भूजल स्तर बुलेटिन

पूर्व - मॉनसून

(मई 2024)

Ground water Level Bulletin

Pre-Monsoon

(May 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.

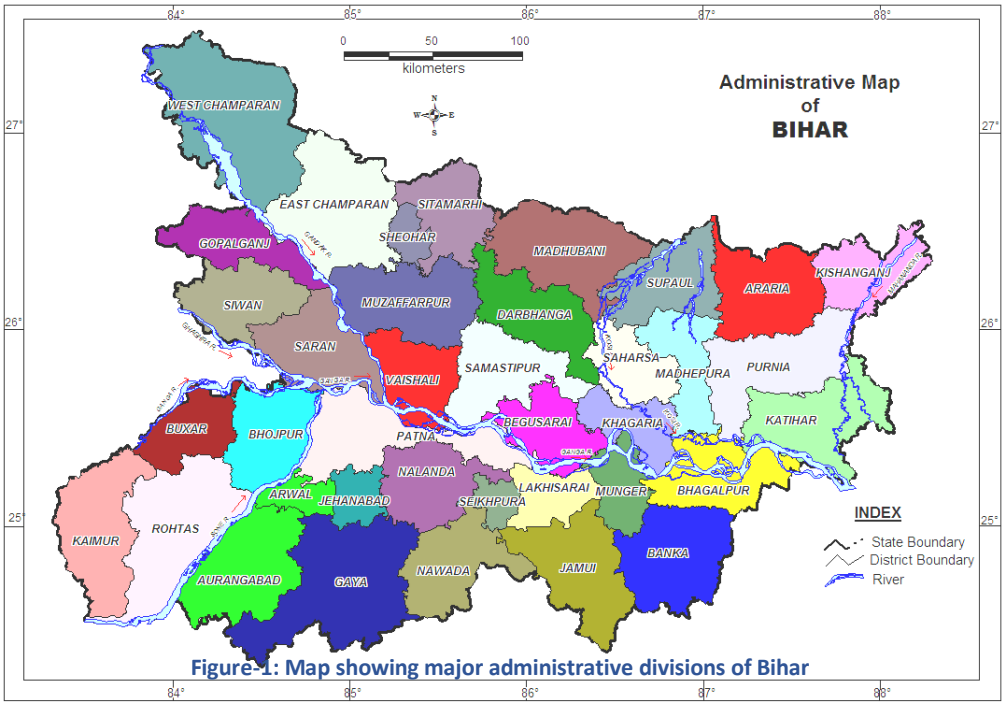

Figure-1: Map showing major administrative divisions of Bihar

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)*

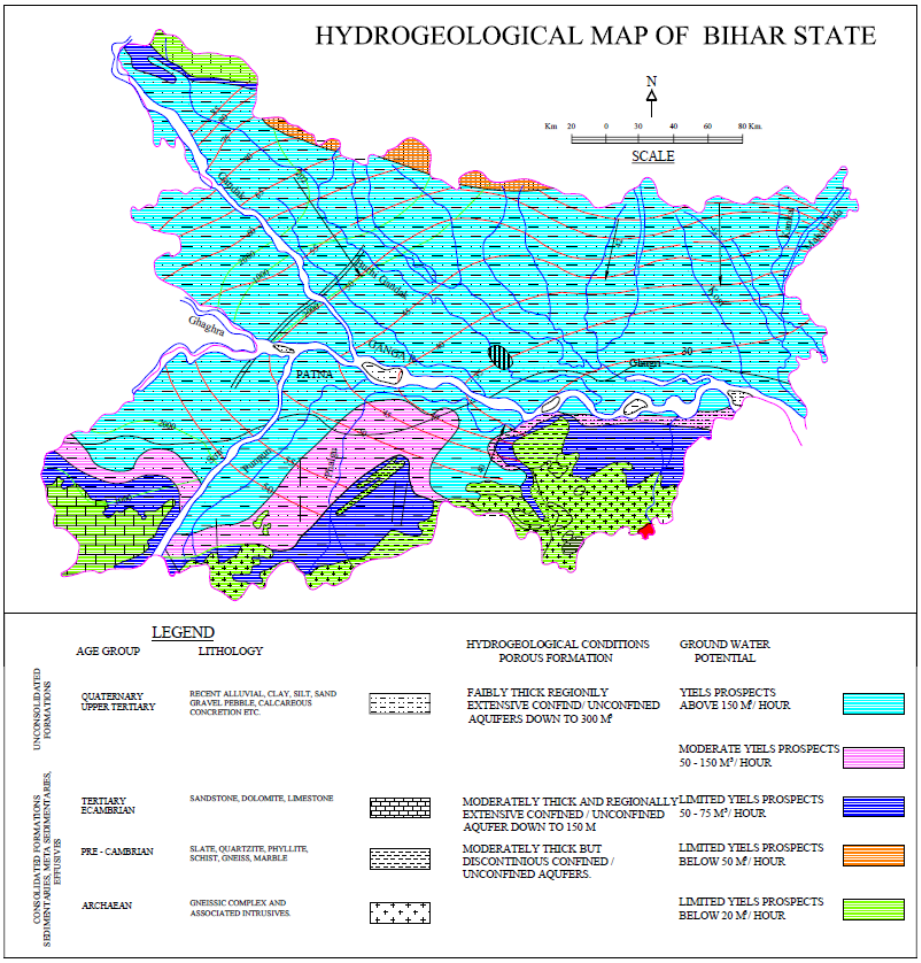

Figure-2: Hydrogeological Map of Bihar state

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 in operation. Groundwater level data was successfully collected from 651 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**.

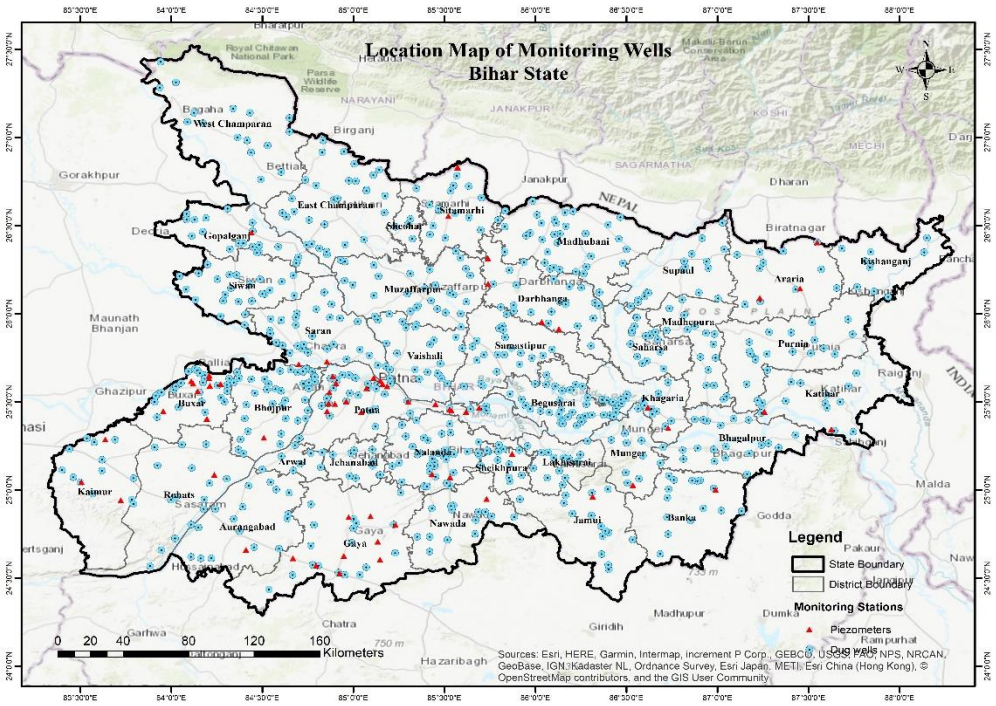

Figure 3- Map showing Location map of Monitoring wells Bihar

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 (May 2024) .

Depth To Water Level were recorded from 601 dugwells .The water levels range from 0.88 mbgl in the Madhubani district to 13.85 mbgl in the Bhagalpur district. The 4% of the wells have a water level of less than 2 mbgl, 43% of the wells have water levels between 2 and 5 mbgl, 50% have water levels between 5 and 10 mbgl, and 2% have water levels deeper than 10 mbgl.

Shallow water levels of less than 2 to 5 mbgl are mainly observed in northern Bihar. Water levels between 5 and 10 mbgl are found throughout the state, while water levels deeper than 10 mbgl are seen in few small patches in places in the State.

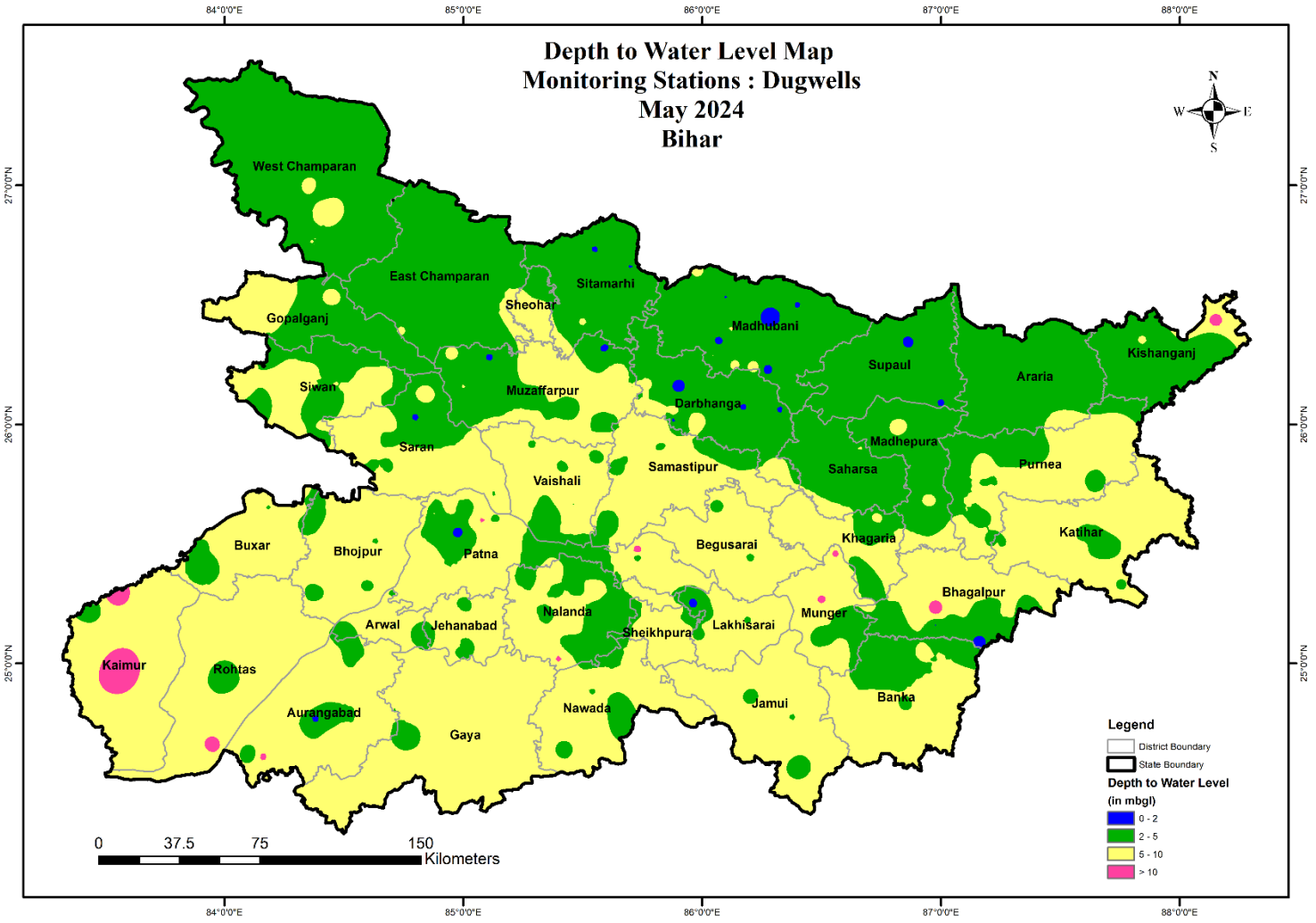

Figure 4- Map showing Depth to Water level map of Monitoring Stations (Dugwells) Bihar

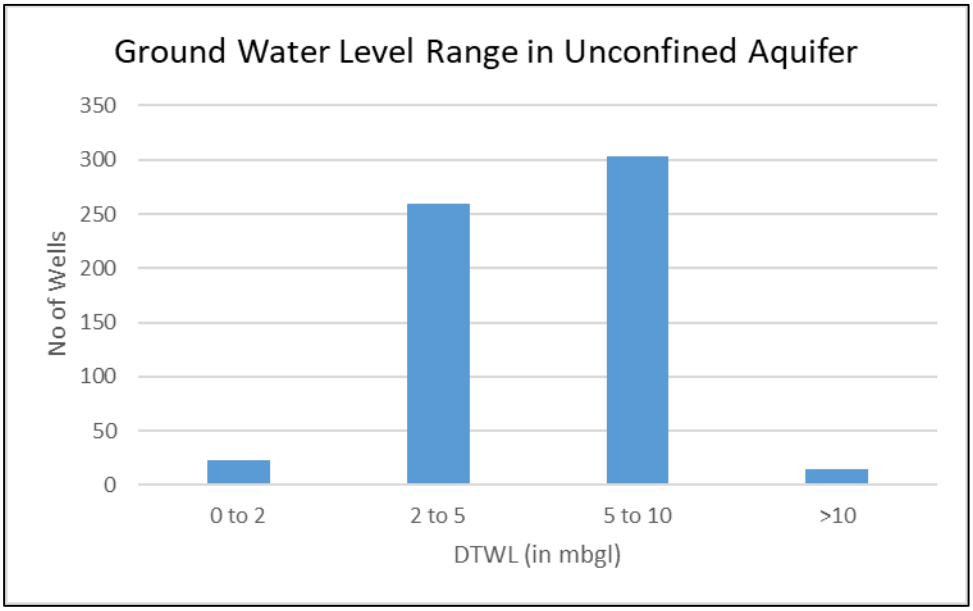

Figure 5- Graph showing Depth to Water level of Monitoring Stations (Dugwells) Bihar

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

Rise in Water Levels:

Out of 499 dugwells , 242 wells exhibited a rise in water levels, and out of 242 wells 87% of wells recorded an increase of less than 2 meters, 10% recorded an increase between 2 and 4 meters, and only 2% of wells exhibited a rise of more than 4 meters. A rise of less than 2 meters was mainly observed in parts of Vaishali, Supaul, Begusarai, and Madhubani districts. The increase of 2 to 4 meters was primarily noted in Bhagalpur, Khagaria, and Nalanda districts. The rise of over 4 meters was observed in wells located in Banka, Kaimur, Jahanabad ,Begusarai, and Darbhanga districts.

Fall in Water Levels:

Out of 499 dugwells , 239 wells recorded a fall in water levels, and out of the 239 wells 91% of wells showed a decrease of less than 2 meters, while the remaining 9% recorded a fall between 2 and 3 meters. A decrease of less than 2 meters was observed across all districts, significantly in Saran, Purbi Champaran, Sitamarhi, and Bhojpur districts. The 8% of wells that showed a fall of 2 to 3 meters were primarily located in Bhagalpur, Begusarai, and Bhojpur districts.

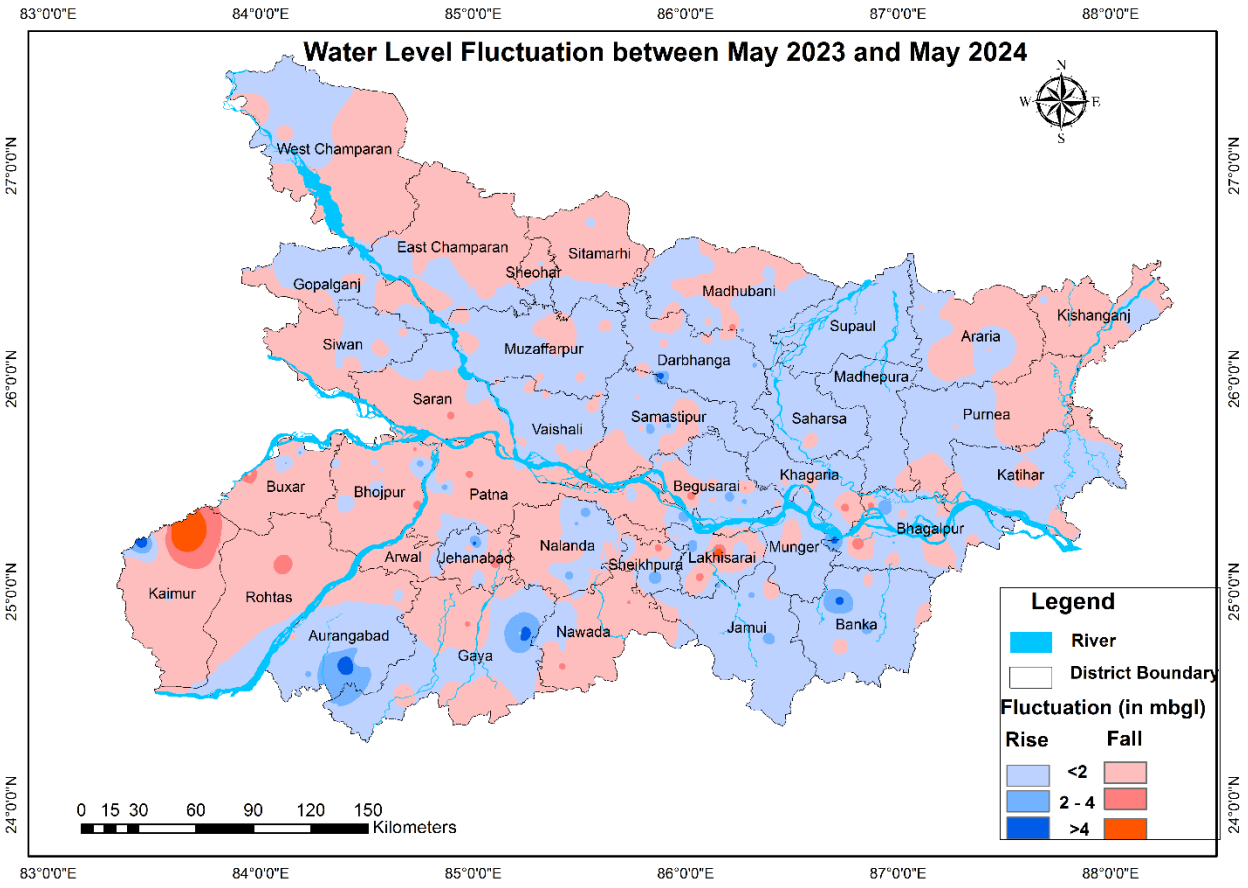

Figure 6-Map showing Annual Water level fluctuation map of unconfined aquifer of Bihar

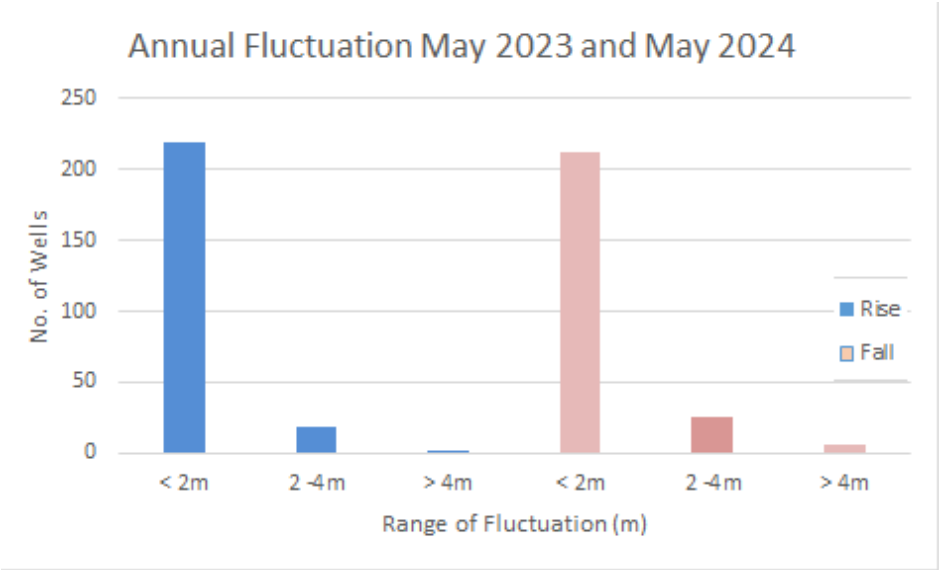

Figure 7- Graph showing Annual Water level fluctuation of Monitoring Stations (Dugwells) Bihar

Seasonal Fluctuation of Water Level in Unconfined Aquifer (November 2023 to May 2024)

Rise in Water Levels:

Out of 548 dug wells , 44 wells exhibited a rise in water levels, and out of 44 wells 82 % of wells recorded an increase of less than 2 meters and 4% recorded an increase between 2 and 4 meters.

Fall in Water Levels:

Out of 548 dugwells , 504 wells recorded a fall in water levels, and out of the 504 wells 54% of wells showed a decrease of less than 2 meters, and 38% of wells fall between 2 to 4 meters and 40% of wells recorded more than 4 m fall .

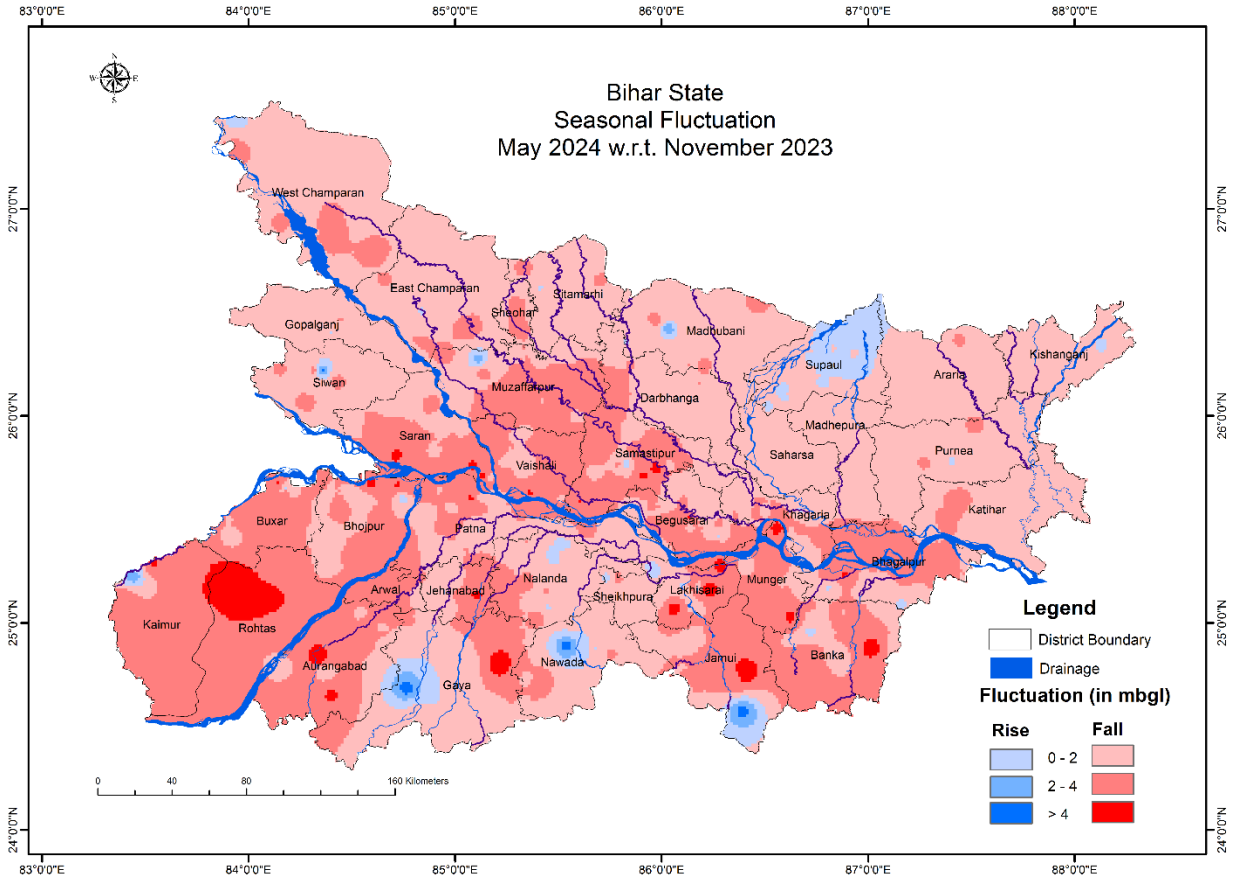

Figure 8-Map showing Seasonal Water level fluctuation map of unconfined aquifer of Bihar

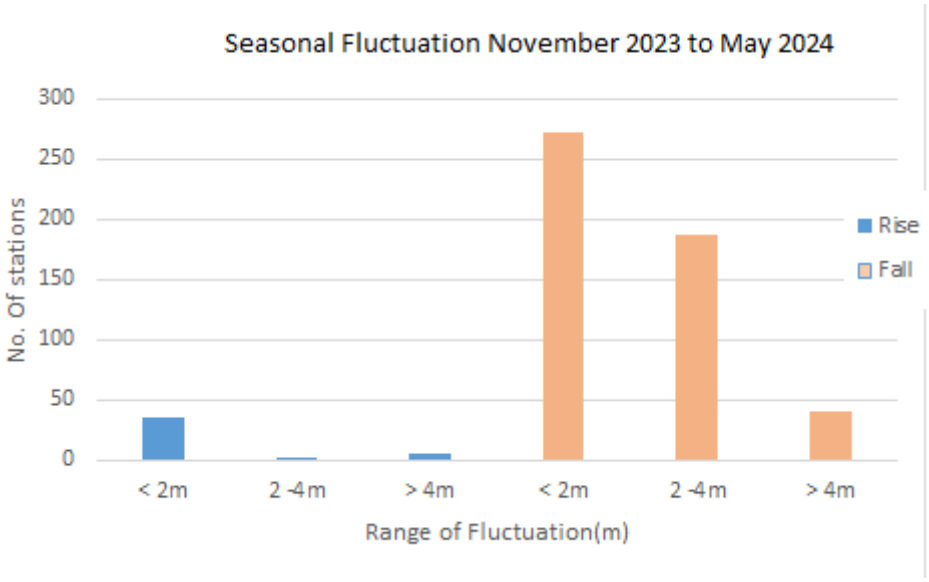

Figure 9- Graph showing Seasonal Water level fluctuation of Monitoring Stations (Dugwells) Bihar

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

Rise in Water Levels:

Out of 452 dug wells , 181 wells exhibited a rise in water levels.Out of 181 wells, water level rise of less than 2 m is recorded in 85 % wells, 2 to 4 m in 12 % 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 Aurangabad ,Vaishali , Supual darbhanga, Khagaria, Siwan, Buxar, Nalanda, Sheikhpura banka, Munger ,Muzaffarpur ,Samastipur ,Saran and gaya districts and rise of more than 4 m is significantly observed In gaya, Bhagalpur and Munger districts.

Fall in Water Levels:

Out of the 452 wells, 271 wells that have exhibited fall in water levels, Out of 271 wells 92% have recorded less than 2 m while 6% in the range of 2 to 4 m and remaining 0.3% wells exhibited water level fall of more than 4 m. Fall of less than 2 m is observed in all districts mainly in parts of Purbi Champaran, Pashchmi Champaran, Araria, Purnia, Kathihar, Kishanganj, and Nawada districts. Fall beyond 2 m is recorded mainly in Kaimur, Patna and Jehanabad.

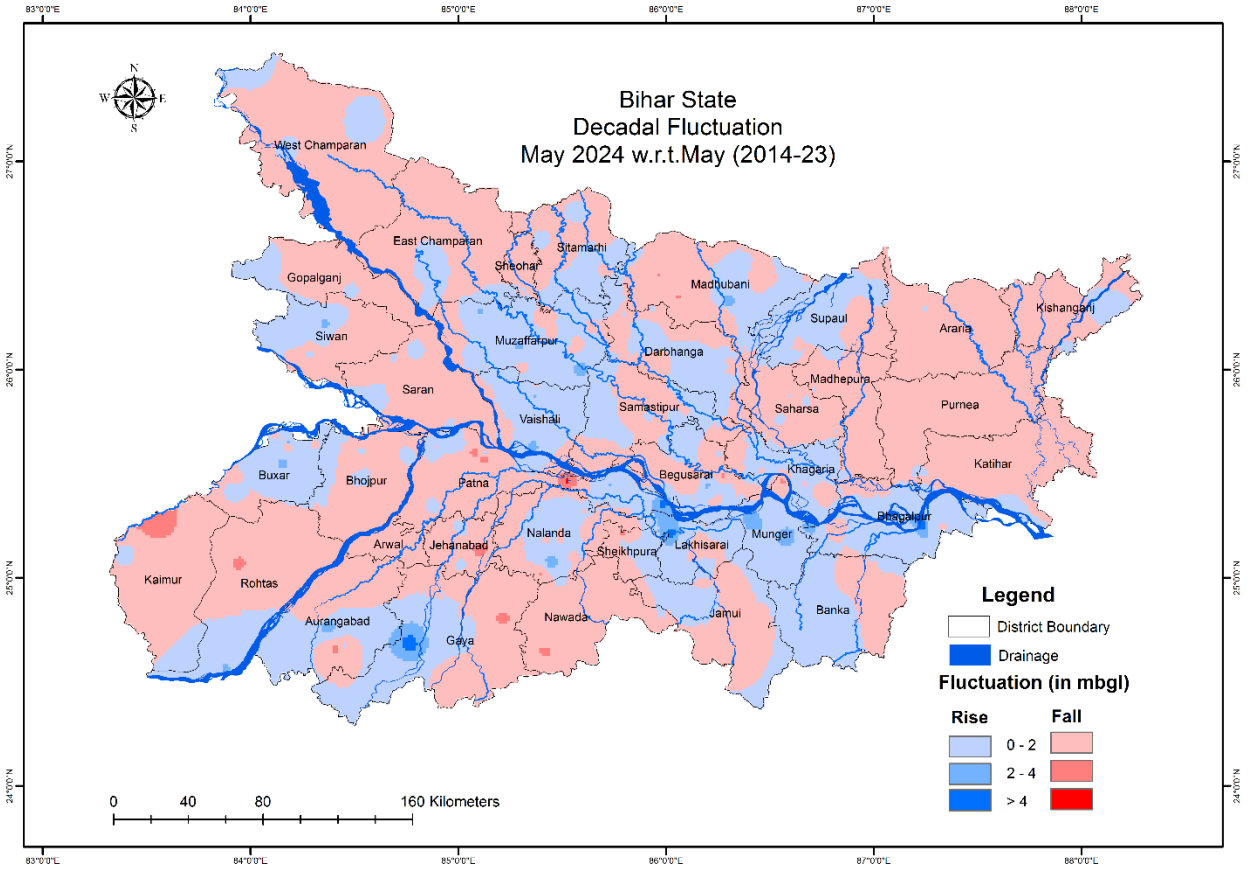

Figure 10- Map showing Decadal Water level fluctuation map of unconfined aquifer of Bihar

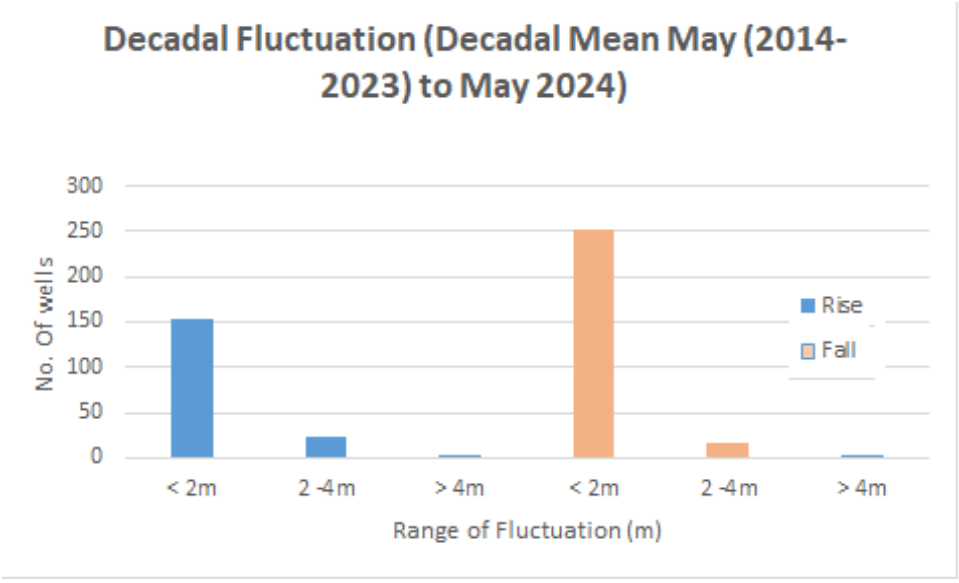

Figure 11- Graph showing Decadal Water level fluctuation map of unconfined aquifer of Bihar

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 In May 2024, the water levels in 601 dug wells across Bihar ranged from 0.88 meters in Madhubani to 13.85 meters in Bhagalpur. Most wells (93%) had water levels between 2 and 10 meters, with shallow levels found primarily in northern Bihar. Over the period from May 2023 to May 2024, 242 wells recorded a rise in water levels, with 87% of these showing an increase of less than 2 meters, especially in Vaishali and Madhubani. In contrast, 239 wells recorded a decrease, mostly under 2 meters, in districts like Saran and Bhojpur. Over the past decade (2014-2023), 181 wells showed a rise in water levels, predominantly under 2 meters, with significant increases in Gaya and Bhagalpur, while 271 wells recorded a fall, mainly under 2 meters, in areas like Purbi Champaran and Kaimur.