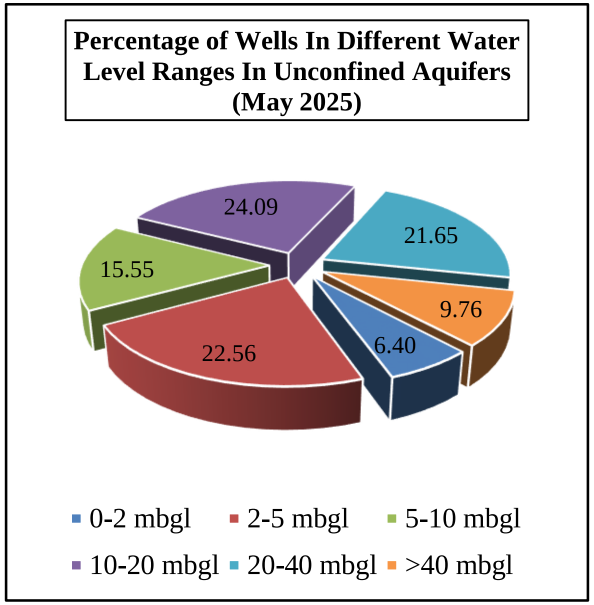

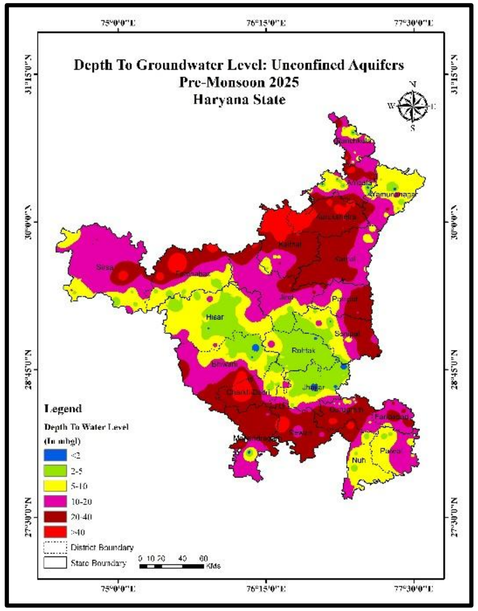

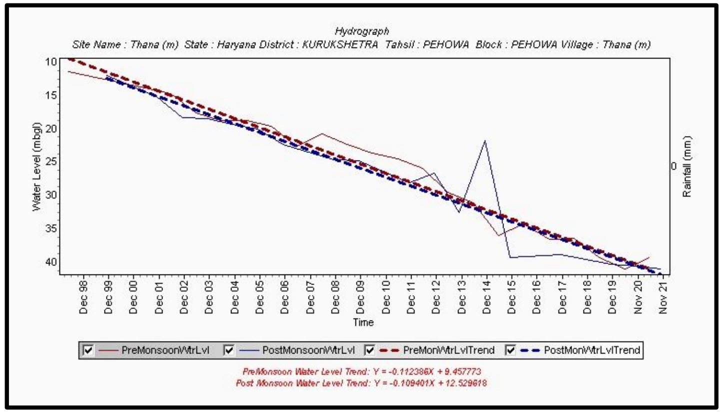

GROUND WATER LEVEL BULLETIN

HARYANA STATE

ABSTRACT

Ground water level Scenario during May 2025 highlighting the **findings, status of ground water level in unconfined aquifers andits** annual and decadal comparison.

CGWB, NORTH WESTERN REGION, CHANDIGARH

SUBMITTED BY

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Scientist ‘B’ (Hydrogeology) & OIC (RODC),CGWB, NWR, Chandigarh

1.0 INTRODUCTION

Groundwater bulletin is prepared by CGWB depicting changes in groundwater regime of the country 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 involve climatic parameters like rainfall, evapotranspiration etc., whereas anthropogenic influences include groundwater pumping from the aquifers, recharge due to irrigation systemsand other practices like waste disposal etc.

Groundwater levels are being measured by Central Ground Water Board four times a year during January, May, August and November. The regime monitoring started in the year 1969 by Central Groundwater Board. A network of 26,000 observation wells called **National Hydrograph Network Stations (NHNS)**, as on 30.04.2025, located all over the country is being monitored.

2.0 STUDY AREA

Ground water is among the Nation's most precious natural resources. Measurements of water levels in wells provide the most fundamental indicator of the status of this resource and are critical to meaningful evaluations of the quantity and quality of ground water and its interaction with surface water. Water-level measurements are made by Central Ground Water Board four times a year but the measurements in May are quite crucial as it provides the overall impact of rainfall infiltration into ground water system during monsoon season and ground water withdrawal for irrigation which counts nearly 65% of its annual irrigation demands during this period only.

The Haryana State is located between north latitudes 27^0 39' & 30^0 55' and east longitudes 74^0 27' & 77^0 35' covering an area of 44,212 sq. km. The State has been divided into four main divisions viz. Ambala, Gurgaon, Rohtak and Hisar, which are further sub-divided into 22 districts and 142 community development blocks. The state is sub-divided into nine physiographic units and is drained by two major rivers, Ghaggar and Yamuna. There are four irrigation systems in the

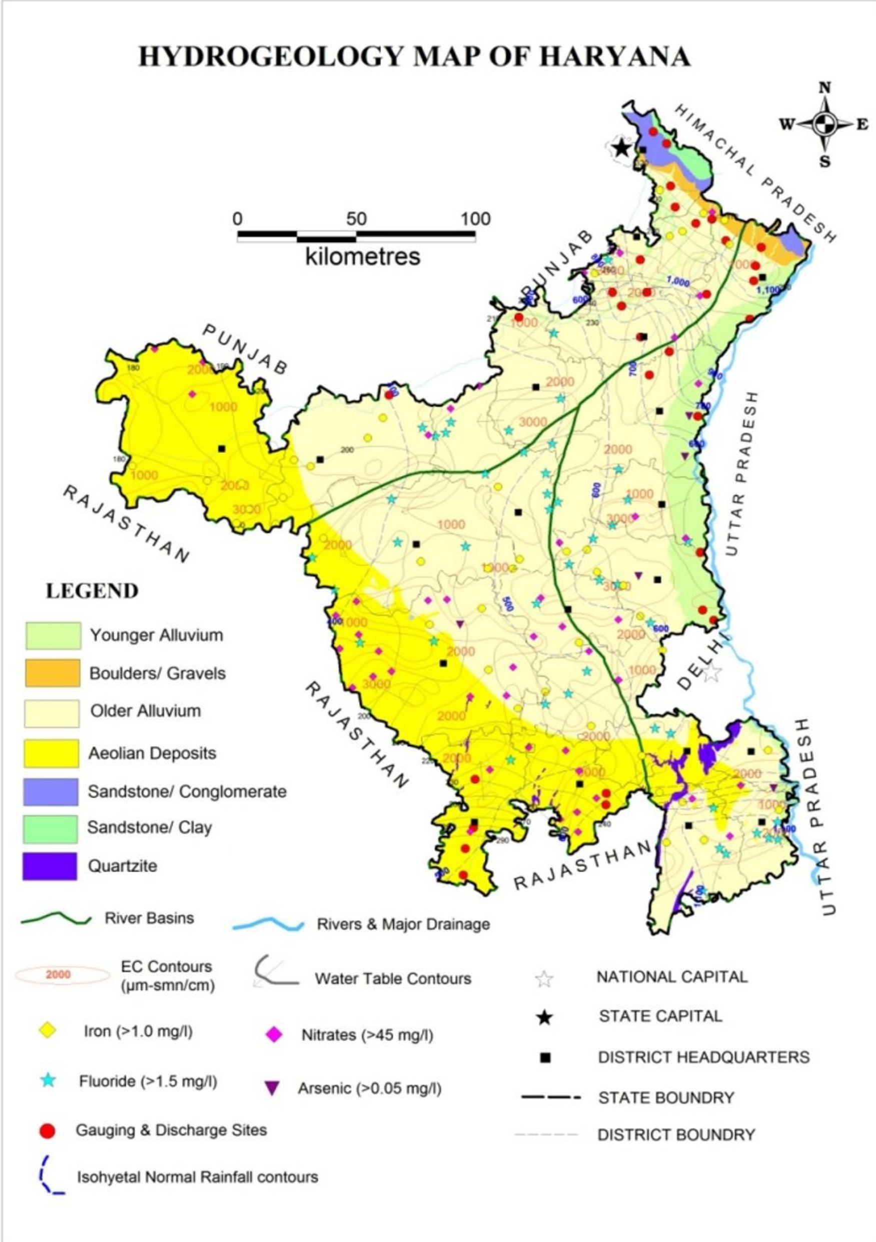

Figure-1: Map showing major aquifers and Hydrogeology of Haryana

state namely Western Yamuna Canal, Bhakra canal, Agra canal and Ghaggar canal. Three geological rock groups are prevalent in the state viz. Pre-Cambrian, Tertiary and Quaternary. The Quaternary Group comprises of alluvium which occupies 97% of the area of the State. The Tertiary Group is represented by the outermost zone of the Siwalik System composed mainly of sandstones, clay and boulders. The rocks of Pre-Cambrian Group which form part of the Aravalli Hill Ranges are exposed in Gurgaon, Mewat and Faridabad districts and as small outcrops in other Southern districts. The thickness of alluvium deposits decreases from North to South. The State of Haryana lies in the great Indo-Gangetic Plain. The Quaternary alluvium has been deposited at places on semi-consolidated Tertiary rocks (Siwalik Group) or on a basement of metamorphic and igneous rocks of Precambrian Era. The present and ancient rivers laid down the alluvial sediments since Pleistocene Epoch in the foredeep or a down wrap formed in front of the rising Himalayan ranges and these pediments represent the younger geological formation.

3.0 GROUND WATER LEVEL MONITORING

Central Ground Water Board, North Western Region, Chandigarh has established Ground Water Observation Wells (GWOW) in Haryana State for monitoring the water levels. As on 31.03.2025, there were 495 Ground Water Observation Wells which included 151 dug wells and 344 piezometers for monitoring unconfined, semi- confined & confined aquifers. The district wise details of Ground water observation wells are given in Table 1 and location of these Ground water observation wells is shown in Figure 2.

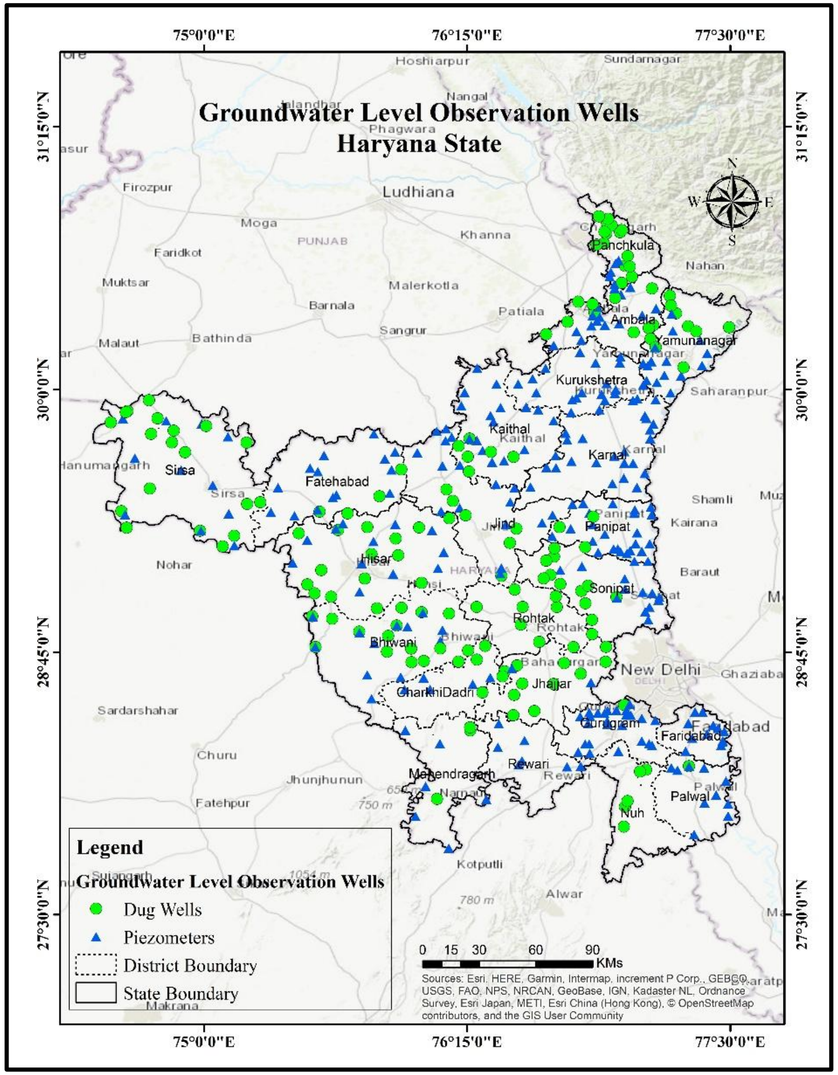

Figure- 2: Map showing locations of monitoring wells (NHNS) in Haryana

S. No.	Districts	Dug Well	Piezometer	Total
1	Ambala	11	25	36
2	Bhiwani	17	14	31
3	CharkhiDadri	5	7	12
4	Faridabad	0	12	12
5	Fatehabad	2	19	21
6	Gurugram	1	24	25
7	Hisar	17	18	35
8	Jhajjar	10	2	12
9	Jind	6	21	27
10	Kaithal	6	26	32
11	Karnal	0	33	33
12	Kurukshetra	0	26	26
13	Mahendragarh	3	6	9
14	Nuh	5	2	7
15	Palwal	1	10	11
16	Panchkula	17	7	24
17	Panipat	3	27	30
18	Rewari	0	7	7
19	Rohtak	9	0	9
20	Sirsa	19	19	38
21	Sonipat	11	14	25
22	Yamunanagar	8	25	33
Total		**151**	**344**	**495**

Table 1: District-wise distribution of water level monitoring stations

4.0 RAINFALL

Haryana experiences a predominantly semi-arid to sub-humid climate, with significant variability in rainfall both spatially and temporally. The state receives most of its annual rainfall during the southwest monsoon season (June to September), accounting for approximately 75–80% of the total annual precipitation. Average annual rainfall in Haryana varies from about 300 mm in the southwestern arid districts like Sirsa and Hisar to over 1,000 mm in the northeastern regions such as Panchkula and Yamunanagar. This uneven distribution plays a critical role in influencing the recharge potential of groundwater across different parts of the state.

Despite occasional spells of heavy rain, Haryana's rainfall is characterized by high inter-annual and intra-seasonal variability, often leading to frequent occurrences of both drought and localized flooding. The limited and erratic nature of rainfall, combined with high dependence on groundwater for irrigation, has resulted in declining groundwater levels, especially in central and southern districts. Effective water management strategies must therefore account for the region's rainfall pattern to ensure sustainable groundwater recharge and usage.

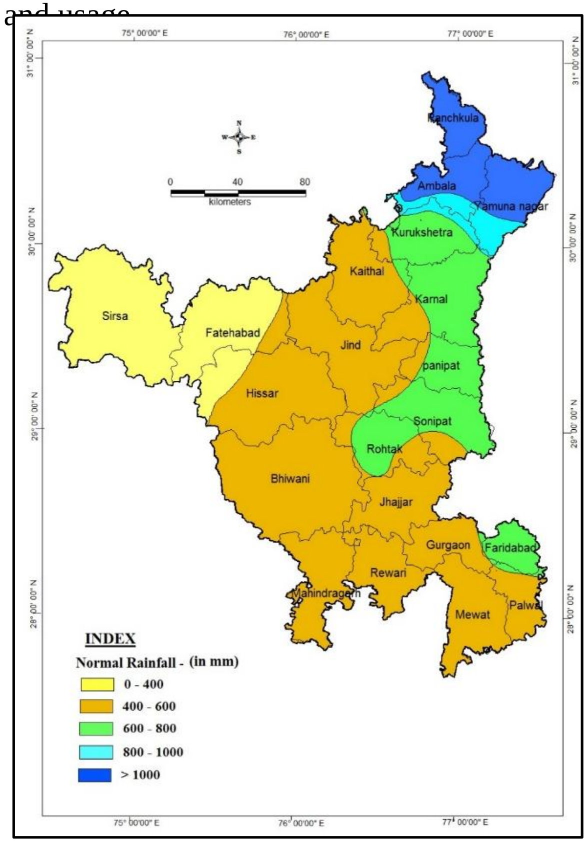

Figure-3: Isohyetal Map of Normal Rainfall In Haryana State

S. No.	District	2012	2015	2018	2021	Normal Average
1	Ambala	861	921	937	689	963
2	Bhiwani	397	328	373	533	428
3	Charkhi Dadri	450	599	325	535	535
4	Faridabad	469	489	437	611	521
5	Fatehabad	485	220	203	596	376
6	Gurugram	397	627	514	988	583
7	Hisar	419	371	294	518	415
8	Jhajjar	313	521	482	929	442
9	Jind	390	472	479	698	529
10	Kaithal	477	443	660	693	583
11	Karnal	477	643	943	708	724
12	Kurukshetra	633	495	731	580	696
13	Mahendragarh	468	400	442	715	502
14	Nuh (Mewat)	497	499	431	697	572
15	Palwal	496	435	391	572	508
16	Panchkula	981	1261	1216	959	1112
17	Panipat	432	610	542	697	615
18	Rewari	395	489	554	901	562
19	Rohtak	316	501	459	860	601
20	Sirsa	396	311	229	388	320
21	Sonipat	405	584	560	858	629
22	Yamunanagar	1024	1036	1236	1159	1109

Table-2: District-Wise Variability of Rainfall In Haryana State

5.0 GROUND WATER LEVEL SCENARIO (MAY, 2025)

5.1 UNCONFINED AQUIFER

5.1.1 DEPTH TO WATER LEVEL DATA

The behavioral pattern of water level in May 2025 along with depth to water level map (Fig.5) is discussed below.

The depth to water level lies between 0.74 mbgl in Dugwell in Village Choli, District Yamunanagar and 72.93 mbgl in Piezometer in Village Dahina, District Rewar. Very shallow water levels of 0-2 m (causing water logging) occur in 6.40% of wells and 0.32% area of the state in isolated patches in Jhajjar and Bhiwani districts. Shallow water levels of 2-5 m have been observed in 22.56% of the wells and 13.15% of the total area that lies in central parts of state i.e Hisar, Bhiwani, Rohtak, Jhajjar and Charkhi Dadri districts. The water levels between 5-10 m are observed in Fatehabad, Jind, Sirsa, Hisar, Panchkula, Bhiwani, Charkhi Dadri, Rohtak, Jhajjar, Mahendragarh, Nuh, Palwal, Ambala and Yamunanagar districts. About 15.55% of wells and 23.09% of the area fall in this range. Moderately Deep water levels (10-20 m) are observed in 24.09% wells covering about 30.12% area of the State Sirsa, Fatehabad, Jind, Panipat, Karnal, Sonipat, Panchkula, Nuh, Yamunanagar, Gurgaon, Faridabad, Palwal, Bhiwani, Charkhi Dadri and Mahendragarh districts. Deep water levels (20-40 m) are observed in parts of Kurukshetra, Kaithal, Karnal, Panipat, Sirsa, Bhiwani, Gurgaon, Rewari, Faridabad, Charkhi Dadri, Fatehabad, Sonipat and Yamunanagar districts and observed in 21.65% wells covering about 28.43% area of the state. Very deep water levels (>40 m) are observed in 9.76% wells as patches in Gurgaon, Kurukshetra, Kaithal, Charkhi Dadri, Rewari, Fatehabad and Sirsa districts covering 4.90% area of the State.

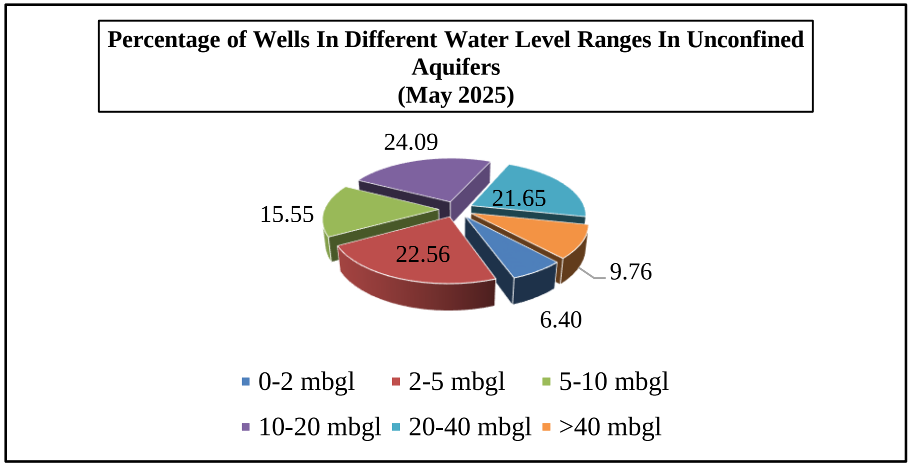

Figure-4: Percentage of wells in different water level ranges in unconfined aquifer.

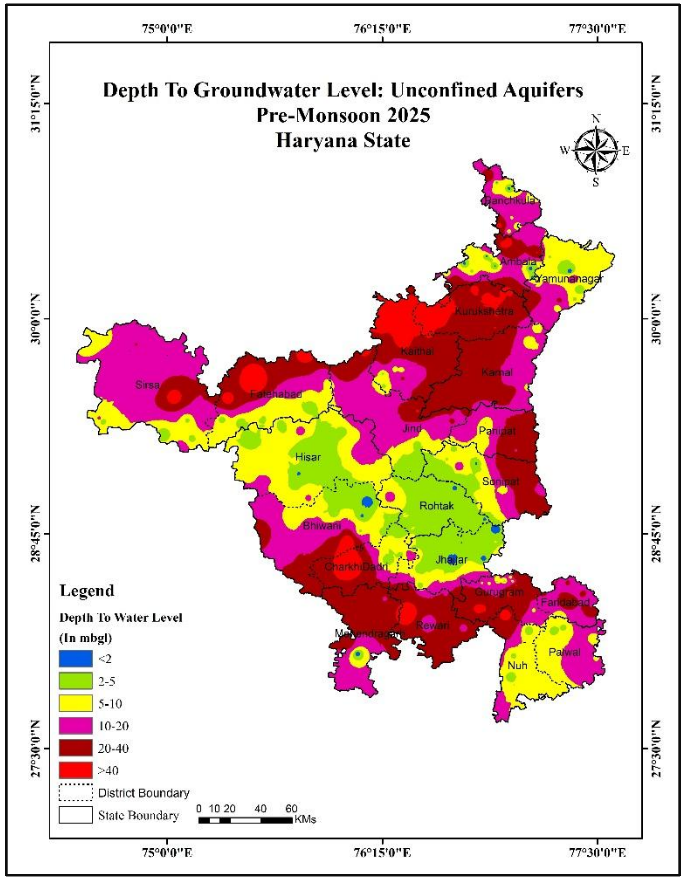

Figure-5: Depth to Water Level Map Unconfined Aquifer, May 2025

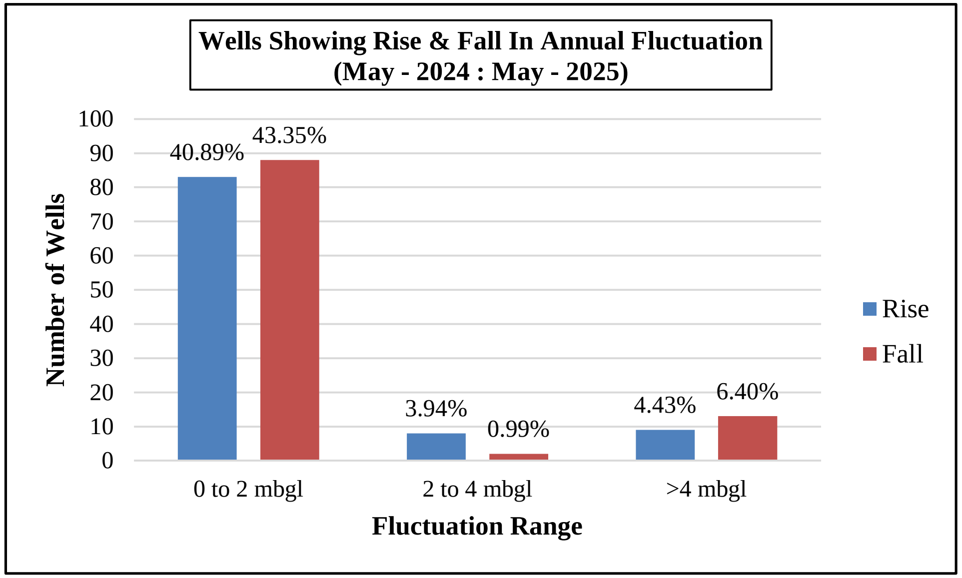

Figure-6: Percentage of wells showing rise and fall in WL in unconfined aquifer (May 2024 to May 2025)

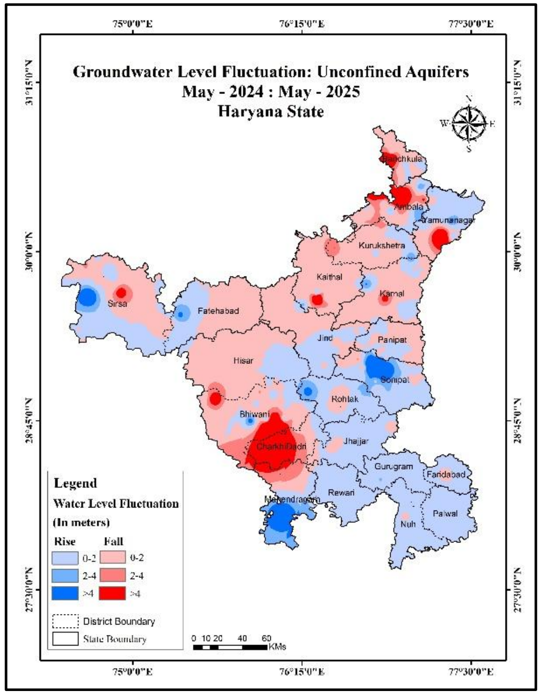

Figure-7: Annual water level fluctuation in unconfined aquifer(May 2024 to May 2025)

5.1.2 ANNUAL FLUCTUATION IN WATER LEVEL

Annual Fluctuation of Water Level in Unconfined Aquifer (Pre-monsoon 2024 – Pre-monsoon 2025)

In order to know the impact of rainfall and ground water withdrawal during last one year, annual water level fluctuations for period May 2024 and May 2025 are calculated. The behavior of annual fluctuations is discussed in the following paragraph and depicted in Fig.7.

Rise in Water Levels:

The water level rise has been recorded in 49.26% of wells monitored and covering 33.68% area of the State. Water level rise in the range of 0-2 m is observed in 40.89% wells and 29.74% of area. Water level rise 2-4m is observed in 3.94% wells and 2.46% of area. The water level rise of >4m is observed in 4.43% wells and 1.48% of area as isolated patch in Mahendragarh, Sonipat and Sirsa districts.

Fall in Water Levels:

The annual fluctuation depicts general decline of water levels in 50.74% of wells monitored and covering 66.32% area of the State. The decline has been observed in all districts of the state. Water level decline the range of 0-2 m is observed in 43.35% of wells and 30.11% of the area. Water level decline in the range of 2-4 m is observed in less than 1% of wells and 33.13% of the area. Whereas, the water level decline of >4m is observed in 6.40% of wells and 3.08% of the area during the period, as isolated patches in Charkhi Dadri, Yamunanagar, Ambala, Panchkula districts.

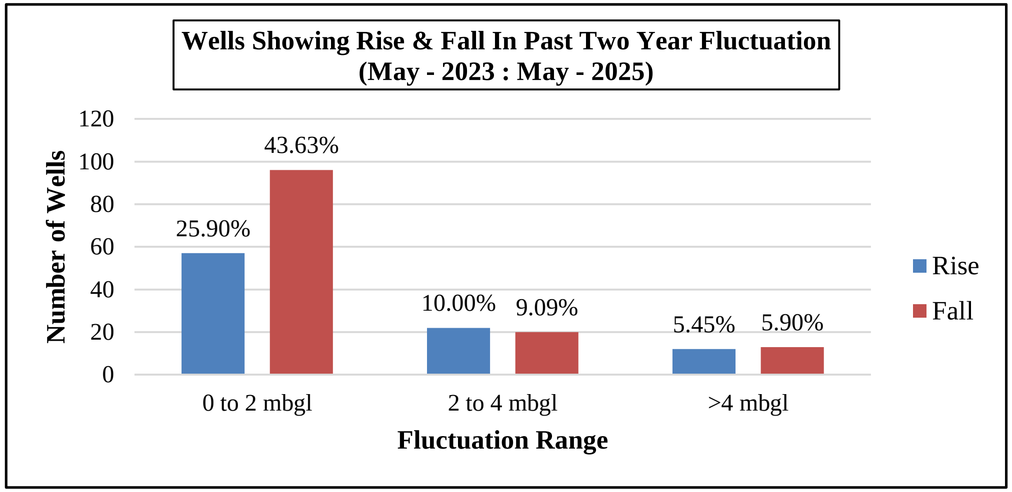

Figure-8: Percentage of wells showing rise and fall in WL in unconfined aquifers (May 2023 to May 2025)

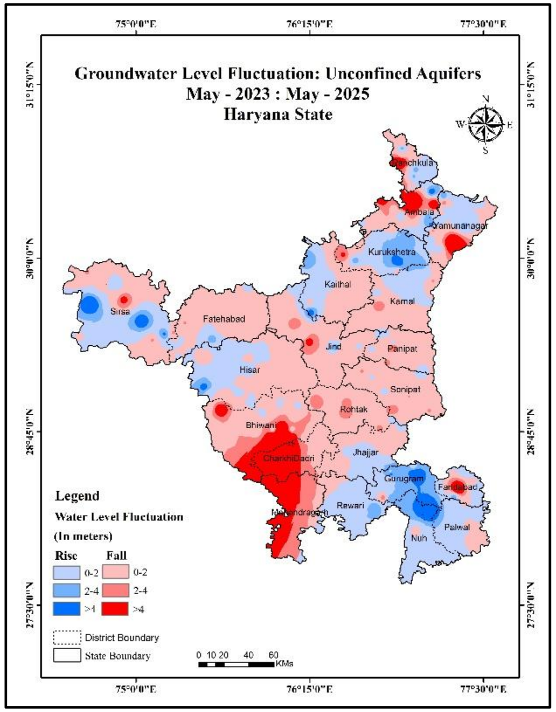

Figure-9: Water Level Fluctuation Map (May 2023 to May 2025)

Past Two Year Fluctuation of Water Level in Unconfined Aquifer (May 2023 to May 2025)

In order to know the impact of rainfall and ground water withdrawal during last two years, past two year water level fluctuations for period May 2023 and May 2025 are calculated. The behavior of annual fluctuations is discussed in the following paragraph and depicted in Fig.9.

Rise in Water Levels

The water level rise has been recorded in 41.35% of wells monitored and covering 35.91% area of the State. Water level rise in the range of 0-2 m is observed in 25.90% wells and 28.34% of area. Water level rise 2-4m is observed in 10.00% wells and 5.74% of area. The water level rise of >4m is observed in 5.45% wells and 1.84% of area as isolated patches in Gurgaon, Nuh, Kurukshetra and Sirsa districts.

Fall in Water Levels

The annual fluctuation depicts general decline of water levels in 58.65% of wells monitored and covering 64.09% area of the State. The decline has been observed in all districts of the state. Water level decline the range of 0-2 m is observed in 43.63% of wells and 50.83% of the area. Water level decline in the range of 2-4 m is observed in 9.09% of wells and 6.374% of the area. Whereas, the water level decline of >4m is observed in 5.90% of wells and 6.89% of the area during the period, as isolated patches in Charkhi Dadri, Mahdendragarh, Bhiwani, Panchkula, Yamunanagar, Ambala and Faridabad districts.

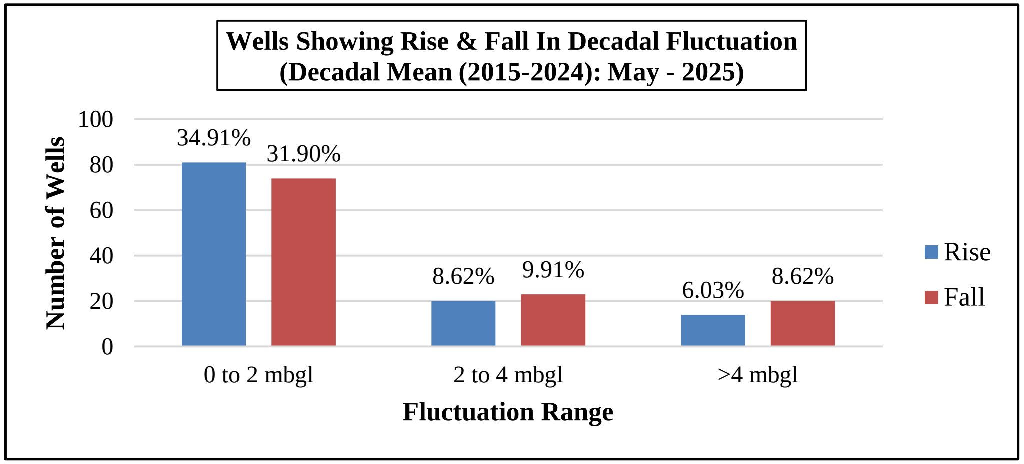

Figure-10: Percentage of wells showing rise and fall in WL in unconfined Aquifer (Decadal Mean May (2015-2024) to May 2025)

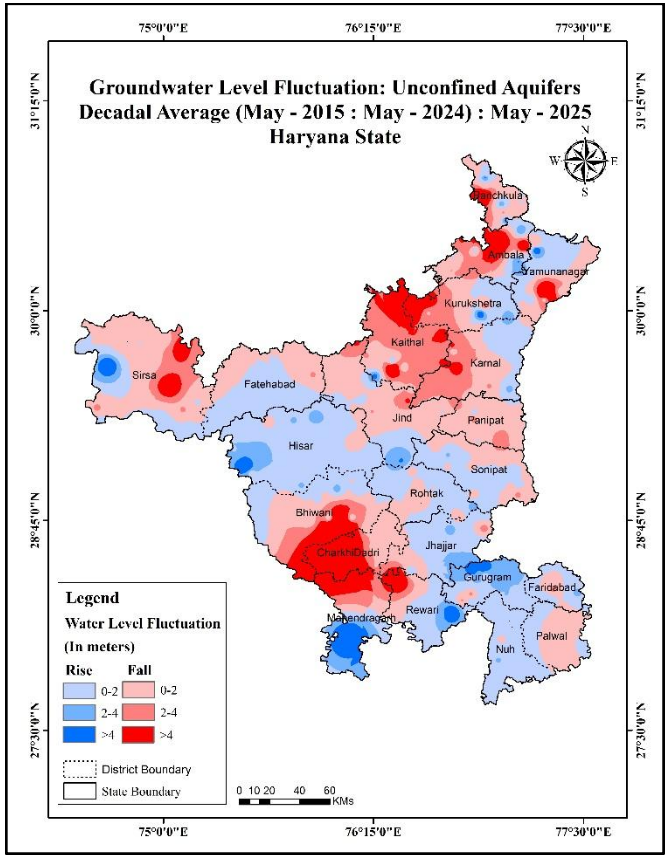

Figure-11: Water level fluctuation in unconfined Aquifer(Decadal Mean May (2015-2024) to May 2025)

5.1.3 DECADAL FLUCTUATION IN WATER LEVEL

Decadal Fluctuation of Water Level in Unconfined Aquifer Decadal Mean (2015-2024): May - 2025

Changes in water level behaviour since last one decade are determined using decadal mean data. Water level mean of past one decade (2015-2024) for each ground water observation well is computed and compared with the respective water level data of May 2025. The behaviour of water level over the period under reference is discussed in paragraph below along with Fig.11.

Rise in Water Levels:

The decadal mean fluctuations show that rise in 49.56% of observation wells monitored covering about 45.88% area of the state. Water level rise in the range of 0-2 m is observed in 34.91% of wells and 38.75% of the area. Water level rise of 2-4m is observed in 8.62% of wells and 5.32% of the area. Water level rise of >4m is observed in 6.03% of wells and 1.81% of the state area as isolated patch in Sirsa, Hisar, Gurgaon and Rewari districts.

Fall in Water Levels:

The decadal mean fluctuations show that decline in 50.44% of observation wells monitored covering about 54.12% area of the state. The decline has been observed in all districts of the state. The decline of 0-2 m has been observed in about 31.90% of wells and 34.20% of area. Water level decline of 2-4 m is observed in 9.91% of the wells and 8.51% of the area. Water level decline of >4m is observed in 8.62% of the wells and 8.41% of area during the period, in Sirsa, Kurukshetra, Karnal, Yamunanagar, Rewari, Bhiwani and Charkhi Dadri districts.

6.0 SUMMARY

The Groundwater Level Bulletin for Haryana, published by the Central Ground Water Board, North Western Region, Chandigarh presents an assessment of the groundwater scenario as of May 2025, focusing on unconfined aquifers and comparing annual and decadal trends. Groundwater monitoring across 495 observation wells reveals significant spatial variations in water table depths, ranging from less than 1 meter to over 70 meters below ground level. Annual and two-year analyses indicate a general decline in groundwater levels across more than half the state, with localized rises in certain districts. The decadal comparison shows a similar trend, with over 50% of wells recording declining levels, though some areas exhibit improvement. Rainfall variability, excessive groundwater extraction for irrigation, and limited recharge are major contributing factors. To address this, recommendations include a mix of demand-side measures like crop diversification and smart irrigation, alongside supply-side strategies such as artificial recharge, wastewater reuse, and rainwater harvesting.

7.0 RECOMMENDATIONS

The declining trend of ground water level in Haryana can be improved by Demand and Supply-Side Interventions for Water Conservation which are as given below:

1. **Demand Side Interventions**
   - Change in Paddy Variant – Switching from PUSA-44 (150 days maturity) to PR-126 (117 days maturity) can save 25% of groundwater.
   - Use of AI and Tensiometers – AI-based irrigation and tensiometers help optimize water usage, reducing irrigation needs from 1102 mm/acre to 820 mm/acre.
   - Reduction of Standing Water Column – Lowering the water column from 145 cm to 120 cm in rice cultivation reduces water consumption.

2. **Supply Side Interventions**
   - Artificial recharge structures in government buildings can aid groundwater conservation. Lining of Unlined Channels – Converting unlined irrigation channels to lined ones can reduce groundwater overdraft.
   - Underground Pipelines – Expanding underground pipeline coverage can decrease groundwater development.
   - Canal Water for Irrigation – Maximizing canal water usage can improve groundwater recharge and reduce dependence on groundwater.
   - Artificial Recharge in Paleochannels – Excavating ponds and constructing recharge trenches in paleochannels can enhance groundwater recharge.
   - Reuse of Wastewater – Treating and reusing pond water through the 3-pond system or Thapar model, with solar-powered lifting, helps conserve groundwater.
   - Construction of Injection Wells – Injection wells at minor canal outlets can use surplus canal water to recharge groundwater.
   - Rainwater Harvesting – Installing rainwater harvesting structure after sufficient scientific study.