भूजल स्तर बुलेटिन

(अगस्त 2024)

Ground water Level Bulletin

(August 2024)

केन्द्रीय भूमि जल बोर्ड

मध्य-पूर्वी क्षेत्र

पटना

Central Ground Water Board
Mid-Eastern Region
Patna

1.0 INTRODUCTION

Groundwater bulletin is prepared by CGWB depicting changes in groundwater regime of the State through different seasons. It is an effort to obtain information on groundwater levels through representative monitoring wells. The important attributes of groundwater regime monitoring are groundwater level.

The natural conditions affecting the groundwater regime include climatic parameters like rainfall, evapotranspiration etc., whereas anthropogenic influences include pumpage from the aquifer, recharge due to irrigation systems and other practices like waste disposal etc.

Groundwater levels are measured by the Central Ground Water Board four times a year, during January, March/April/May, August, and November. This regime of monitoring was initiated in 1969 by the Central Ground Water Board. For the state of Bihar, however, a network of 916 monitoring wells, known as National Hydrograph Network Stations (NHNS), is being used for monitoring.

ABOUT THE STATE

Bihar state lies between 83º 20' and 88º 00' E Longitudes and 24º 15' and 27º 23' N Latitudes. It shares international border with Nepal in the north and is bounded in the east, west and south by West Bengal, Uttar Pradesh and Jharkhand states respectively. The state covers geographical area of 94,163 Sq.km and has its capital at Patna (Fig 1).

Administratively the state is divided into 38 districts and 534 community development blocks.

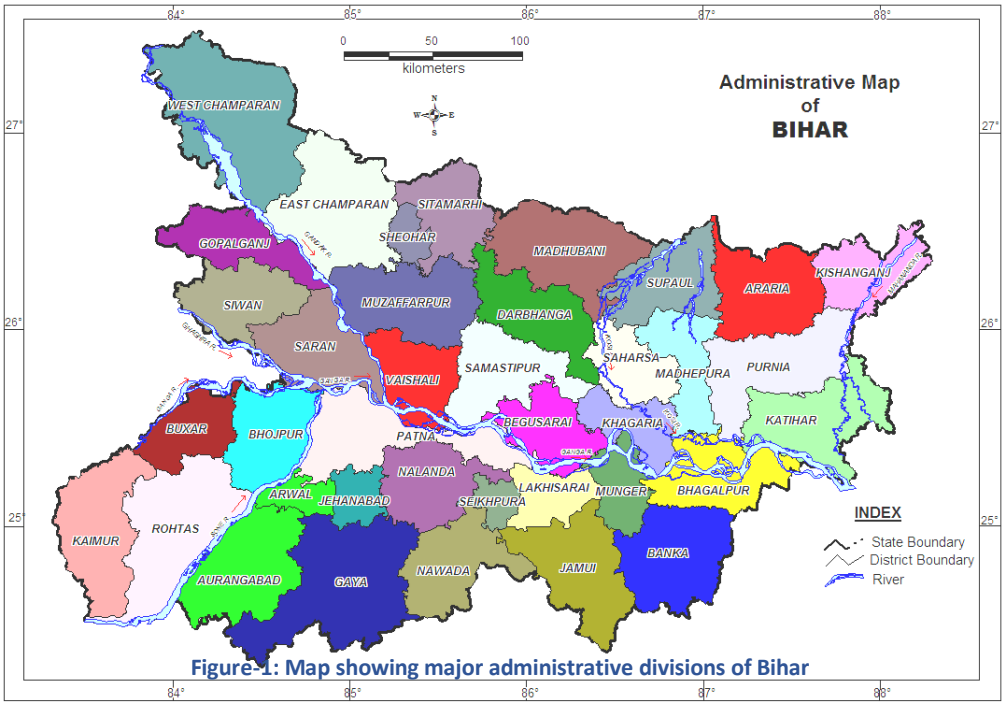

Figure-1: Map showing major administrative divisions of Bihar

Geologically, the state is underlain by diverse rock types of different geological ages from Pre-Cambrian to Recent. The Proterozoic and Archean Pre-Cambrian rocks, including granite, granitic-gneiss, quartzite, phyllites, slates, and metabasics, are prominent. The Chhotanagpur Granite Gneissic Complex (CGGC), with mica-bearing pegmatite in Gaya, Nawada, and Munger, is found near Jharkhand. Meta-sedimentary rocks like phyllite, schist, and quartzite also appear in these areas. Groundwater is influenced by the weathered mantle and saprolite zone thickness, ranging from 5 to 20 meters. It exists under unconfined conditions in the weathered mantle and saprolite zone and under confined to semi-confined conditions in joints and fractures.

The Vindhyan Super-Group, in Rohtas, Kaimur, and Aurangabad districts, includes sandstone, limestone, quartzite, and schist. These rocks are consolidated and mostly unaffected by tectonic disturbances. Vindhyan sandstones, with low primary porosity, host groundwater in the weathered residuum and secondary porosity under unconfined conditions. The weathered residuum is 5 to 10 meters thick.

The Siwalik formation, from the Upper Tertiary age, is found in West Champaran district. Comprising sandstone, conglomerate, red clay, and spongy limestone, these hills have faults and confined groundwater in deep sandstones.

Quaternary alluvium covers 89% of Bihar, with recent to sub-recent sediments over 300 meters thick in north Bihar plain, thinning southward. Groundwater is under unconfined conditions within 70 meters depth, with deeper aquifers exhibiting confined conditions.*(Source CGWB, Yearbook 2021-22)*

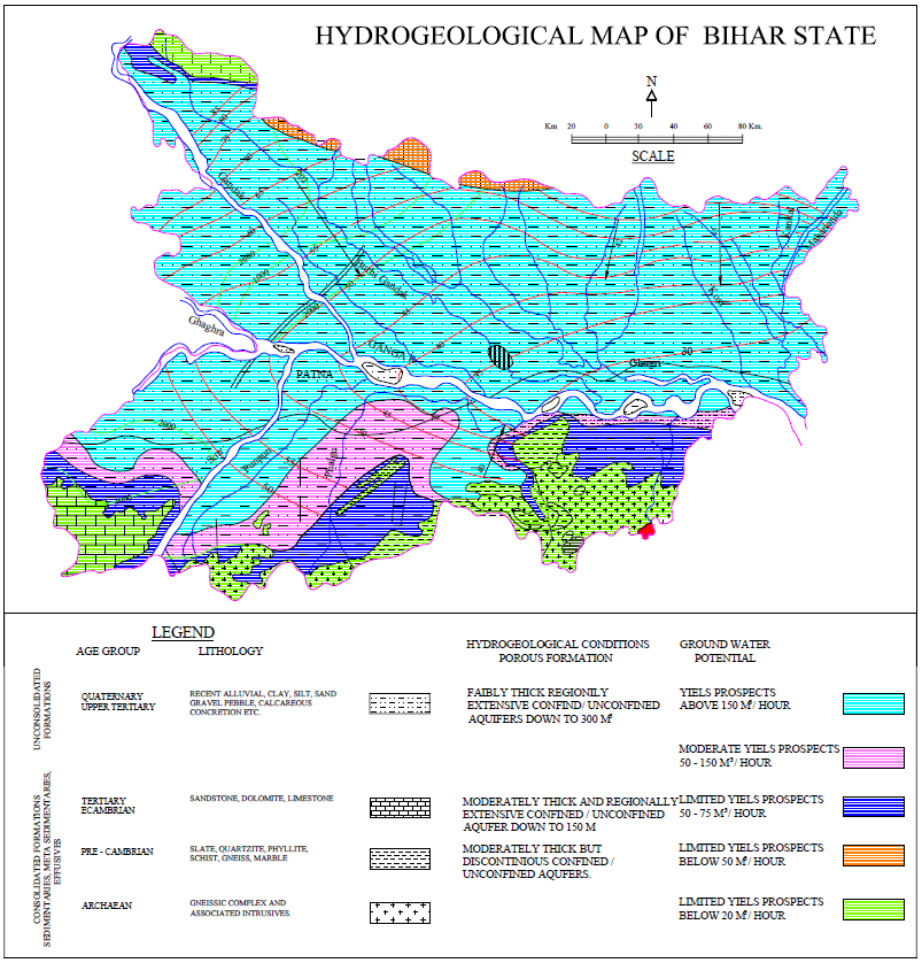

Figure-2: Hydrogeological Map of Bihar state

3.0 GROUND WATER LEVEL MONITORING

Central Ground Water Board, Mid Eastern Region, Patna, is monitoring changes in groundwater regime in the state on quarterly basis continuously. This is facilitated by a network of monitoring stations in the State located in diverse hydrogeological and geomorphic units. As of May 2024, there are 916 monitoring wells for ground water rigime monitoring. . Groundwater level data was successfully collected from 778 of these wells. The remaining wells could not be monitored due to various factors . The district-wise breakup of the water level monitoring stations is given in **Table-1**.

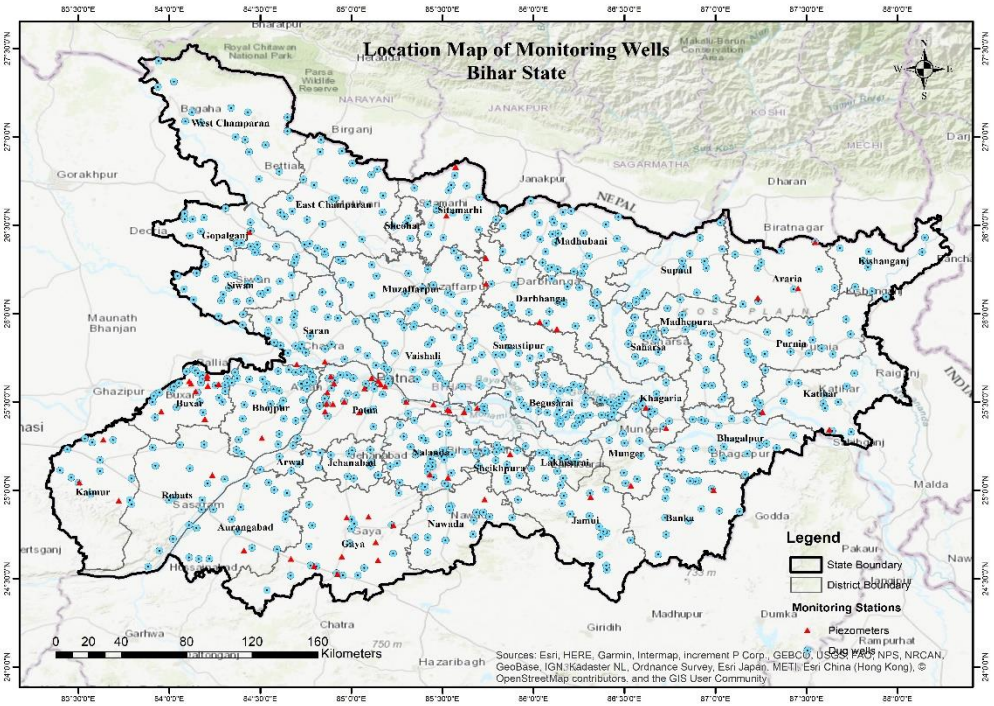

Figure 3- Map showing Location map of Monitoring wells Bihar

Table :1			
District-wise distribution of water level monitoring stations in Bihar			
Name of District	**No. of Dug wells**	**No. of Tubewells**	**Total**
ARARIA	9	4	13
ARWAL	10	0	10
AURANGABAD	15	3	18
BANKA	15	1	16
BEGUSARAI	36	0	36
BHAGALPUR	43	0	43
BHOJPUR	44	2	46
BUXAR	33	8	41
DARBHANGA	19	7	26
GAYA	17	11	28
GOPALGANJ	22	4	26
JAMUI	16	1	17
JEHANABAD	9	2	11
KAIMUR (BHABUA)	14	3	17
KATIHAR	17	3	20
KHAGARIA	17	1	18
KISHANGANJ	10	0	10
LAKHISARAI	12	0	12
MADHEPURA	16	0	16
MADHUBANI	24	0	24
MUNGER	11	0	11
MUZAFFARPUR	28	0	28
NALANDA	41	4	45
NAWADA	15	1	16
PASHCHIM CHAMPARAN	18	3	21
PATNA	39	26	65
PURBI CHAMPARAN	37	1	38
PURNIA	19	0	19
ROHTAS	19	1	20
SAHARSA	18	0	18
SAMASTIPUR	24	3	27
SARAN	38	3	41
SHEIKHPURA	11	1	12
SHEOHAR	5	0	5
SITAMARHI	16	2	18
SIWAN	26	2	28
SUPAUL	25	0	25
VAISHALI	29	2	31
TOTAL	817	99	916

Depth To Water Level in Unconfined Aquifer (August 2024) .

The depth to the water table in 717 dug wells was monitored across various districts. The water levels vary from 0.08 meters below ground level (mbgl) in Madhubani district to 12.1 mbgl in Nalanda district. The distribution of water levels is as follows: 4% of the wells have water levels less than 2 mbgl, 24% have water levels ranging from 2 to 5 mbgl, 60% exhibit water levels between 5 and 10 mbgl, and 16% have water levels greater than 10 mbgl.

Shallow water levels, ranging from 2 to 5 mbgl, are predominantly observed in the northern regions of Bihar. Water levels between 5 and 10 mbgl are found throughout the state, while deeper water levels, exceeding 10 mbgl, are present in isolated areas across certain regions

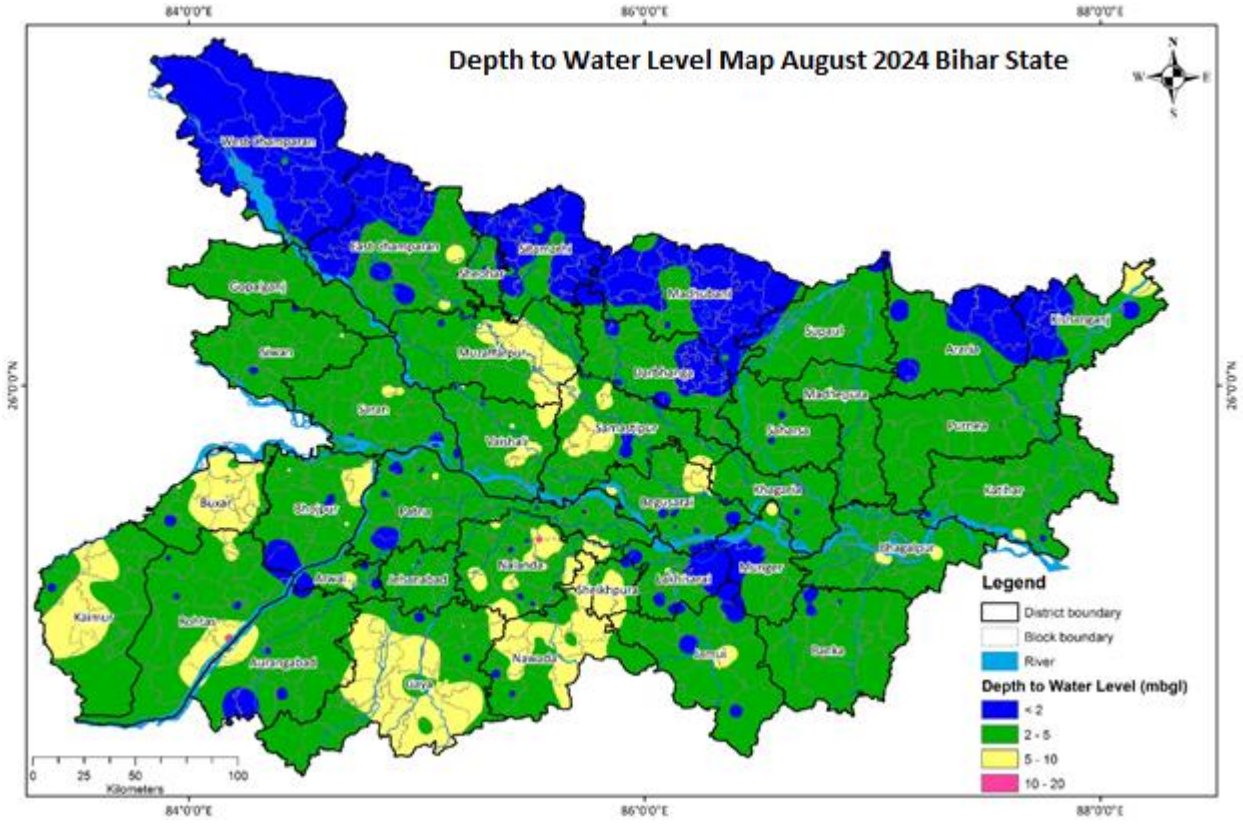

Figure 4- Map showing Depth to Water level map of Monitoring Stations (Dugwells) Bihar

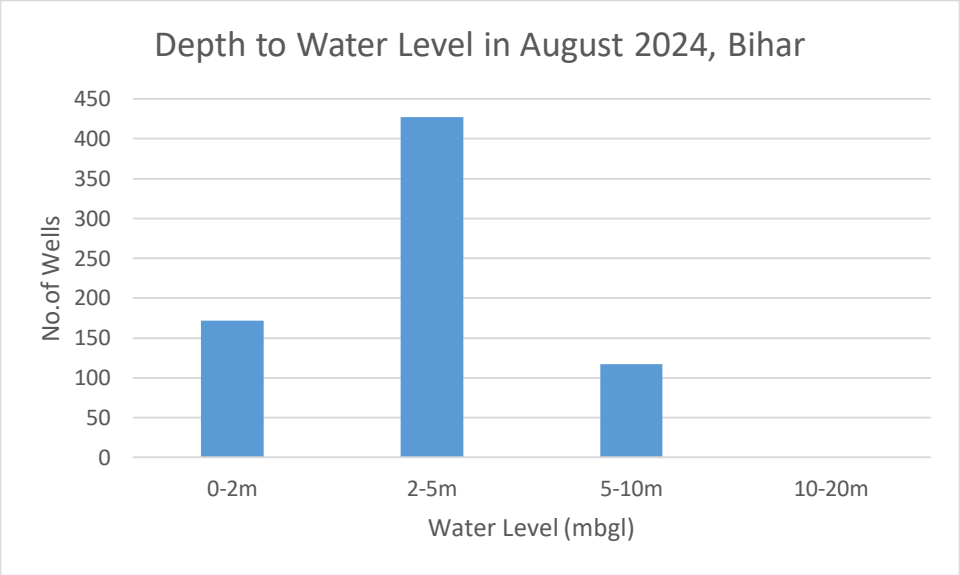

Figure 5- Graph showing Depth to Water level of Monitoring Stations (Dugwells) Bihar

Annual Fluctuation of Water Level in Unconfined Aquifer (Aug 2023 to Aug 2024)

Rise in Water Levels:

Out of 679 dug wells , 299 wells registered a rise in water levels, and out of 299 wells 82 % of wells recorded an increase of less than 2 meters and 18% exhibit an increase between 2 and 4 meters. Rise of less than 2m are mainly observed Arwal, Madhubani, Pashchim Champaran, Samastipur and Sitamarhi. The 18% of wells that showed a rise of 2 to 4 meters were primarily located in jamui, jehanabad and kaimur (bhabua) districts

Fall in Water Levels:

Out of 679 dugwells , 380 wells recorded a fall in water levels, and out of the 380 wells 83% of wells showed a decrease of less than 2 meters, while the 13% recorded a fall between 2 to 4 meters and 4% of wells recorded more than 4 m.. A decrease of less than 2 meters was observed across all districts, significantly Araria ,Bhagalpur, Darbhanga, Gaya, Gopalganj, Katihar, Kishanganj, Madhepura, Purnia, Saharsa, Siwan, Supaul and Vaishali districts. The 13 % of wells that showed a fall of 2 to 4 meters were primarily located in Gaya ,Muzaffarpur, Nawada districts.

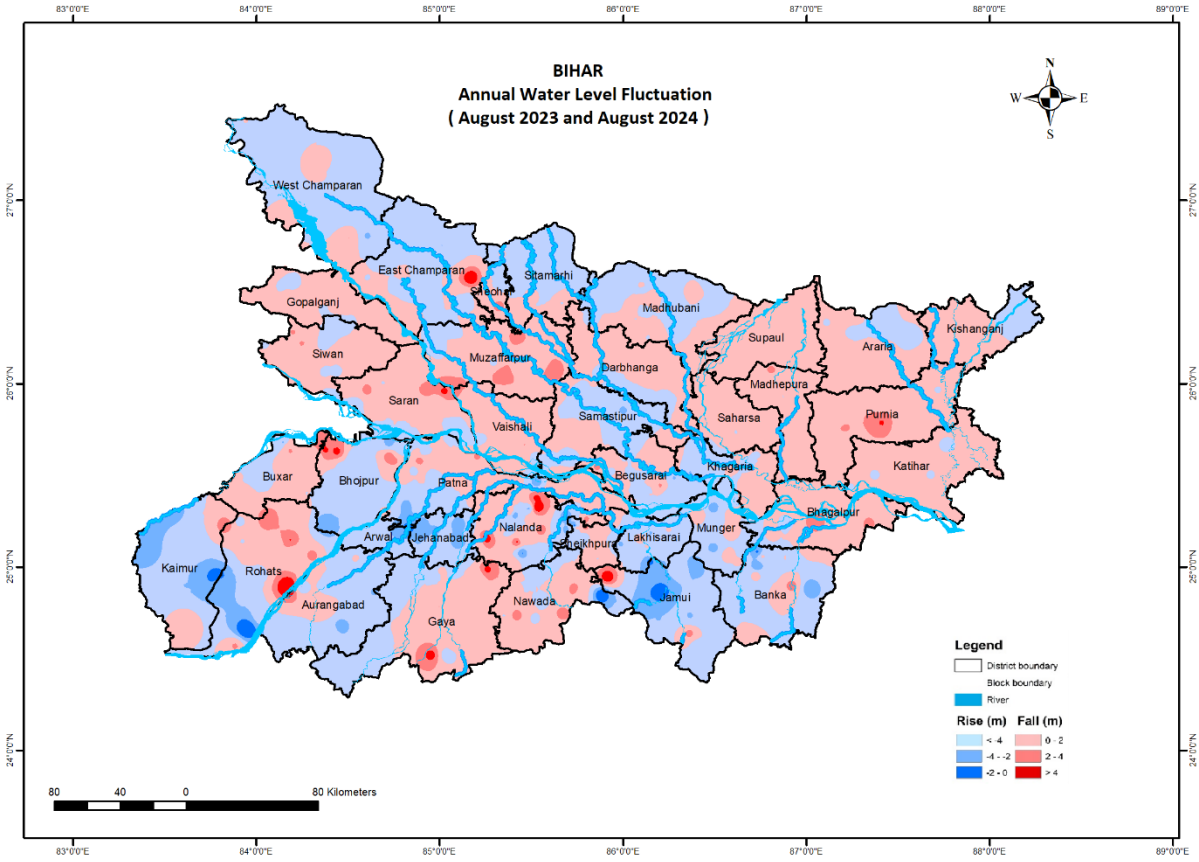

Figure 6-Map showing Annual Water level fluctuation map of unconfined aquifer of Bihar

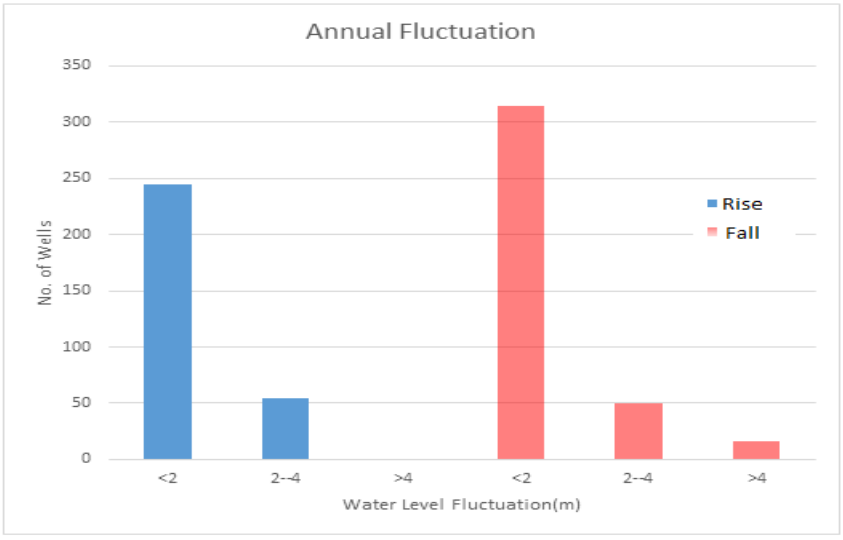

Figure 7- Graph showing Annual Water level fluctuation of Monitoring Stations (Dugwells) Bihar

Seasonal Fluctuation of Water Level in Unconfined Aquifer (May 2024 to Aug 2024)

Rise in Water Levels:

Out of 581 dug wells , 505 wells registered a rise in water levels, and out of 299 wells 82 % of wells recorded an increase of less than 2 meters and 18% recorded an increase between 2 and 4 meters. Rise of less than 2m are mainly observed Arwal, Madhubani, Pashchim Champaran, Samastipur and Sitamarhi. The 18% of wells that showed a rise of 2 to 4 meters were primarily located in jamui, jehanabad and kaimur (bhabua) districts

Fall in Water Levels:

Out of 581 dugwells , 38 wells recorded a fall in water levels, and out of the 38 wells 86% of wells showed a decrease of less than 2 meters, while rest fall between 2 to 4 meters .A decrease of less than 2 meters was mainly observed in Supaul districts.

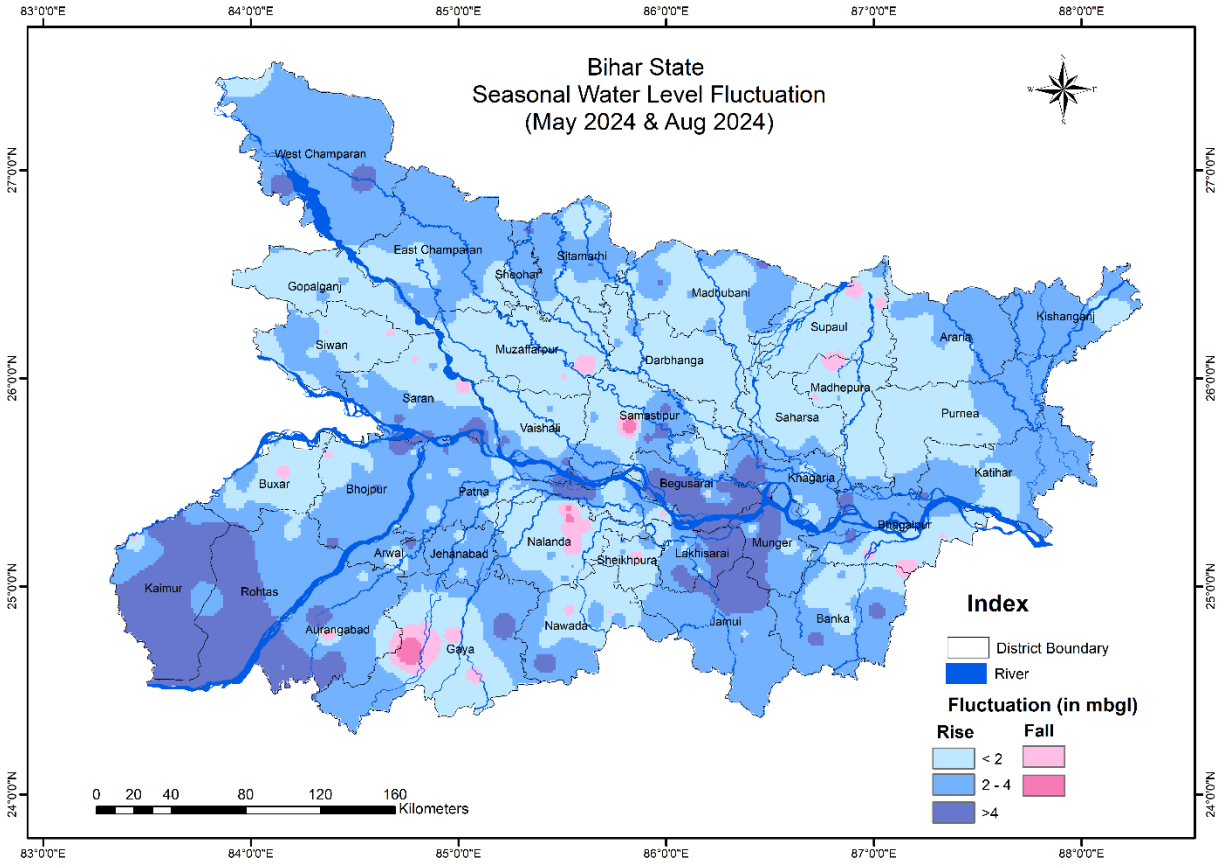

Figure 8- Map showing Seasonal Water level fluctuation map of unconfined aquifer of Bihar

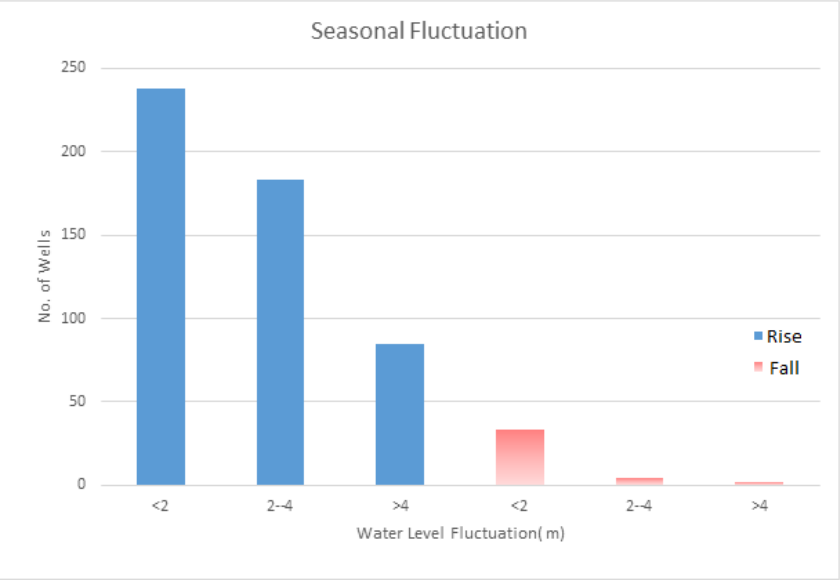

Figure 9- Graph showing Seasonal Water level fluctuation of Monitoring Stations (Dugwells) Bihar

Decadal Fluctuation of Water Level in Unconfined Aquifer (Decadal Mean Aug (2014-2023) to November 2024)

Rise in Water Levels:

Out of 615 dug wells , 269 wells registered a rise in water levels.Out of 269 wells, water level rise of less than 2 m is recorded in 94 % wells, 2 to 4 m in 5 % wells and more than 4 m in 1% of the wells. Water level rise of less than 2 m is seen in all the districts, significantly In Bhagalpur, Bhojpur ,Darbhanga , Begusarai, Banka , Jamui , Lakhisarai ,Madhubani 'Munger ,Muzaffarpur ,Nalanda ,Pashchim Champaran ,Purbi Champaran ,Samastipur ,Saran ,Sitamarhi districts and rise of more than 4 m is significantly observed In Buxar, Nalanda ,Rohtas, Samastipur, Saran and Patna districts.

Fall in Water Levels:

Out of the 615 wells, 329 wells that have registered fall in water levels, 81% have recorded less than 2 m while 18% in the range of 2 to 4 m and remaining 1% wells registered water level fall of more than 4 m. Fall of less than 2 m is observed in all districts mainly in parts of Begusarai, ,Bhagalpur, Bhojpur ,Buxar ,Gaya, Madhepura, Muzaffarpur ,Purbi Champaran ,Rohtas ,Saran ,Sheikhpura ,Supaul ,Vaishali ,Patna districts. Fall beyond 4 m is recorded mainly in Gaya, Munger, Sheikhpura, Nalanda , Purbi Champaran districts

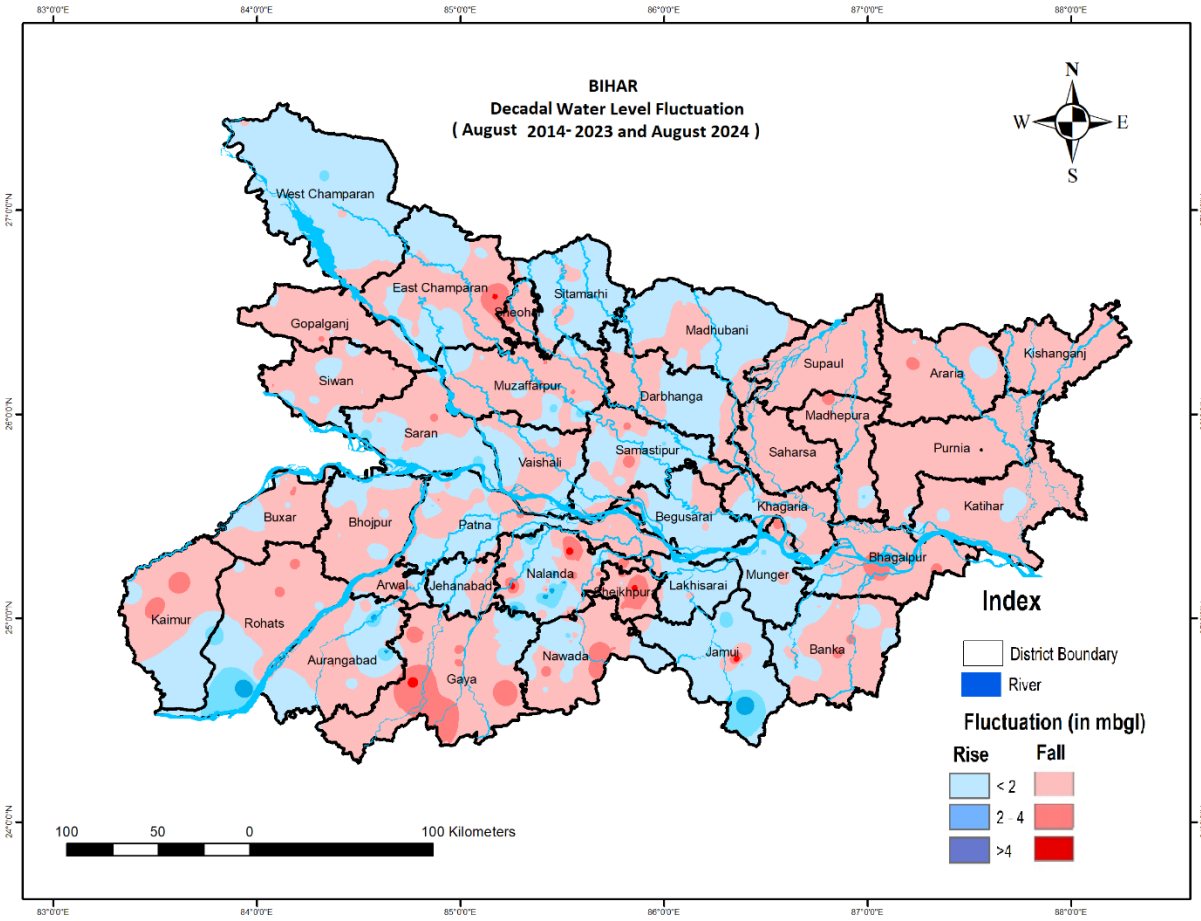

Figure 10- Map showing Decadal Water level fluctuation map of unconfined aquifer of Bihar

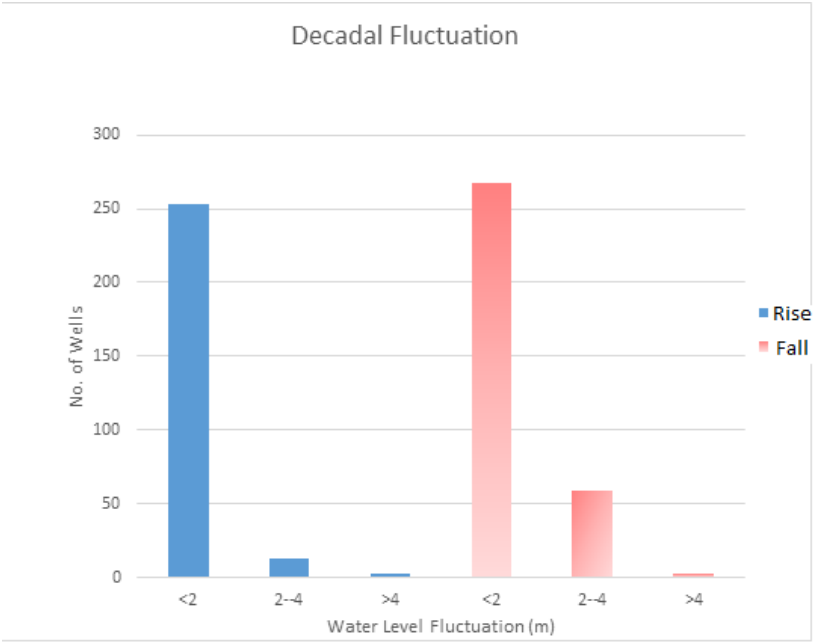

Figure 11- Graph showing Decadal Water level fluctuation map of unconfined aquifer of Bihar

Summary

As a component of the National Ground Water Monitoring Programme, the CGWB, MER, Patna conducts monitoring of the ground water conditions on a quarterly basis: The depth to the water table was monitored in 717 dug wells across Bihar, with water levels ranging from 0.08 meters below ground level (mbgl) in Madhubani to 12.1 mbgl in Nalanda. Of these, 4% of wells had water levels less than 2 mbgl, 24% ranged from 2 to 5 mbgl, 60% were between 5 and 10 mbgl, and 16% exceeded 10 mbgl. Annual fluctuation between August 2023 and August 2024, 299 out of 679 wells showed a rise in water levels, with 82% recording an increase of less than 2 meters, mainly in Arwal, Madhubani, and Pashchim Champaran, while 18% showed a rise of 2–4 meters, primarily in Jamui, Jehanabad, and Kaimur. Conversely, 380 wells recorded a fall, with 83% showing a decrease of less than 2 meters, significantly in Araria, Bhagalpur, and Darbhanga, while 13% recorded a fall of 2–4 meters, mainly in Gaya, Muzaffarpur, and Nawada. Seasonal fluctuation (May–August 2024), with 505 out of 581 wells registering a rise and 38 wells showing a fall. Over the decadal period (2014–2024), 269 out of 615 wells recorded a rise in water levels, with 94% showing a rise of less than 2 meters, mainly in Bhagalpur, Darbhanga, and Samastipur, and 1% exceeding 4 meters, notably in Buxar and Rohtas. Meanwhile, 329 wells registered a fall, with 81% experiencing a fall of less than 2 meters, notably in Begusarai and Bhojpur, while 1% exceeded a 4-meter fall, primarily in Gaya, Munger, and Nalanda.