	Kharsidag	3			7		0.0413	18		
242	Barwadag	8	0.3507		9		0.0526	32	0.0631	
	SAHIBGANJ									
			PreMonsoon			**PreMonsoon**			**Annual**	
Sl No.	**Location**	**Data Points**	**Rise (m/year)**	**Fall (m/year)**	**Data Points**	**Rise (m/year)**	**Fall (m/year)**	**Data Points**	**Rise (m/year)**	**Fall (m/year)**
243	Ranga	5			7	0.3816		24	0.1442	
244	Barhait	7	0.1783		6	0.1766		30	0.285	
245	Udvababutala	5			7		0.0138	23		
246	Rajmahal	9		0.0541	8		0.0963	35		0.0366
247	Borio	8		0.9005	9	0.0446		32		0.2159
248	Ghat Selumpur	6	0.3985		8	0.0056		26	0.1872	
249	Taljhari1	8	0.8088		6	0.0863		26	0.3718	
250	Mandro	8	0.2004		7	0.1781		32	0.0491	
251	Sahebganj1	9	0.09		8	0.1519		34	0.168	
252	Sakrigali	8	0.3638		7	0.0597		33	0.1377	