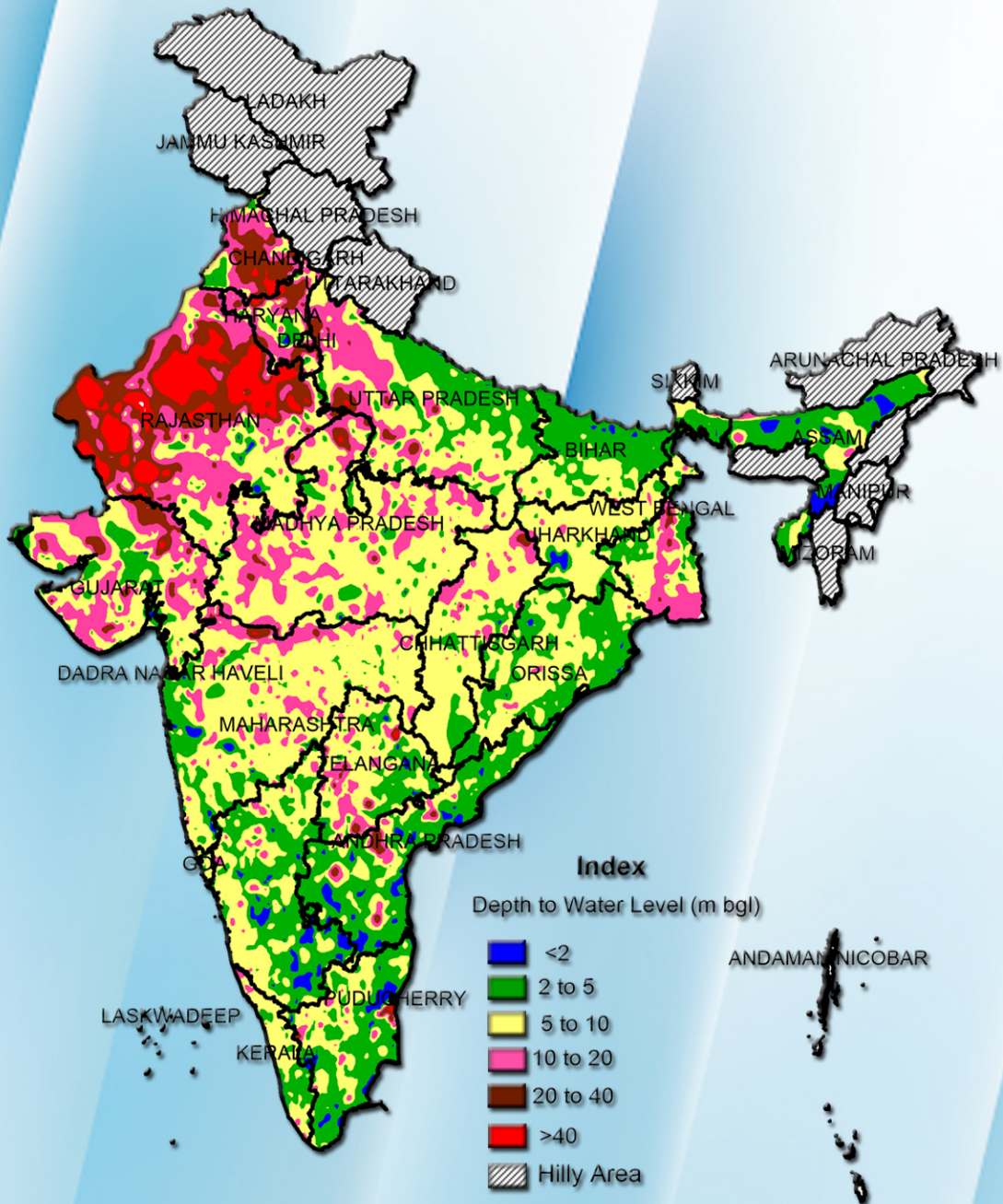




Ground Water Year Book - India 2021-22

भू-जल वार्षिक पत्रिका, भारत वर्ष २०२१-२२



Central Ground Water Board

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

GROUND WATER YEAR BOOK

INDIA 2021-22

CONTENTS	
<i>Chapter</i>	<i>Page No.</i>
1.0 Hydrogeological Setup of the Country	1-4
1.1 Ground Water Occurrence	
1.1.1 Porous Formations	
1.1.2 Fissured Formations (Consolidated Formations)	
1.2 Hydrogeological Units and their Ground Water Potential	
2.0 Rainfall Variations	5-10
3.0 Ground Water Level Scenario	11-47
3.1 Introduction	
3.2 Ground Water Regime in Unconfined Aquifer	
3.2.1 Depth to Water Level in Unconfined Aquifer	
3.2.2 Annual Water Level Fluctuation in Unconfined Aquifer	
3.2.3 Seasonal Water Level Fluctuation in Unconfined Aquifer	
3.2.4 Decadal Water Level Fluctuation in Unconfined Aquifer	
3.3 Ground Water Regime in Deeper Aquifer	
3.3.1 Depth to Water Level in Deeper Aquifer	
3.3.2 Decadal Water Level Fluctuation in Deeper Aquifer	
4.0 Ground Water Resource Availability and Development Status	48-54
4.1 Introduction	
4.2 Dynamic Ground Water Resources, 2020.	
4.3 Ground Water Extraction	
4.4 Stage of Ground Water Extraction	

<i>4.5 Categorization of Assessment Units</i>	
5.0 Ground Water Quality in the Country	55-70
<i>5.1 Introduction</i>	
<i>5.2 Methodology</i>	
<i>5.3 Water Quality Norms and Criteria</i>	
<i>5.4 Chemical Quality of Ground Water in India</i>	
<i>5.4.1 Suitability of ground Water for Potable Purposes</i>	
<i>5.4.2 Uranium occurrence in Shallow Aquifer in India.</i>	
<i>5.4.3 Uranium Concentration and Spatial Distribution</i>	
<i>5. 5 Conclusion on Ground Water Quality in India</i>	
LIST OF PLATES	<i>PLATE No.</i>
<i>Hydrogeological Map of India</i>	<i>I</i>
<i>Annual Rainfall (Normal)</i>	<i>II</i>
<i>Distribution of Actual (2021) Rainfall (mm)</i>	<i>III</i>
<i>Location of Ground Water Monitoring Wells</i>	<i>IV</i>
<i>Depth to Water Level at a glance</i>	<i>V</i>
<i>Depth to water level (August 2021)</i>	<i>VI</i>
<i>Depth to water level (November 2021)</i>	<i>VII</i>
<i>Depth to water level (January 2022)</i>	<i>VIII</i>
<i>Annual water level fluctuation at a glance</i>	<i>IX</i>
<i>Annual water level fluctuation (August 2021-August 2020)</i>	<i>X</i>
<i>Annual water level fluctuation (November 2021-November 2020)</i>	<i>XI</i>
<i>Annual water level fluctuation (January 2021-January 2022)</i>	<i>XII</i>
<i>Seasonal water level fluctuation at glance</i>	<i>XIII</i>
<i>Seasonal water level fluctuation (August 2021-November 2021)</i>	<i>XIV</i>
<i>Seasonal water level fluctuation (August 2021-January 2022)</i>	<i>XV</i>
<i>Decadal water level fluctuation at a glance</i>	<i>XVI</i>

<i>Decadal water level fluctuation, Decadal mean August (2011-2020) Vs August 2021</i>	<i>XVII</i>
<i>Decadal water level fluctuation, Decadal mean November (2011-2020) Vs November 2021</i>	<i>XVIII</i>
<i>Decadal water level fluctuation, Decadal mean January (20120-2021) Vs January 2022</i>	<i>XIX</i>
<i>Ground Water Resources and Extraction Scenario in India</i>	<i>XX</i>
<i>Spatial Variation in Annual Ground Water Recharge</i>	<i>XXI</i>
<i>Categorization of Assessment Units</i>	<i>XXII</i>
LIST OF TABLES	TABLE No.
<i>Aquifer System In The Country</i>	<i>1</i>
<i>State-Wise Seasonal and Annual Rainfall Distribution</i>	<i>2</i>
<i>State/UT- Wise Status of ground water Monitoring Wells</i>	<i>3</i>
<i>Methods for Chemical Analysis of Ground Water Samples</i>	<i>4</i>
<i>Indian Standard for Drinking Water Specifications</i>	<i>5</i>
<i>State-Wise Distribution of Total Water Quality Monitoring Stations</i>	<i>6</i>
<i>Hydro-Chemical Data of Ground Water in India (An Overview)</i>	<i>7</i>
<i>No. of Samples & % of Samples Having EC > 3000 μS/cmAt 25°C In States of India</i>	<i>8</i>
<i>No. of Samples & % of Samples Having NO₃> 45 mg/L In States of India</i>	<i>9</i>
<i>No. of Samples & % of Samples Having F > 1.5 mg/L In States of India</i>	<i>10</i>
<i>Details of Partly Uranium Affected districts in Various States</i>	<i>11</i>
LIST OF ANNEXURES	ANNEXURE No.
<i>State - Wise DTWL and Distribution Of Percentage Of Observation Wells - August 2021 in Unconfined Aquifer</i>	<i>I</i>
<i>State - Wise DTWL and Distribution Of Percentage Of Observation Wells - November 2021 (Post-Monsoon) in Unconfined Aquifer</i>	<i>II</i>
<i>State - Wise DTWL and Distribution Of Percentage Of Observation Wells - January 2022 in Unconfined Aquifer</i>	<i>III</i>

<i>State - Wise Annual Fluctuation And Frequency Distribution From Different Ranges From August 2020 To August 2021 in Unconfined Aquifer</i>	<i>IV</i>
<i>State - Wise Annual Fluctuation And Frequency Distribution From Different Ranges From November 2020 To November 2021 (Post-Monsoon) in Unconfined Aquifer</i>	<i>V</i>
<i>State - Wise Annual Fluctuation And Frequency Distribution From Different Ranges From January 2021 To January 2022 in Unconfined Aquifer</i>	<i>VI</i>
<i>State - Wise Seasonal Fluctuation And Frequency Distribution From Different Ranges From August 2021 To November 2021 in Unconfined Aquifer</i>	<i>VII</i>
<i>State - Wise Seasonal Fluctuation And Frequency Distribution From Different Ranges From August 2021 To January 2022 in Unconfined Aquifer</i>	<i>VIII</i>
<i>State-wise Decadal Water Level Fluctuation With Mean August (2011 to 2020) and August 2021 in Unconfined Aquifer</i>	<i>IX</i>
<i>State-wise Decadal Water Level Fluctuation With Mean November (2011 to 2020) and November 2021(Post-Monsoon) in Unconfined Aquifer</i>	<i>X</i>
<i>State-wise Decadal Water Level Fluctuation With Mean January (2012 to 2021) and January 2022 in Unconfined Aquifer</i>	<i>XI</i>
<i>State - Wise DTWL and Distribution Of Percentage Of Observation Wells - August 2021 in Deeper Aquifer</i>	<i>XII</i>
<i>State - Wise DTWL and Distribution Of Percentage Of Observation Wells - November 2021 in Deeper Aquifer</i>	<i>XIII</i>
<i>State - Wise DTWL and Distribution Of Percentage Of Observation Wells - January 2022 in Deeper Aquifer</i>	<i>XIV</i>
<i>State-wise Decadal Water Level Fluctuation With Mean August (2011 to 2020) and August 2021 in Deeper Aquifer</i>	<i>XV</i>
<i>State-wise Decadal Water Level Fluctuation With Mean November (2011 to 2020) and November 2021(Post-Monsoon) in Deeper Aquifer</i>	<i>XVI</i>
<i>State-wise Decadal Water Level Fluctuation With Mean January (2012 to 2021) and January 2022 in Deeper Aquifer</i>	<i>XVII</i>
<i>State-Wise Ground Water Resources of India, 2020</i>	<i>XVIII</i>
<i>Categorization of Blocks/ Mandals/ Talukas in India (2020)</i>	<i>XIX</i>

1. HYDROGEOLOGICAL SETUP OF THE COUNTRY

1.1 GROUND WATER OCCURRENCE

The ground water behavior in the Indian sub-continent is highly complicated due to the occurrence of diversified geological formations with considerable lithological and chronological variations, complex tectonic framework, climatological dissimilarities and various hydrochemical conditions. Studies carried out over the years have revealed that aquifer groups in alluvial / soft rocks even transcend the surface basin boundaries. Broadly two groups of rock formations have been identified depending on characteristically different hydraulics of ground water, Viz. Porous Formations and Fissured Formations.

1.1.1 POROUS FORMATION

Porous formations have been further subdivided into Unconsolidated and Semi-consolidated formations.

UNCONSOLIDATED FORMATIONS

The areas covered by alluvial sediments of river basins, coastal and deltaic tracts constitute the unconsolidated formations. These are by far the most significant ground water reservoirs for large scale and extensive development. The hydrogeological environment and ground water regime in the Indo-Ganga-Brahmaputra basin indicate the existence of potential aquifers having enormous fresh ground water reserve. Bestowed with high incidence of rainfall and covered by a thick pile of porous sediments, these ground water reservoirs get replenished every year and are being used heavily. In these areas, in addition to the Annual Replenishable Ground Water Resources available in the zone of water level fluctuation (Dynamic Ground Water Resource), there exists a huge ground water reserve in the deeper passive recharge zone below the zone of fluctuation as well as in the deeper confined aquifers which remains largely unexplored as yet. Although the mode of development of ground water is primarily through dug wells, dug cum bore well and cavity wells, thousands of tube wells have been constructed during last few decades.

SEMI-CONSOLIDATED FORMATIONS

The semi-consolidated formations normally occur in narrow valleys or structurally faulted basins. The Gondwanas, Lathis, Tipams, Cuddalore sandstones and their equivalents are the most extensive productive aquifers in this category. Under favorable situations, these formations give rise to freeflowing wells. In selected tracts of northeastern India, these water-

bearing formations are quite productive. The Upper Gondwanas, which are generally arenaceous, in general, constitute prolific aquifers.

1.1.2 FISSURED FORMATIONS (CONSOLIDATED FORMATIONS)

The consolidated formations occupy almost two-thirds of the country. These formations, except vesicular volcanic rocks have negligible primary porosity. From the hydrogeological point of view, fissured rocks are broadly classified into four types viz. Igneous and metamorphic rocks (excluding volcanic and carbonate rocks), volcanic rocks, consolidated sedimentary rocks and Carbonate rocks.

IGNEOUS AND METAMORPHIC ROCKS EXCLUDING VOLCANIC AND CARBONATE ROCKS

The most common rock types under this category are granites, gneisses, charnockites, khondalites, quartzites, schists and associated phyllites, slates, etc. These rocks possess negligible primary porosity but attain porosity and permeability due to fracturing and weathering. Ground water yield also depends on the rock type and grade of metamorphism. Generally, the granites, khondalites and biotite gneisses have better yield potential as compared to charnockites.

VOLCANIC ROCKS

The predominant types of volcanic rocks are the basaltic lava flows of Deccan Plateau. The highly variable water bearing properties of different flow units control ground water occurrence in Deccan Traps. The Deccan Traps have usually poor to moderate permeability depending on the presence of primary and secondary fractures.

CONSOLIDATED SEDIMENTARY ROCKS EXCLUDING CARBONATE ROCKS

Consolidated sedimentary rocks occur in Cuddapahs, Vindhyan and their equivalents. The formations consist of conglomerates, sandstones, shales. The presence of bedding planes, joints, contact zones and fractures controls the ground water occurrence, movement and yield potential.

CARBONATE ROCKS

Limestones in the Cuddapah, Vindhyan and Bijawar group of rocks dominates the carbonate rocks other than marbles and dolomites. In carbonate rocks, the circulation of water creates solution cavities thereby increasing the permeability of the aquifers. The solution activity leads to widely contrasting permeabilities within short distances.

1.2 HYDROGEOLOGICAL UNITS AND THEIR GROUND WATER POTENTIAL

Hydrogeological map of India is depicted in **Plate-I** and the geographical distribution of hydrogeological units along with their Ground water potential is given in **Table- 1**.

TABLE-1: AQUIFER SYSTEM IN THE COUNTRY

System	Coverage	Ground water potential
Unconsolidated formations - alluvial	Indo-Gangetic, Brahmaputra plains	Enormous reserves down to 600 m depth. High rain fall and hence recharge is ensured. Can support large-scale development through deep tube wells
	Coastal Areas	Reasonably extensive aquifers but risk of saline water intrusion
	Part of Desert area – Rajasthan and Gujarat	Scanty rainfall. Negligible recharge. Salinity hazards. Ground water Availability at great depths.
Consolidated/semi-consolidated formations - sedimentaries, basalts and crystalline rocks	Peninsular Areas	Availability depends on secondary porosity developed due to weathering, fracturing etc. Scope for GW availability at shallow depths (20-40 m) in some areas and deeper depths (100-200 m) in other areas. Varying yields.
Hilly	Hilly states	Low storage capacity due to quick runoff

Hydrogeological Map of India



Legend

Ground Water Potential (Yield Litres/sec)

>40	25-40	10-25	<10	Unconsolidated Formations
1-25	1-10	1-5	<1	Consolidated /Semi-Consolidated Formations
				Hilly Areas

2. RAINFALL VARIATIONS

Variability in the onset, withdrawal and quantum of rainfall during the monsoon season has profound impacts on water resources, power generation, agriculture, economics and ecosystems in the country. The variation in climate is perhaps greater than any other area of similar size in the world. There is a large variation in the amounts of rainfall received at different locations. The average annual rainfall is about 122 cm, but it has great spatial variations. The areas on the Western Ghats and the Sub-Himalayan areas in North East and Meghalaya Hills receive heavy rainfall of over 250 cm annually, whereas the Areas of Northern parts of Kashmir and Western Rajasthan receive rainfall less than 40 cm. The rainfall pattern roughly reflects the different climate regimes of the country, which vary from humid in the northeast (about 180 days rainfall in a year), to arid in Rajasthan (20 days rainfall in a year). Due to climatic changes, in recent times, the occurrence of high intensity rainfall event has increased and the number of rainy days has decreased. In some years, it has been observed that, the southwest monsoon has extended beyond its normal withdrawal date.

Normal Annual Rainfall:

The rainfall over India has large spatial as well as temporal variability. Annual rainfall is more than 200 cm over these regions. For the country as whole, mean monthly rainfall during July (301 mm) is highest and contributes about 24.6% of annual rainfall (1219.77 mm). The mean rainfall during August is slightly lower and contributes about 21.9% of annual rainfall. June and September rainfall are almost similar and contribute 13.8% and 14.5% of annual rainfall, respectively. The mean southwest monsoon (June, July, August & September) rainfall (914 mm) contributes 75.5% of annual rainfall (1219.77 mm). Contribution of pre-monsoon (March, April & May) rainfall and post-monsoon (October, November & December) rainfall in annual rainfall is mostly the same (11%). Coefficient of variation is higher during the months of November, December, January and February. The Thematic map of distribution of annual normal rainfall is given in **Plate-II**. The map shows that, one state i.e., Rajasthan receives annual rainfall between 250 – 500 mm, 9 states and UTs between 500 mm – 1000 mm, 15 states between 1000 – 2000 mm, 4 states between 2000-3000 mm and 5 states more than 3000 mm in a year.

Normal Monsoon Rainfall:

The SW monsoon is the most significant feature of the Indian climate. The season is spread over four months, but the actual period at a particular place depends on onset and withdrawal dates. It varies from less than 75 days over West Rajasthan, to more than 120 days over the

south-western regions of the country contributing to about 75% of the annual rainfall. The onset of the SW monsoon normally starts over the Kerala coast, the southern tip of the country by 1 June, advances along the Konkan coast in early June and covers the whole country by middle of July. However, onset occurs about a week earlier over islands in the Bay of Bengal. The monsoon is influenced by global and local phenomenon like El Nino, northern hemispheric temperatures, sea surface temperatures, snow cover etc. Normal monsoon rainfall more than 150cm is being observed over most parts of northeast India, Konkan & Goa. It ranges from 317 mm in Tamil Nadu state to 2774 mm in Goa state with an average of 1160 mm. In the North-eastern states it ranges from 1330 mm to 2787 mm with an average of 1716 mm.

Normal Post-monsoon rainfall:

North-East (NE) monsoon or Post-monsoon season is transition season associated with the establishment of the north-easterly wind regime over the Indian subcontinent. Meteorological subdivisions namely Coastal Andhra Pradesh Rayalaseema, Tamil Nadu, Kerala and South Interior Karnataka receive good amount of rainfall accounting for about 35% of their annual total in these months. Many parts of Tamil Nadu and some parts of Andhra Pradesh and Karnataka receive rainfall during this season due to the storms forming in the Bay of Bengal. It ranges from 18 mm in Rajasthan state to 910 mm in Puducherry UT with an average of 200 mm. In the north eastern states it ranges from it ranges from 169 mm to 315 mm with an average of 239 mm.

Rainfall Variation in 2021

The distribution of annual rainfall in 2021 is given as thematic map in **Plate-III**. The map shows that Ladakh received annual rainfall between 250 – 500 mm, 7 states between 500 mm – 1000 mm, 20 states between 1000 – 2000 mm, 3 states between 2000-3000 mm and 4 states more than 3000 mm. State-wise seasonal and annual observed rainfall, and its percentage departure from normal rainfall is given in **Table-2**. This data is based on India-WRIS, IMD Gridded Data. It may be observed that during 2021, highest rainfall of 3837 mm was received at Goa state and the lowest rainfall of 372.48 mm was received at Ladakh state. However, on comparing with normal rainfall, it may be seen that, Daman & Diu has the highest positive departure of 221% from its normal whereas Meghalaya is with highest negative departure of 59% from its normal rainfall. Negative departure from normal annual rainfall is observed in 14 states. The national average rainfall is 1173 mm with a negative departure of 4% from normal.

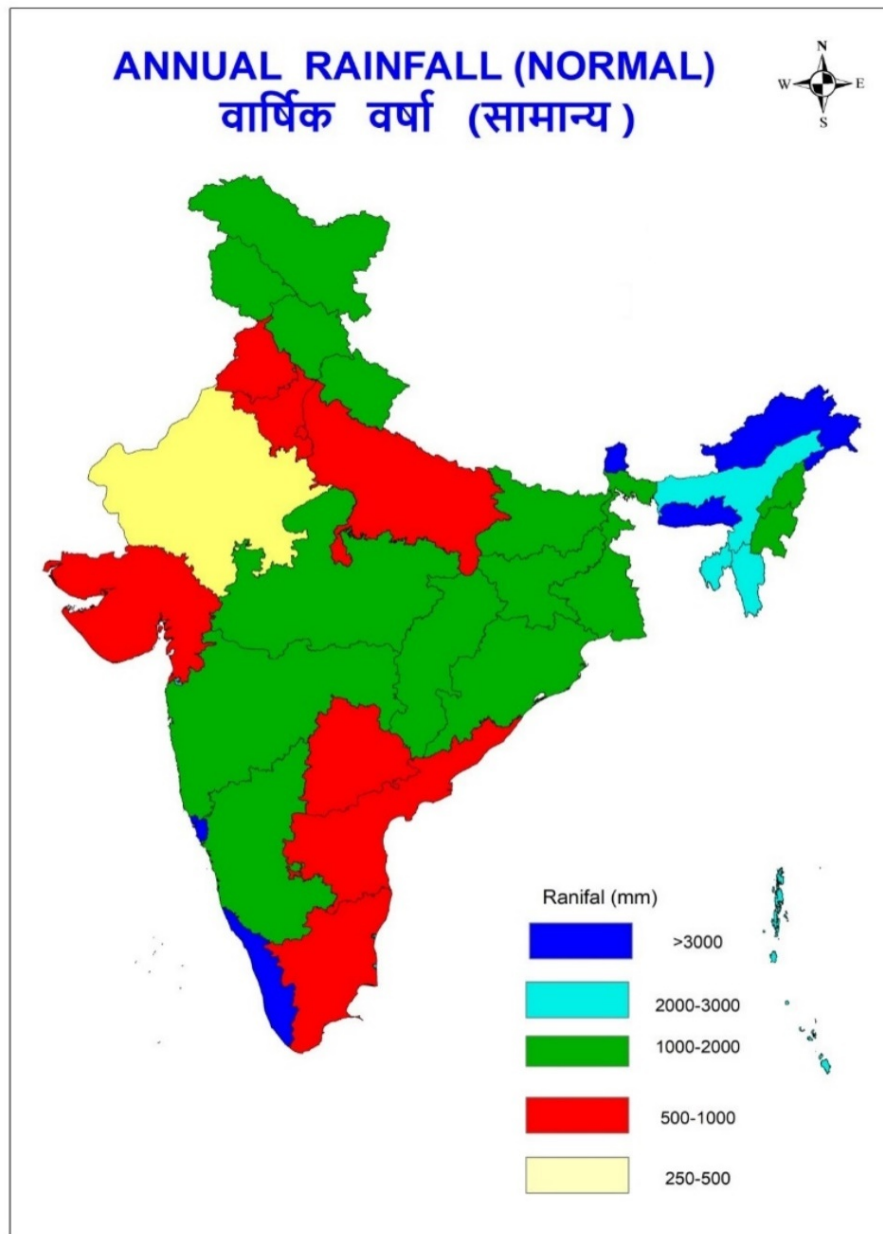
TABLE- 2: STATE-WISE SEASONAL AND ANNUAL RAINFALL DISTRIBUTION (Source: IMD Gridded Data, IndiaWRIS)

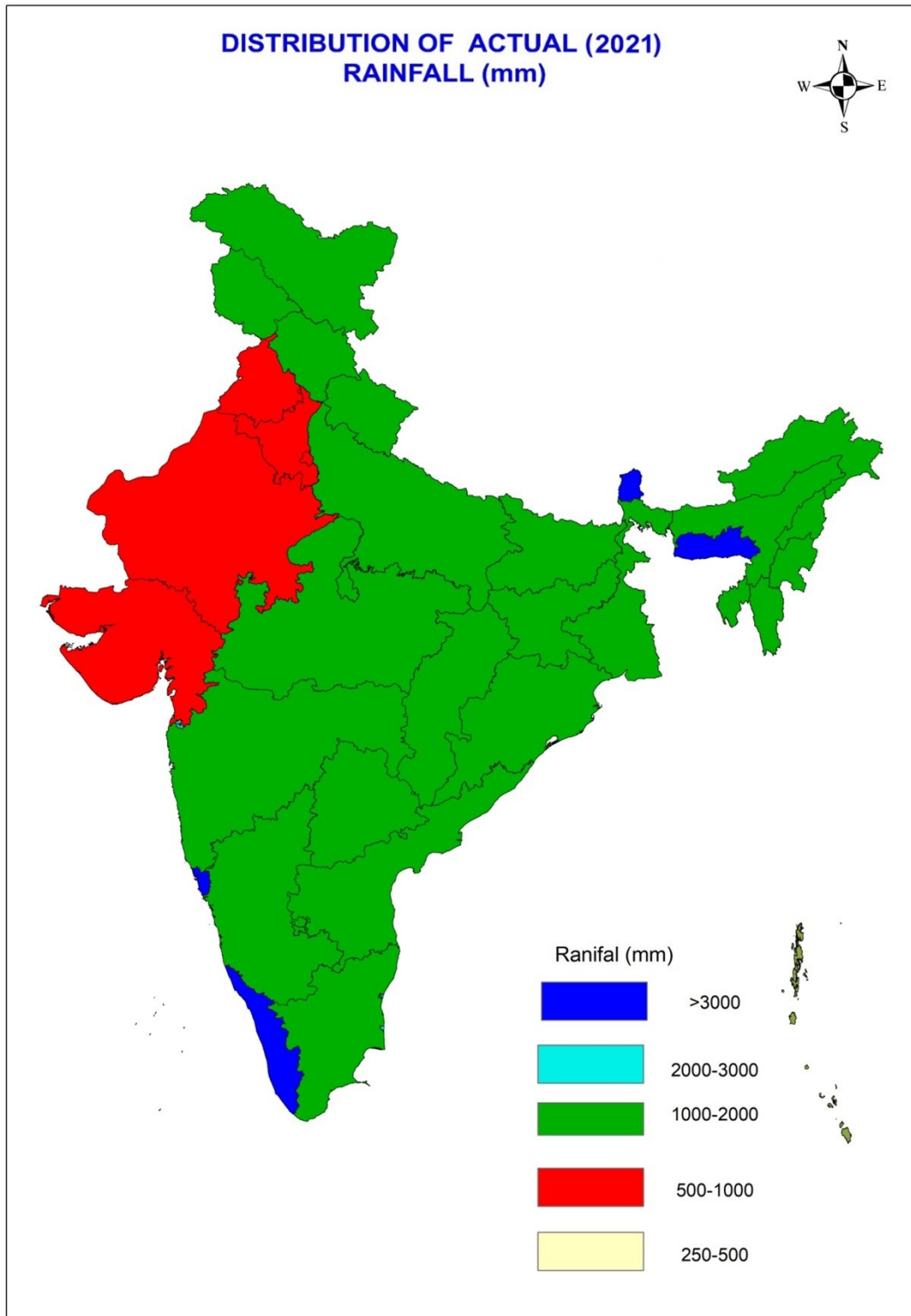
STATE	Monsoon			Non-Monsoon			Percentage of Monsoon Rainfall from Annual	Percentage of Non-Monsoon Rainfall from Annual	Annual 2021		
	Actual	Normal	Deviation	Actual	Normal	Deviation			Actual	Normal	Deviation
ANDAMAN & NICOBAR	-	1447.72	-	-	1461.74	-	-	-	-	2909.46	-
ANDHRA PRADESH	577.05	492.12	17%	578.81	377.42	53%	50%	50%	1155.85	869.52	33%
ARUNACHAL PRADESH	1161.56	1935.05	-40%	724.51	1066.08	-32%	62%	38%	1886.05	3001.14	-37%
ASSAM	1040.04	1442.10	-28%	460.25	830.39	-45%	69%	31%	1500.28	2272.49	-34%
BIHAR	1008.17	1034.27	-3%	475.51	187.98	153%	68%	32%	1483.69	1222.26	21%
CHANDIGARH	654.40	846.60	-23%	164.60	231.10	-29%	80%	20%	819.00	1077.70	-24%
CHHATTISGARH	990.68	1140.08	-13%	200.82	160.00	26%	83%	17%	1191.50	1300.07	-8%
DAMAN & DIU	1638.34	574.20	185%	365.06	50.80	619%	82%	18%	2003.40	625.00	221%
DADRA AND NAGAR HAV	2500.43	-	-	381.64	-	-	87%	13%	2882.07	-	-
DELHI	743.51	667.10	11%	228.83	126.90	80%	76%	24%	972.34	794.00	22%
GOA	2975.99	2773.90	7%	861.52	271.30	218%	78%	22%	3837.53	3045.20	26%
GUJARAT	650.12	672.68	-3%	101.70	38.21	166%	86%	14%	751.80	710.89	6%
HARYANA	564.45	460.09	23%	117.34	97.92	20%	83%	17%	681.78	558.02	22%
HIMACHAL PRADESH	649.92	772.36	-16%	390.74	550.45	-29%	62%	38%	1040.65	1322.81	-21%
JAMMU & KASHMIR	442.77	552.99	-20%	573.13	648.47	-12%	44%	56%	1015.91	1201.45	-15%
JHARKHAND	1015.39	1095.08	-7%	407.26	230.50	77%	71%	29%	1422.64	1325.58	7%
KARNATAKA	759.93	896.12	-15%	578.40	319.73	81%	57%	43%	1338.32	1215.84	10%
KERALA	1448.46	2140.62	-32%	1699.40	956.38	78%	46%	54%	3147.85	3097.00	2%
LADAKH	107.40	-	-	265.08	-	-	29%	71%	372.48	-	-
MADHYA PRADESH	882.12	996.91	-12%	146.91	105.23	40%	86%	14%	1029.03	1102.13	-7%
MAHARASHTRA	1070.40	1001.60	7%	226.27	141.56	60%	83%	17%	1296.67	1143.15	13%
MANIPUR	581.99	841.25	-31%	332.42	527.35	-37%	64%	36%	914.44	1368.61	-33%

STATE	Monsoon			Non-Monsoon			Percentage of Monsoon Rainfall from Annual	Percentage of Non-Monsoon Rainfall from Annual	Annual 2021		
	Actual	Normal	Deviation	Actual	Normal	Deviation			Actual	Normal	Deviation
MEGHALAYA	2315.89	6218.27	-63%	938.93	1786.30	-47%	71%	29%	3254.82	8004.57	-59%
MIZORAM	1269.09	1345.10	-6%	439.54	833.10	-47%	74%	26%	1708.62	2178.20	-22%
NAGALAND	722.09	1341.80	-46%	293.26	559.82	-48%	71%	29%	1015.35	1901.64	-47%
ODISHA	993.17	1159.49	-14%	412.32	310.48	33%	71%	29%	1405.49	1469.97	-4%
PONDICHERRY	471.37	326.70	44%	1673.02	1036.50	61%	22%	78%	2144.39	1363.20	57%
PUNJAB	520.76	500.42	4%	108.50	145.71	-26%	83%	17%	629.24	646.13	-3%
RAJASTHAN	468.02	418.13	12%	98.27	43.35	127%	83%	17%	566.28	461.47	23%
SIKKIM	1883.31	2023.90	-7%	1213.83	1066.60	14%	61%	39%	3097.15	3090.50	0%
TAMILNADU	375.22	316.35	19%	1033.64	605.59	71%	27%	73%	1408.86	921.94	53%
TELANGANA	980.52	766.95	28%	170.58	175.51	-3%	85%	15%	1151.08	942.46	22%
TRIPURA	1241.79	1478.47	-16%	529.41	882.88	-40%	70%	30%	1771.19	2361.35	-25%
UTTAR PRADESH	784.35	856.79	-8%	221.79	124.02	79%	78%	22%	1006.13	980.80	3%
UTTARAKHAND	1186.25	1212.52	-2%	552.05	357.19	55%	68%	32%	1738.31	1569.70	11%
WEST BENGAL	1429.90	1342.21	7%	541.94	397.04	36%	73%	27%	1971.85	1739.23	13%
Minimum	107.40	316.35		98.27	38.21		22%	26%	372.48	461.47	
Maximum	2975.99	6218.27		1699.40	1786.30		87%	44%	3837.53	8004.57	

It may be observed from the data that the variation of southwest monsoon rainfall is very high and it ranges from 107 mm in Ladakh to 2976 mm in Goa state. The states of Andhra Pradesh, Daman & Diu, Delhi, Haryana, Pondicherry, Rajasthan, Tamil Nadu and Telangana has received more than normal (positive departure of more than 10%) rainfall in the monsoon season. The states of Arunachal Pradesh, Assam, Chandigarh, Chhattisgarh, Himachal Pradesh, Jammu & Kashmir, Karnataka, Kerala, Madhya Pradesh, Manipur, Meghalaya, Nagaland, Orissa and Tripura have received rainfall with negative departure (more than 10%) from normal. The national average monsoon rainfall is 803 mm with a negative departure of 12% from normal.

PLATE – II





3.0 GROUND WATER LEVEL SCENARIO

3.1 INTRODUCTION

Ground Water Year Book is prepared annually by CGWB depicting changes in ground water regime of the country through different seasons. It is an effort to obtain information on ground water levels through representative monitoring wells. The important attributes of ground water regime monitoring are ground water level.

The natural conditions affecting the ground water regime involve 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.

Ground water levels are being measured by Central Ground Water Board four times a year during January, March/April/ May, August and November. The regime monitoring started in the year 1969 by Central Ground Water Board. A network of 23209 observation wells, as on 31.03.2022, located all over the country is being monitored. Ground water samples are collected from these observation wells once a year during the month of March/April/ May to obtain background information of ground water quality changes on regional scale. The database thus generated forms the basis for planning the ground water development and management programmes. The ground water level and quality monitoring is of particular importance in coastal as well inland saline environment to assess the changes in salt water/fresh water interface as also the gradual quality changes in the fresh ground water regime. This data is used for assessment of ground water resources and changes in the regime consequent to various development and management activities.

The premonsoon water level data is collected from all the monitoring stations during the months of March/ April/ May, depending on the climatological conditions of the region. For North eastern states premonsoon data is collected during March, since the onset of monsoon is normally observed in April. Similarly for Orissa, West Bengal and Kerala where monsoon appears early in May the monitoring is carried out during the month of April. For remaining states pre-monsoon monitoring month is May. Water levels during August are monitored to assess the impact of monsoon on the ground water resources. Post monsoon data collected during November reflects the cumulative effect of ground water recharge and withdrawal of ground water for various purposes. January water level data indicates the effect of withdrawal for rabi crops.

The data is analyzed to know about the frequency distribution of water levels during different periods and seasonal, annual and decadal fluctuations in water levels. The water level and

water level fluctuation maps are prepared for each monitoring period to study the spatial and temporal changes in ground water regime.

The State/UT-wise distribution of the ground water observation wells is given in **Table- 3** and depicted in **Plate-IV**.

PLATE - IV

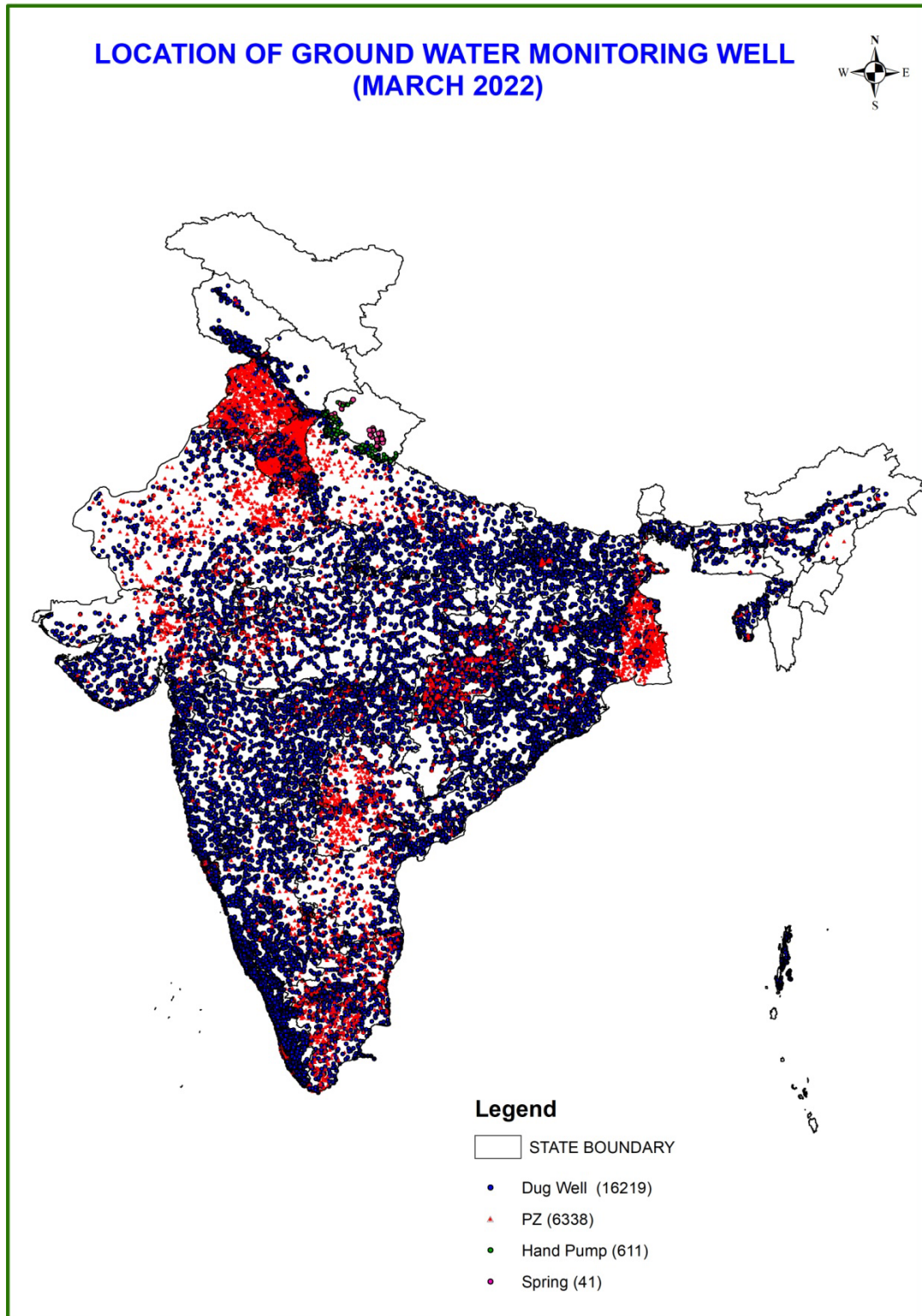


TABLE-3:
STATE/UT -WISE STATUS OF GROUND WATER MONITORING WELLS

Status of Ground Water Monitoring Stations (March 2022)						
Sl No	Name of the State/UTs	Number of Ground Water Monitoring Stations				
		DW	PZ	HP	Spring	Total
1	Andhra Pradesh	656	316			972
2	Arunachal Pradesh	26	4			30
3	Assam	355	59			414
4	Bihar	710	40			750
5	Chhattisgarh	1122	173			1295
6	Delhi	23	106			129
7	Goa	88	44			132
8	Gujarat	836	264			1100
9	Haryana	197	341			538
10	Himachal Pradesh	136	4			140
11	Jammu & Kashmir	287	14			301
12	Jharkhand	435	17			452
13	Karnataka	1413	262			1675
14	Kerala	1374	217			1591
15	Madhya Pradesh	1182	300			1482
16	Maharashtra	1716	207			1923
17	Manipur					
18	Meghalaya	60	10			70
19	Nagaland	22	8			30
20	Odisha	1501	122			1623
21	Punjab	146	342			488
22	Rajasthan	708	558			1266
23	Tamil Nadu	793	586			1379
24	Telangana	275	610			885
25	Tripura	100	15			115
26	Uttar Pradesh	797	210			1007
27	Uttarakhand	38	12	126	41	217
28	West Bengal	686	397	485		1568
	UTs					
1	Andaman & Nicobar	111	2			113
2	Chandigarh	1	25			26
3	Dadra & Nagar Haveli	17	0			17
4	Daman & Diu	21	3			24
5	Pondicherry	9	7			16
	TOTAL	16219	6338	611	41	23209

3.2 GROUND WATER REGIME IN UNCONFINED AQUIFER

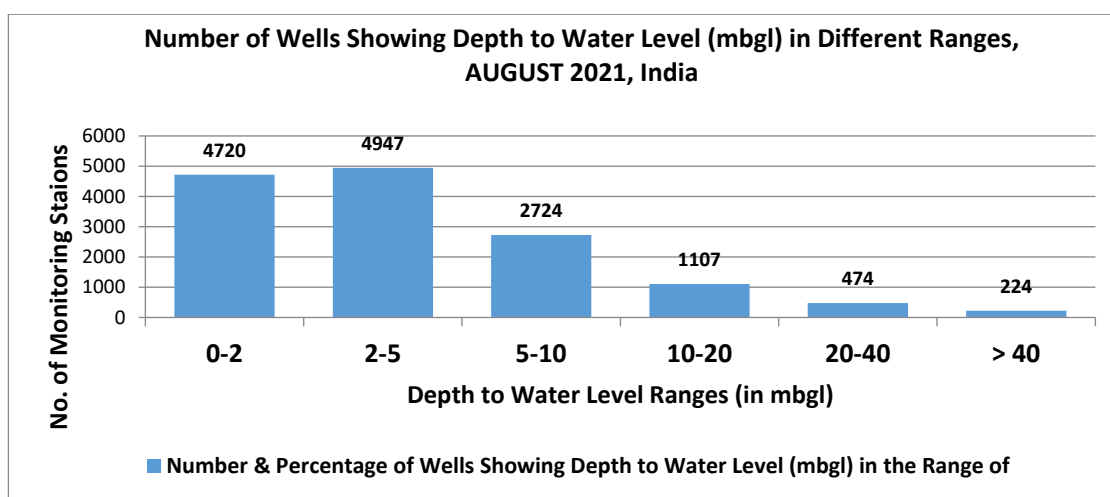
3.2.1 DEPTH TO WATER LEVEL IN UNCONFINED AQUIFER

DEPTH TO WATER LEVEL – PRE MONSOON 2021

The ground water level could not be carried out in time in the month of May 2021, due to the lockdown imposed in various parts of the country due to the outbreak of Covid-19 pandemic. In some states monitoring is done, but all stations are not covered. Due to insufficiency of data the water level analysis for the pre-monsoon season has not been carried out.

DEPTH TO WATER LEVEL – AUGUST 2021

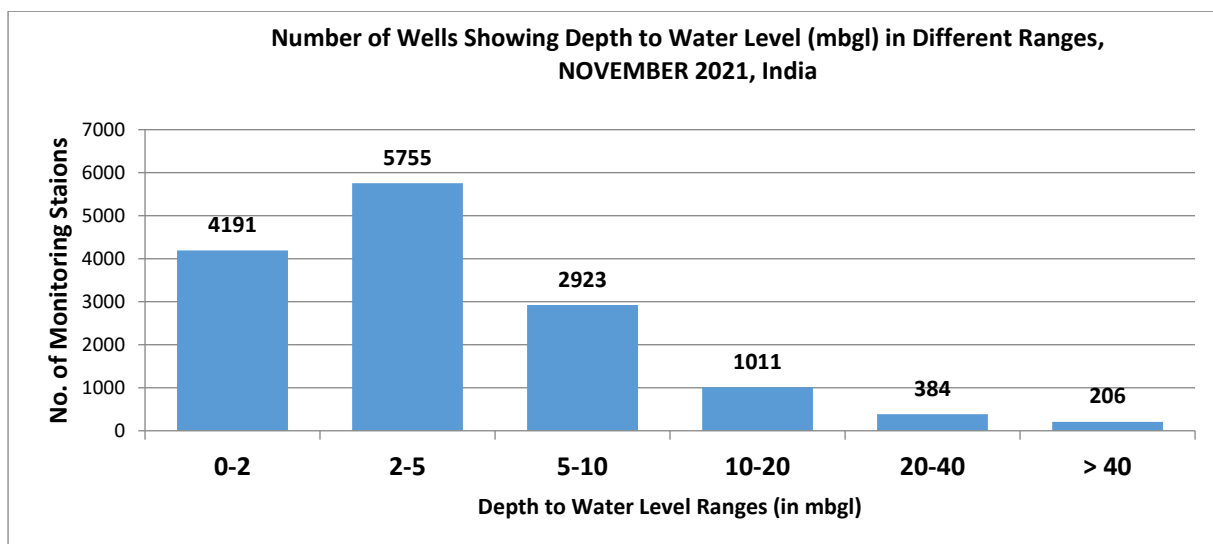
The ground water level data for August 2021 (*Annexure-I*) indicates that, out of the 14196 wells analysed, 4720 (33.3 %) wells are showing water level less than 2 m bgl (metres below ground level), 4947 (34.85%) wells are showing water level in the depth range of 2-5 m bgl, 2724 (19.2 %) wells are showing water level in the depth range of 5-10 m bgl, 1107 (7.8%) wells are showing water level in the depth range of 10-20 m bgl, 474 (3.3%) wells are showing water level in the depth range of 20-40 m bgl and the remaining 224 (1.6%) wells are showing water level more than 40 m bgl. The map of depth to water levels during August 2021 is shown in **Plate-VI**. The general depth to water level of the country ranges from 0 to 5 m bgl. Almost 68 % of the wells analysed show water level in the range of 0- 5 m bgl. Very shallow water level of less than 2 m bgl is observed in considerable number of wells in almost all the states, such as except Chandigarh, Daman & Diu, Haryana, Punjab, and Tamil Nadu. Water level in the range of 2 –5 m bgl, is observed in almost all states except Haryana, Delhi, Punjab and Rajasthan, where less than 15 % of wells have water level of 2-5 mbgl. In major parts of north-western and western states, depth to water level is generally deeper and ranges from



about 10- 40 m bgl. In parts Delhi, Haryana and Rajasthan, water level of more than 40 m bgl is also recorded. The maximum depth to water level of 116.93 m bgl is observed at Deshnokh in Bikaner dist. of Rajasthan, whereas the minimum is 1.04 m aglat Kanchannagar, in Surendranagar dist. of Gujarat.

DEPTH TO WATER LEVEL – NOVEMBER 2021 (POST-MONSOON)

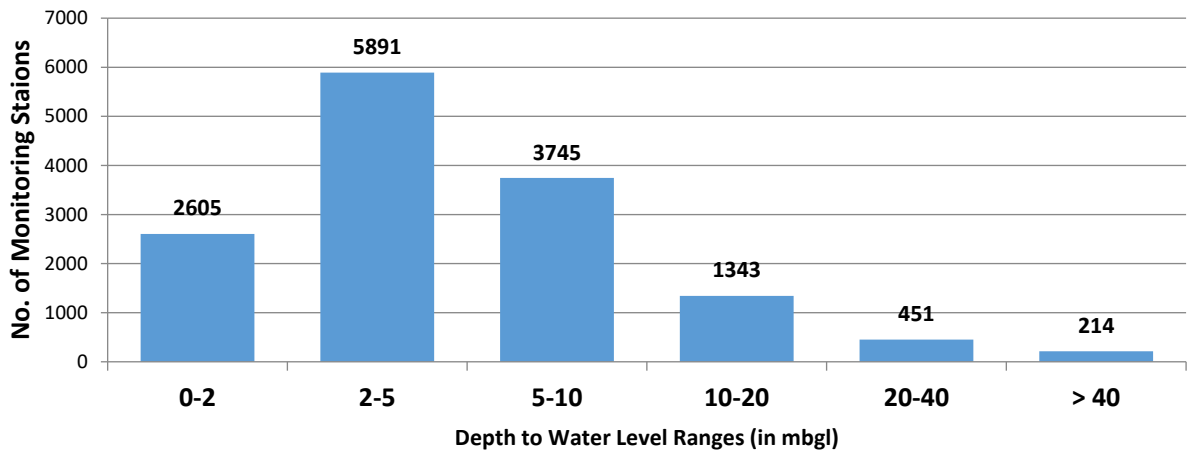
The ground water level data for November 2021 indicates that out of the total 14470 wells analysed, 4191 (29 %) wells are showing water level less than 2 m bgl, 5755 (39.8%) wells are showing water level in the depth range of 2-5 m bgl, 2923 (20.2%) wells are showing water level in the depth range of 5-10 m bgl, 1011 (7%) wells are showing water level in the depth range of 10-20 m bgl, 384 (2.7%) wells are showing water level in the depth range of 20-40 m bgl and the remaining 206 (1.4 %) wells are showing water level more than 40 m bgl. In general, depth to water level ranges from 2 to 5 m bgl as observed at about 69% of the monitoring stations. Very shallow water level of less than 2 m bgl is observed in all the states, except Chandigarh and Nagaland. Ground Water level in the range of 2-5 m bgl is predominant in the entire Country, as major part of the country shows water level in the range 2-5 m bgl. In parts of north-western and western states, especially in the states/UTs of Chandigarh, Delhi, Haryana, Punjab and Rajasthan, depth to water level is generally deeper and ranges from about 10m bgl to more than 40 m bgl. The peninsular part of country recorded a water level in the range of 2 to 10 m bgl. The maximum depth to water level of 116.98 m bgl is observed in Bikaner district of Rajasthan whereas the minimum is less than 1 m bgl. **(Plate-VII, Annexure- II)**



DEPTH TO WATER LEVEL– JANUARY 2022

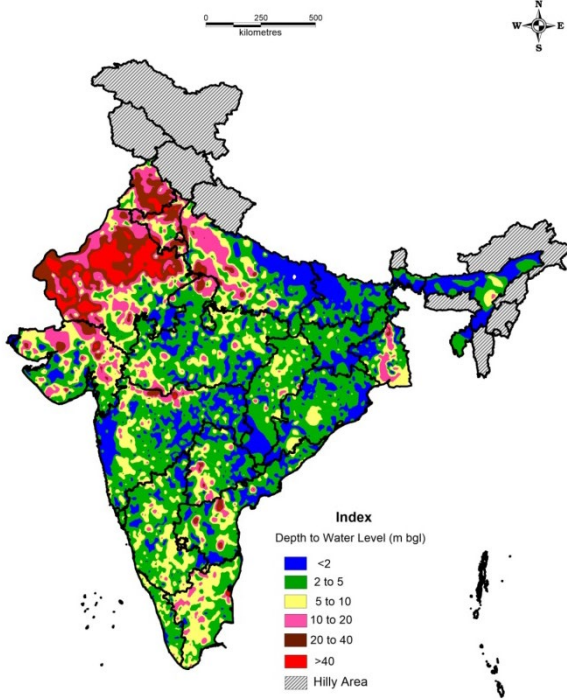
The ground water level data for January 2022 indicates that out of the total 14249 wells analysed, 2605 (18.3%) wells are showing water level less than 2 m bgl (metres below ground level), 5891 (41.3%) wells are showing water level in the depth range of 2-5 m bgl, 3745 (26.3 %) wells are showing water level in the depth range of 5-10 m bgl, 1343 (9.4%) wells are showing water level in the depth range of 10-20 m bgl, 451 (3%) wells are showing water level in the depth range of 20-40 m bgl and the remaining 214 (1.5 %) wells are showing water level more than 40 m bgl. The maximum depth to water level of 129.2 m bgl is observed at Khara in Jodhpur district of Rajasthan, whereas the minimum is less than 1 m bgl. **(Plate-VIII, Annexure-III)**.The depth to water level map of January 2022 for the country indicates that in general depth to water level ranges from 2 to 10 m bgl as observed at about 68% of the monitoring stations. Shallow water level of less than 2 m bgl is observed in very small and isolated pockets in the states of Assam, Odisha, Andhra Pradesh, Tamil Nadu, Konkan areas of Maharashtra and northern parts of Uttar Pradesh and Bihar. Water level in the range of 5 to 10 m bgl is prominent in all the states of Central and western parts of Karnataka and Kerala in Southern India. In major parts of north-western states depth to water level generally ranges from 10-40 m bgl. Water level of more than 40 m bgl is also prevalent in the north western part of the country. In some parts of Haryana, and Delhi and almost major parts of Rajasthan, water level of more than 40 m bgl is recorded.

**Number of Wells Showing Depth to Water Level (mbgl) in Different Ranges,
JANUARY 2022, India**

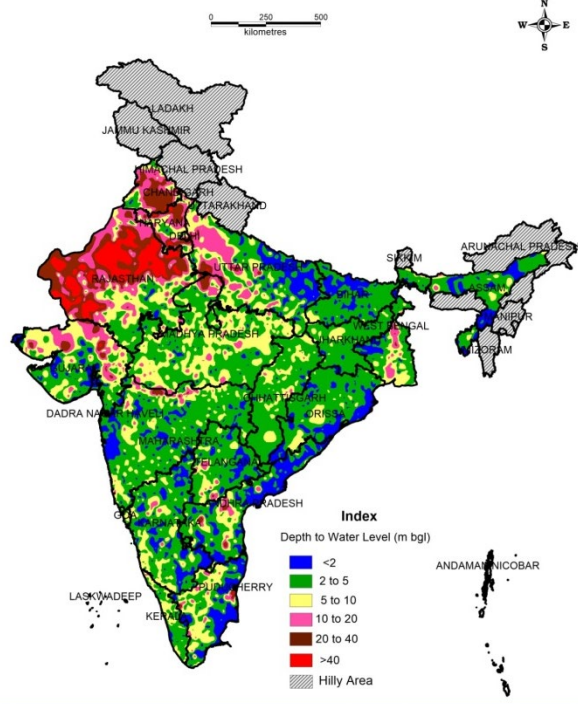


DEPTH TO WATER LEVEL AT A GLANCE

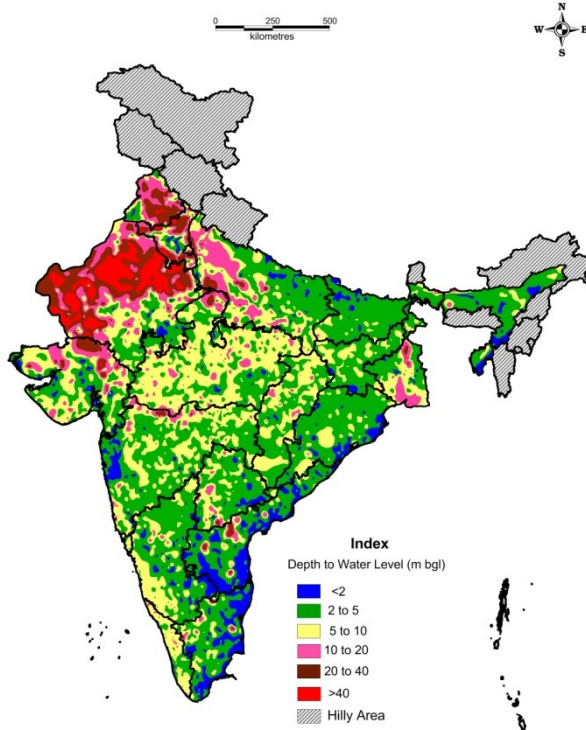
Depth to Water Level Map (August- 2021)

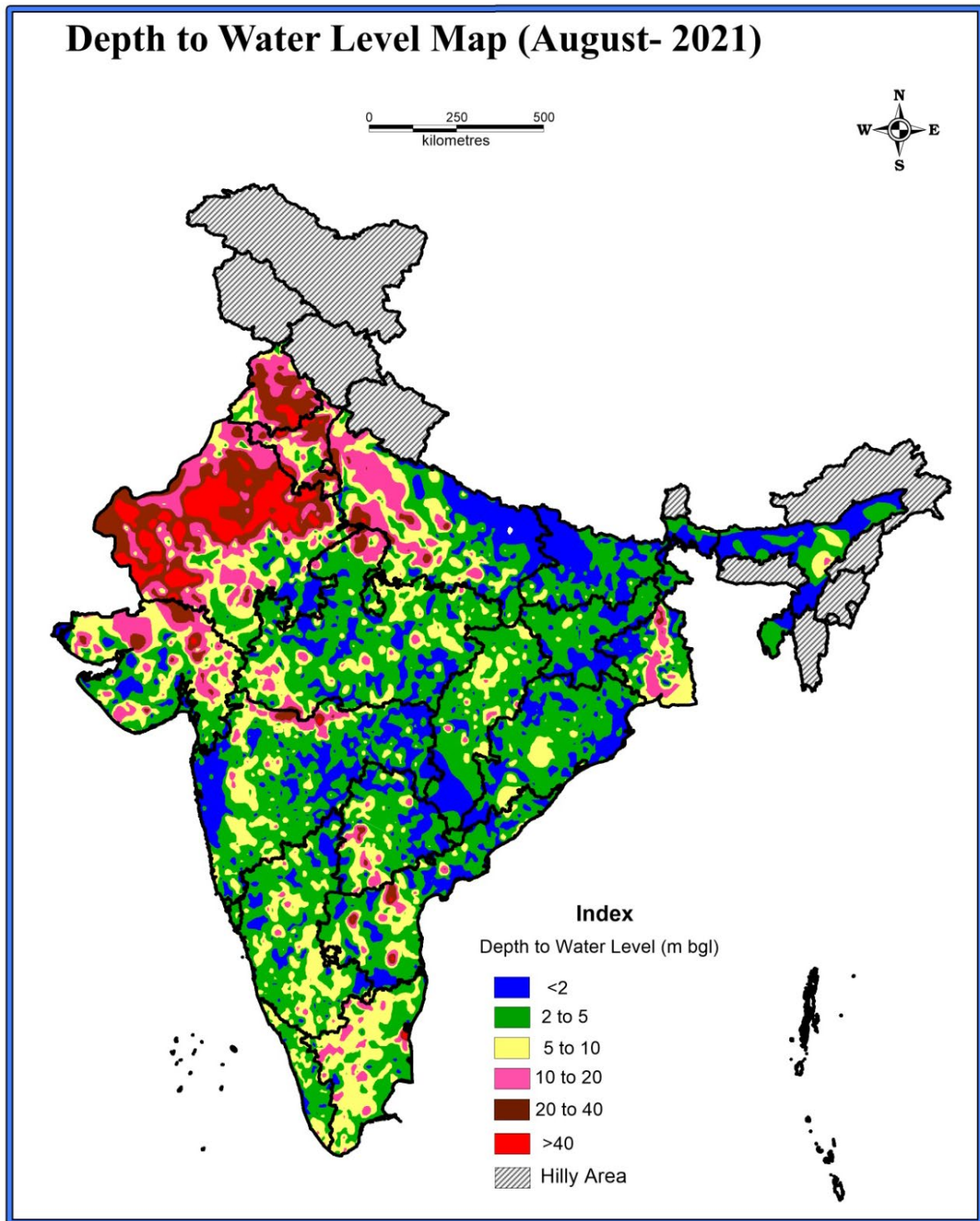


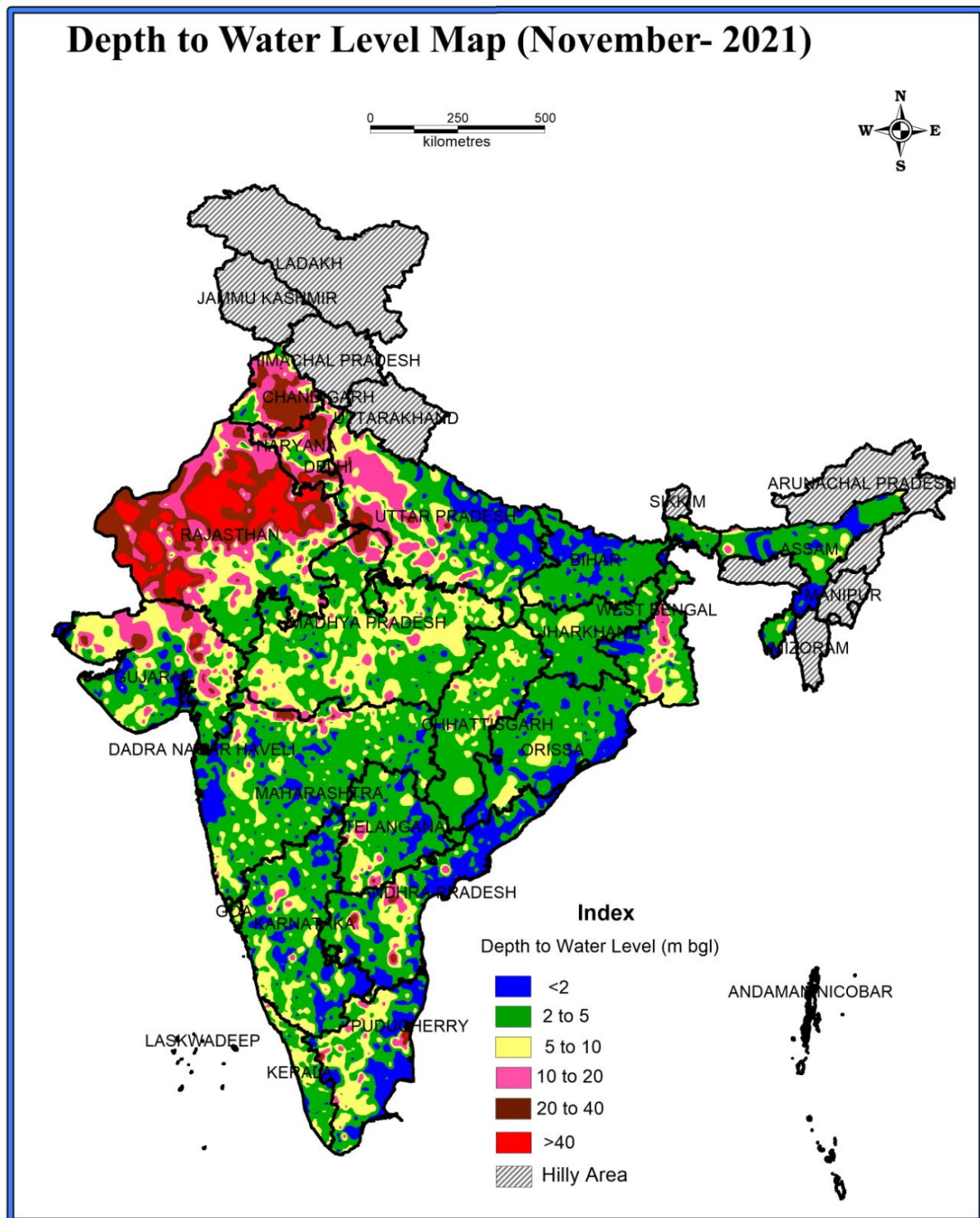
Depth to Water Level Map (November- 2021)

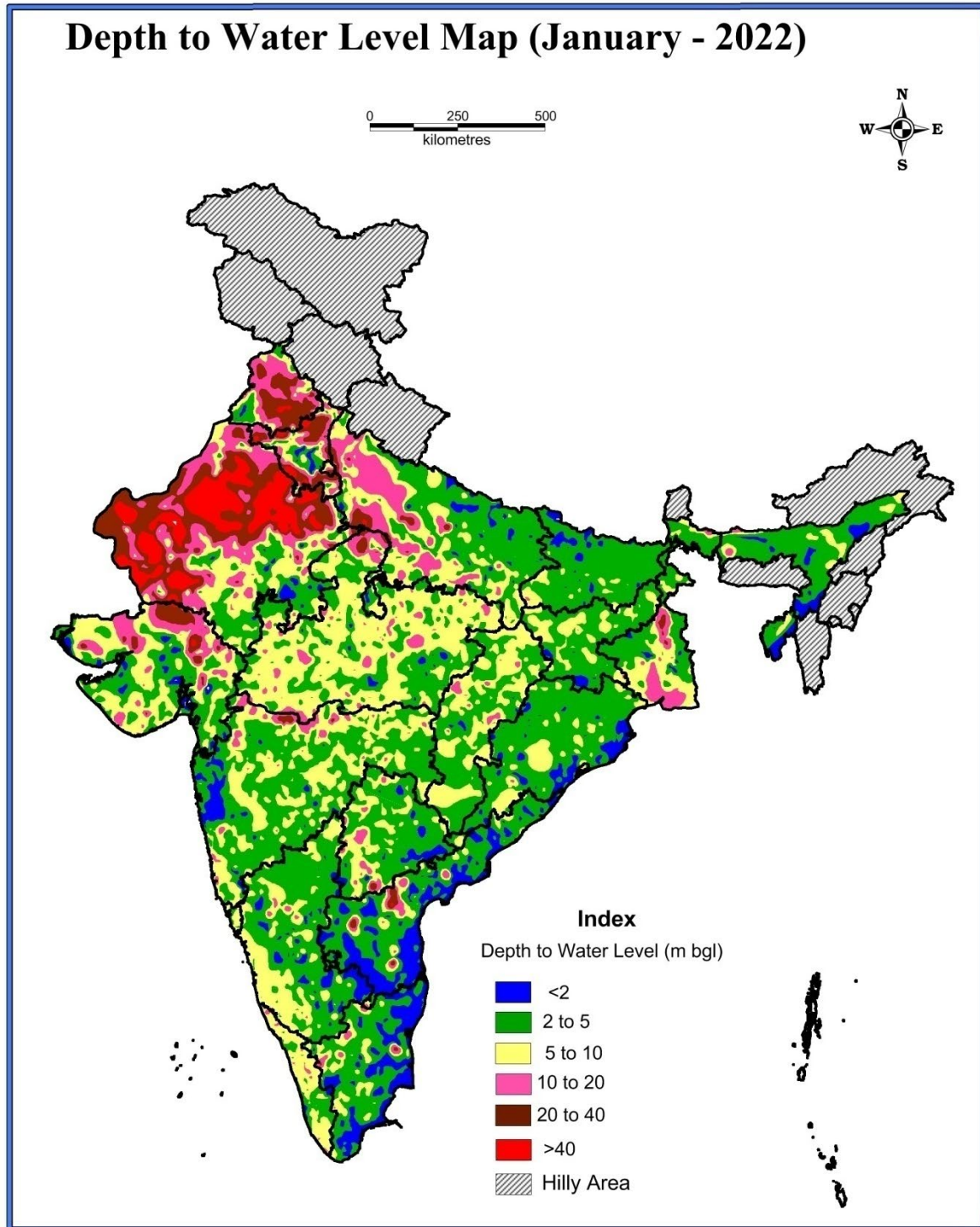


Depth to Water Level Map (January - 2022)









3.2.2 ANNUAL WATER LEVEL FLUCTUATION IN UNCONFINED AQUIFER

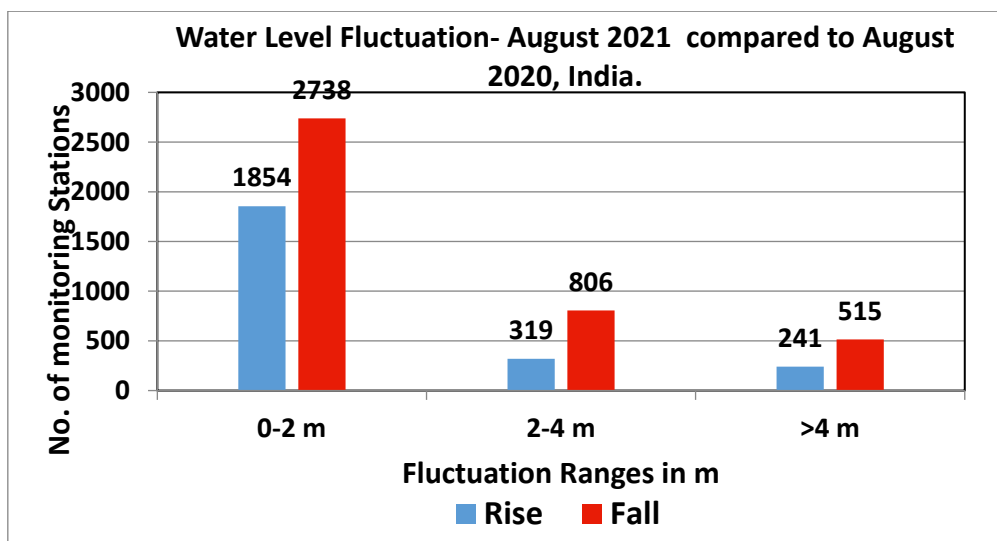
ANNUAL WATER LEVEL FLUCTUATION (PREMONSOON 2021 - PREMONSOON 2020)

The comparison of water level fluctuation of Premonsoon 2021 with respect to Premonsoon 2020, could not be done as the water level monitoring for the two seasons could not be carried out on time a due to the lockdown imposed in various states for the Covid-19 pandemic.

ANNUAL WATER LEVEL FLUCTUATION (AUGUST 2021-AUGUST 2020)

A comparison of depth to water level of August 2021 with August 2020 revealsthat in general, there is both rise and fall in water level in the country. Rise and fall is mostly in the range of 0-2 m. As less number of wells were monitored during August 2020, the water level fluctuation analysis could be done only in 6563 wells. Rise in water level has been observed in the states of Bihar, northern Madhya Pradesh, northern part of West Bengal and parts of Chhatisgarh. (**Plate-X, Annexure-IV**). Falling water level is observed in in Gujarat, Rajasthan, Haryana, Punjab, Odisha and western Uttar Pradesh. The states Maharashtra, Andhra Pradesh, Karnataka, Kerala and Telengana are shaded due to insufficient data points.

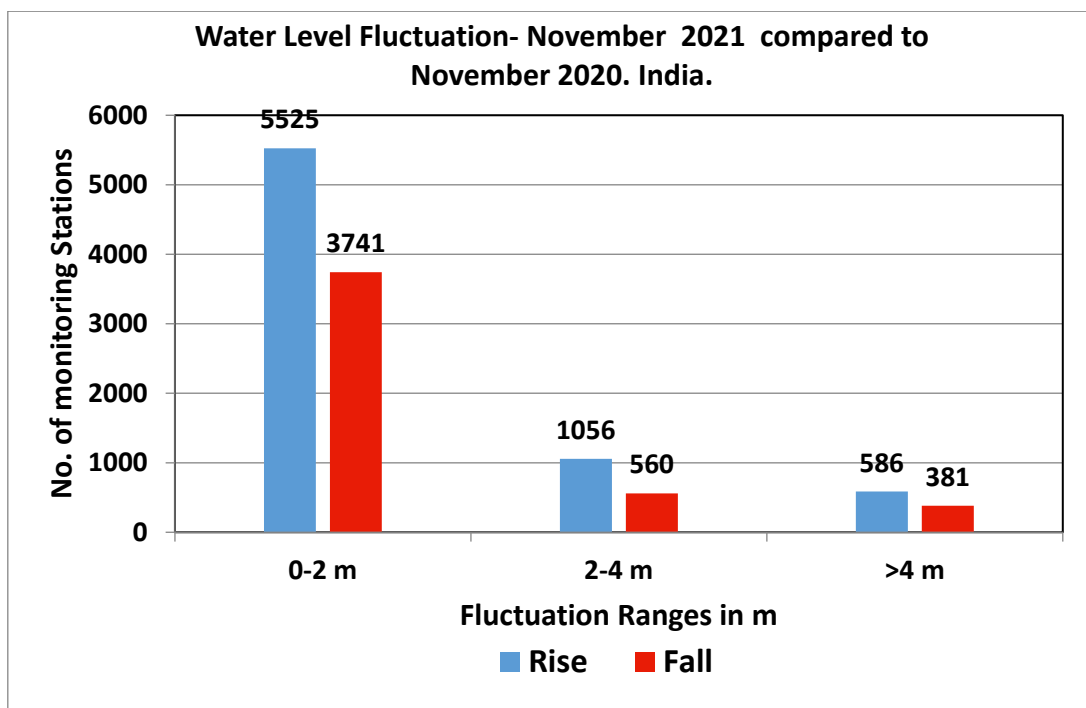
Out of total 6563 wells, about 36.8% (2414) are showing rise and 61.8% (4059) are showing fall in water level. Remaining 1.4% (90) wells do not show any change in water level. About 28% (1854) wells are showing rise in the range of less than 2 m, 5% (319) wells in 2-4 m range and 3.7% (241) wells in more than 4 m range. About 61.8% wells are showing decline in water level, among which 41.7% (2738) wells are showing fall in water level in less than 2 m range, 12.3 % (806) wells in water level in 2-4 m range and 7.8% (515) wells in more than 4 m range. Majority of the wells showing rise/decline falls in the range of 0-2 m.



ANNUAL WATER LEVEL FLUCTUATION (NOVEMBER 2020- NOVEMBER 2021) POST-MONSOON

The water level fluctuation of **November 2021** compared to **November 2020** shows that out of 12011 wells analysed, 7176 (59.7%) are showing rise and 4682 (39%) are showing fall in water level. Remaining 162 (1.3%) stations analysed do not show any change in water level. About 46% wells (5525) are showing rise in the water level in the range of less than 2 m. About 8.8% wells (1056) are showing rise in water level in 2-4 m range and 4.9% wells (586) showing rise in water level more than 4 m range. About 39% wells are showing decline in water level, out of which 3741 wells (31.1%) are showing decline in water level in less than 2 m range. Majority of the wells showing rise/decline falls in the range of 0-2 m. **(Plate-XI, Annexure-V)**

A comparison of depth to water level of November 2021 compared to November 2020 is presented in the form of water level fluctuation map revealsthat in general, there is fall in water level in the central Peninsula India and western part of the country. Fall in water level is dominantly seen in all the states/UTs except in the states of Odisha, Telangana, western Maharashtra, northern Karnataka, Madhya Pradesh, western Rajasthan and north-eastern states. Decline is mostly in the range of 0-2 m. There is rise in water level in southern India comprising of Kerala, Tamil Nadu, southern Karnataka and southern Andhra Pradesh.

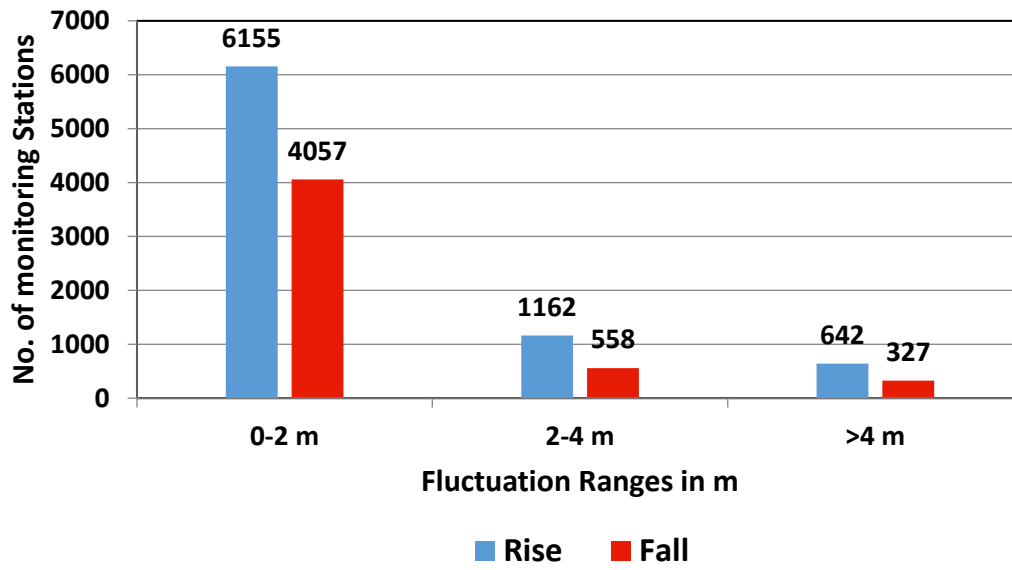


ANNUAL WATER LEVEL FLUCTUATION (JANUARY 2022- JANUARY 2020)

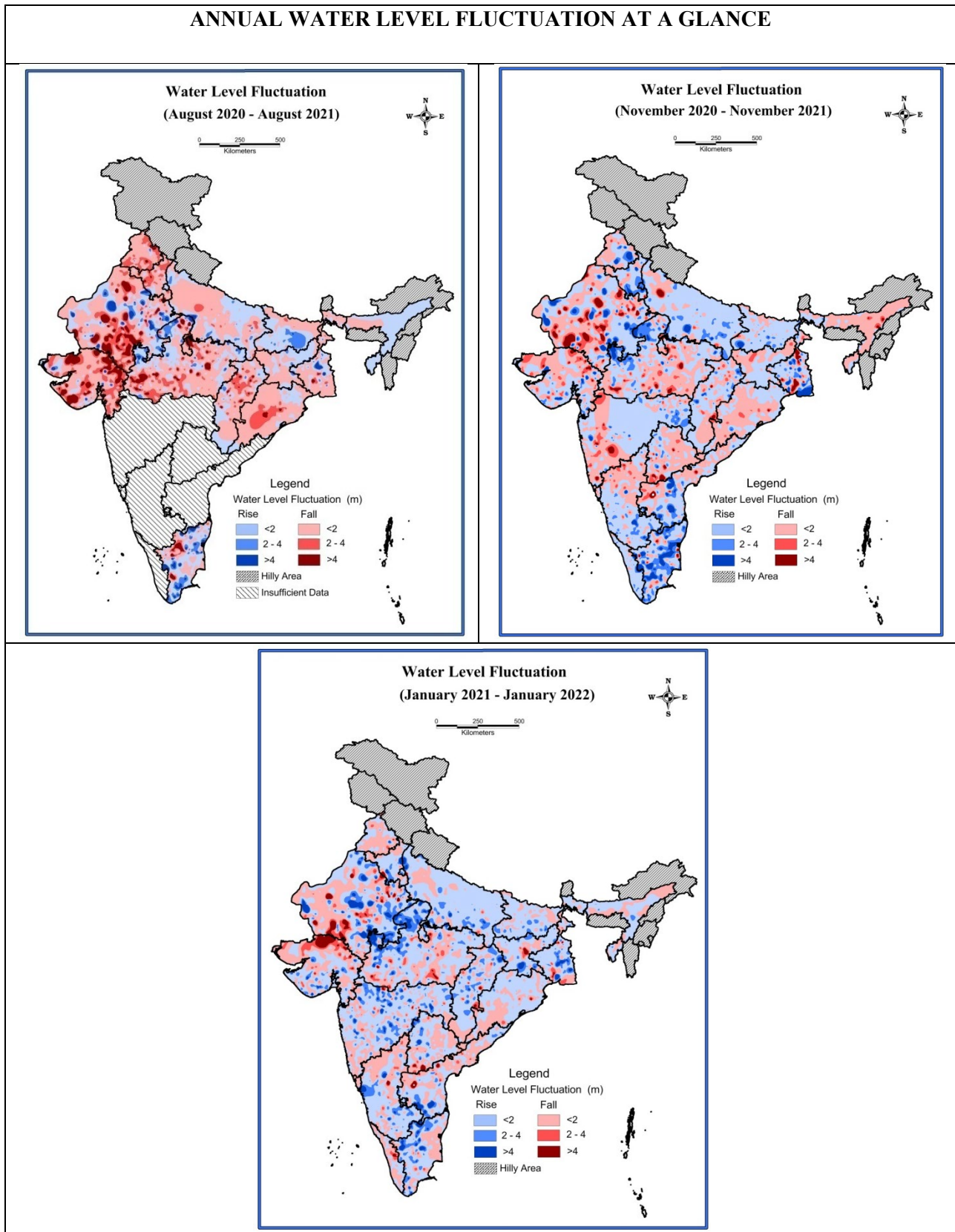
The water level fluctuation of **January 2022 to January 2021** shows that out of 13058 wells analysed, 7959 (61%) are showing rise and 4942 (37.8%) are showing fall in water level. Remaining 157 (1.2%) stations analysed do not show any change in water level. About 47.1% (6155) wells are showing rise in the water level in the range of less than 2 m. About 8.9% (1162) wells are showing rise in water level in 2-4 m range and 4.9% (642) wells showing rise in water level more than 4 m range. About 37.1% wells are showing decline in water level, out of which 31.1% (4057) wells are showing decline in water level in less than 2 m range. About 4.3 % (558) wells are showing decline in water level in 2-4 m range and 4% (327) wells are showing decline in water level more than 4 m range. Majority of the wells showing rise/decline falls in the range of 0-2 m. **(Plate-XII, Annexure-VI)**

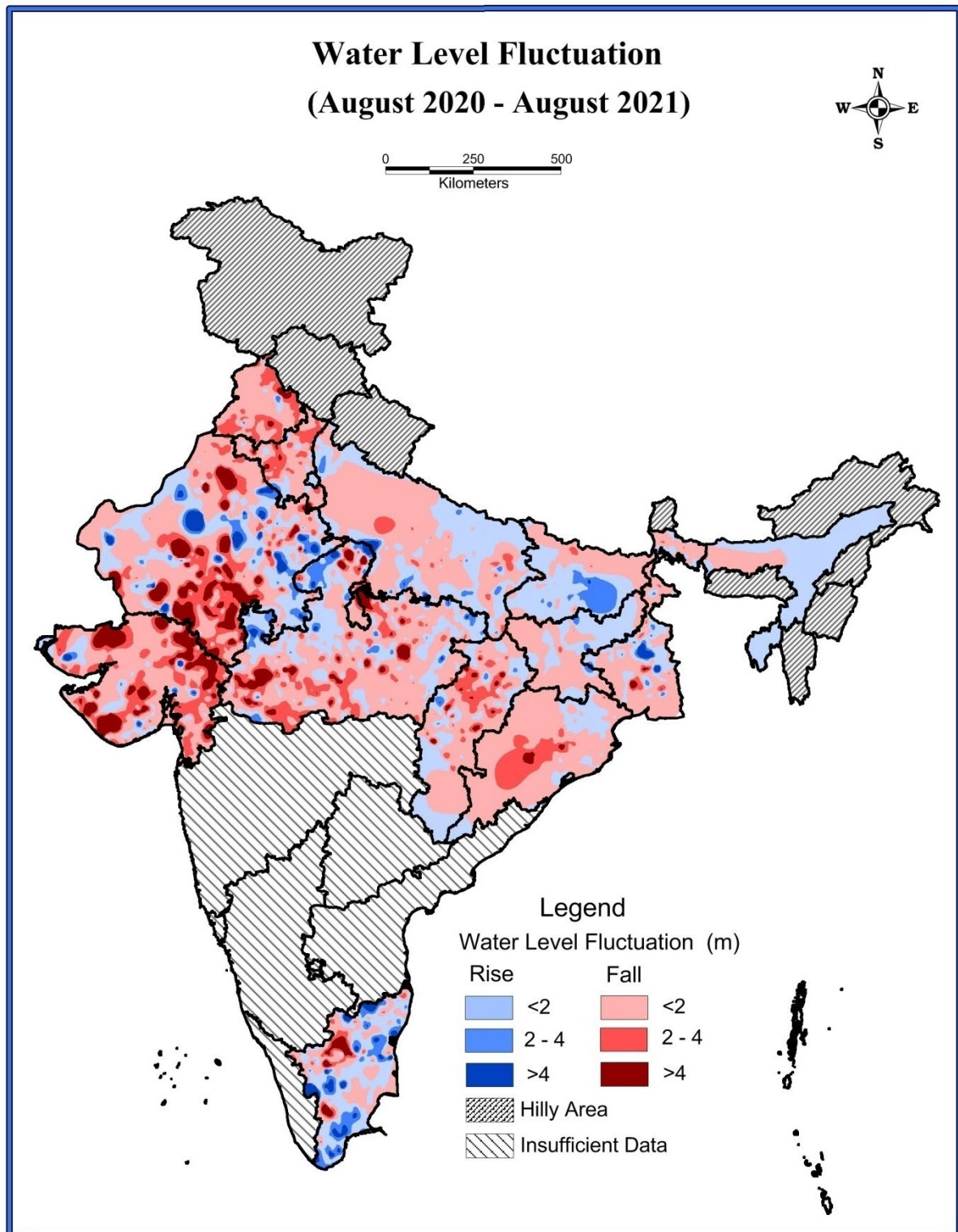
Rise in water level is observed mainly in the southern states of Kerala, Tamil Nadu, Karnataka, Andhra Pradesh and also in Assam, Odisha, Gujarat and Rajasthan. Fall is mostly in the range of 0-2 m, although fall in the range of more than 2 m is also prevalent in all the states in small patches.

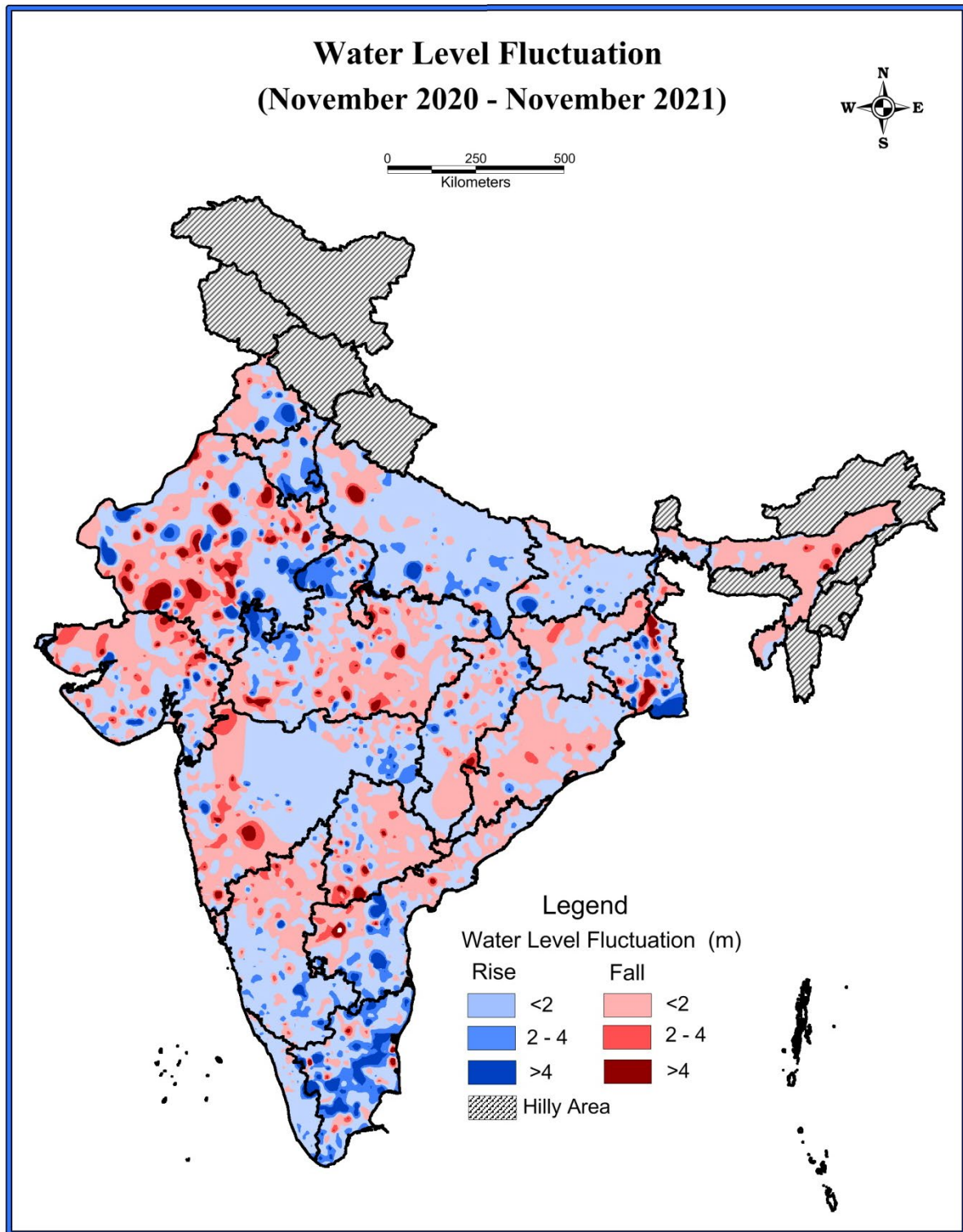
Water Level Fluctuation- January 2022 compared to January 2021, India.

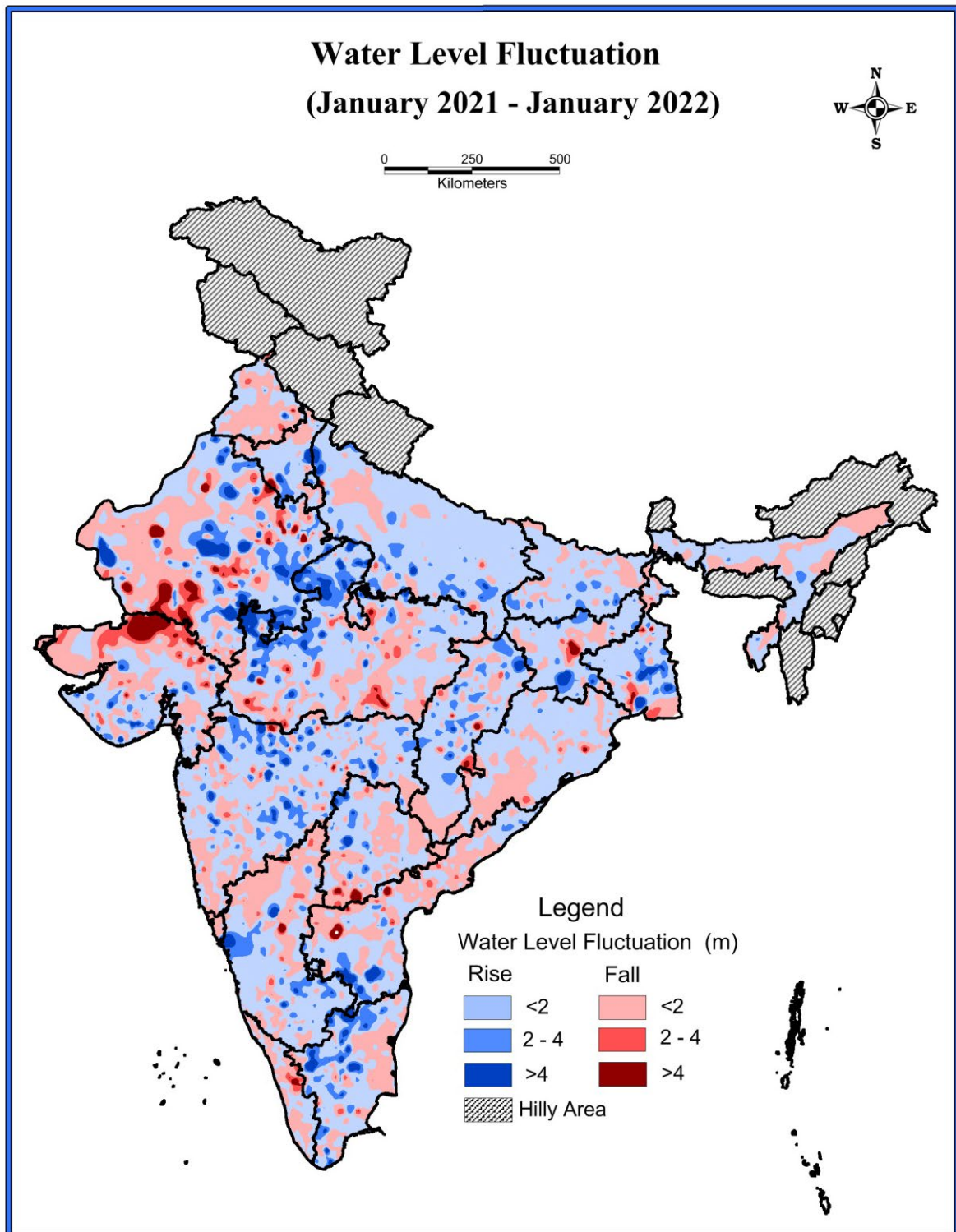


ANNUAL WATER LEVEL FLUCTUATION AT A GLANCE





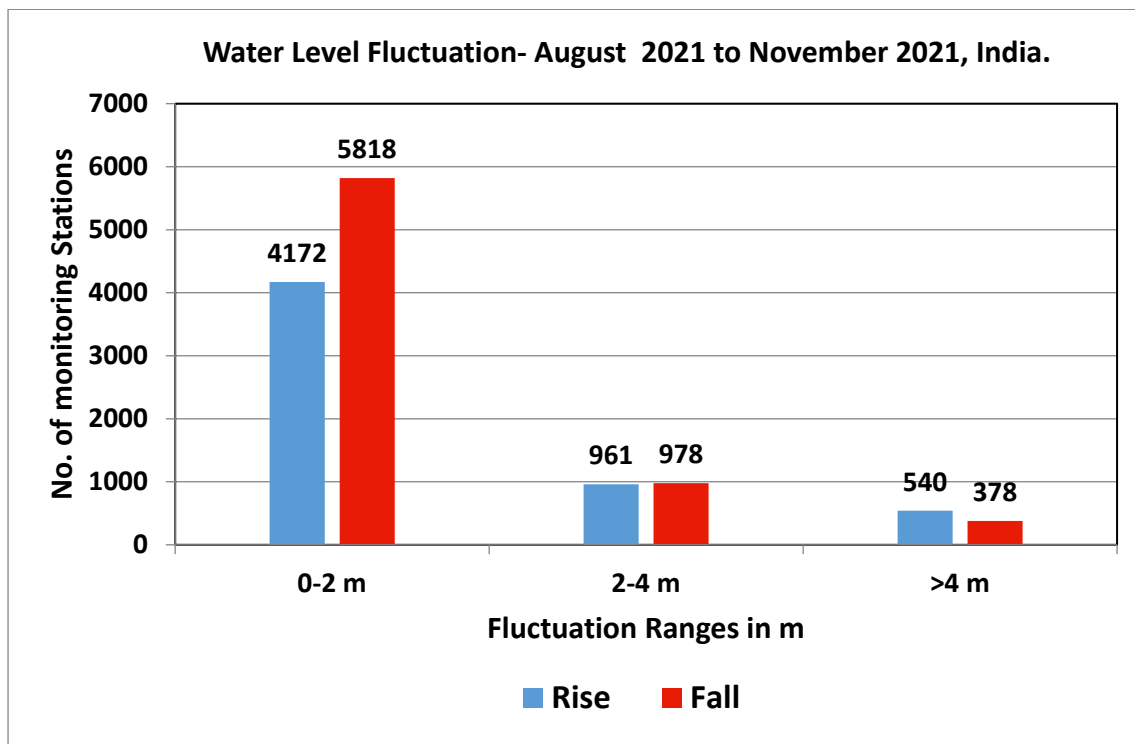




3.2.3 SEASONAL WATER LEVEL FLUCTUATION IN UNCONFINED AQUIFER

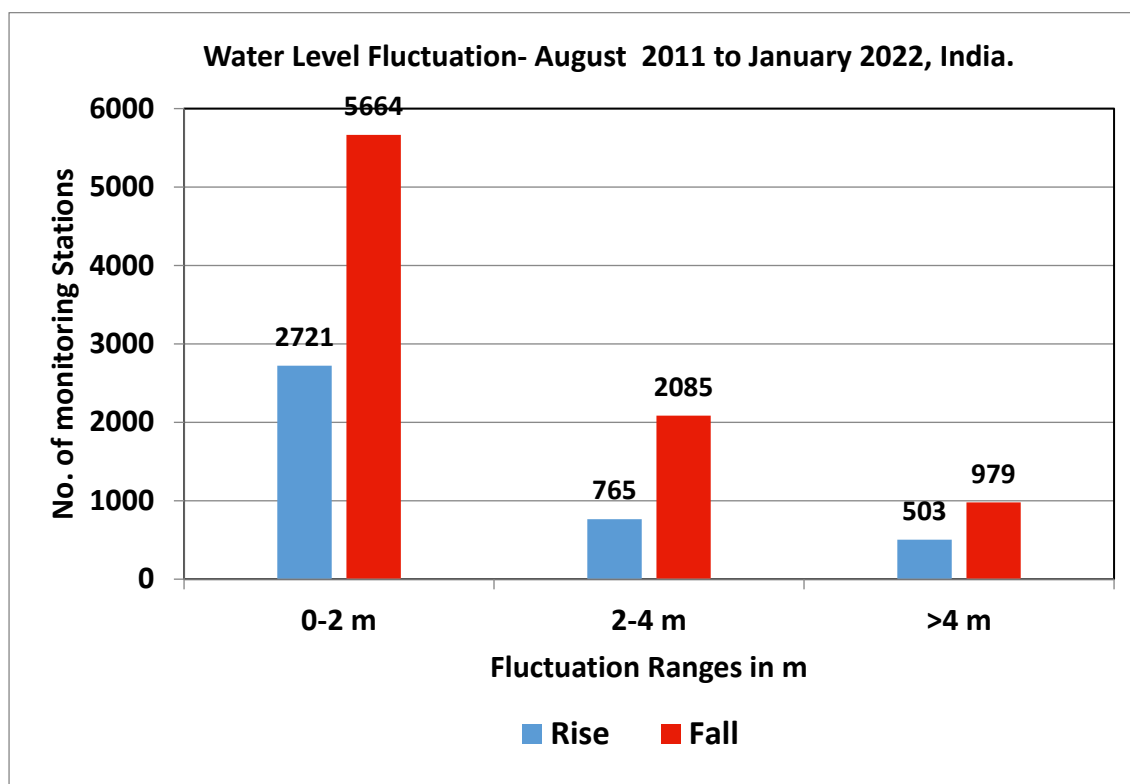
SEASONAL WATER LEVEL FLUCTUATION (NOVEMBER 2021- AUGUST 2021)

A comparison of depth to water level of August 2021 with post-monsoon 2021 indicates that out of analysed 13161 wells, about 43.1 % (5673) of wells are showing rise in water levels, out of which 31.7%(4172) wells are showing rise of less than 2 m range. About 7.3% (961) wells are showing rise in water level in the range of 2-4 m and another 4.1 % (540) wells are showing rise in water in range of more than 4 m. Similarly, 54.5 % (7174) wells are showing decline in water level, out of which 44.2% (5818) wells are showing decline in water in the range of 0-2 m, 7.4% (978) wells are showing fall in water level in the range of 2-4 m and the remaining 2.9 % (378) wells are showing fall in water level of more than 4 m (**Plate-XIV, Annexure-VII**). Rise in water level from 0 to more than 4 m is mostly prominent in southern India, western and northern states, coastal Andhra Pradesh and West Bengal. Water level decline of 0-2 m has been observed in central India covering eastern Maharashtra, Odisha, Chhatisgarh, Madhya Pradesh, Bihar, north-eastern states and Konkan area. Fall of 2-4m or more is observed in Madhya Pradesh, parts of Maharashtra, Gujarat and Rajasthan.

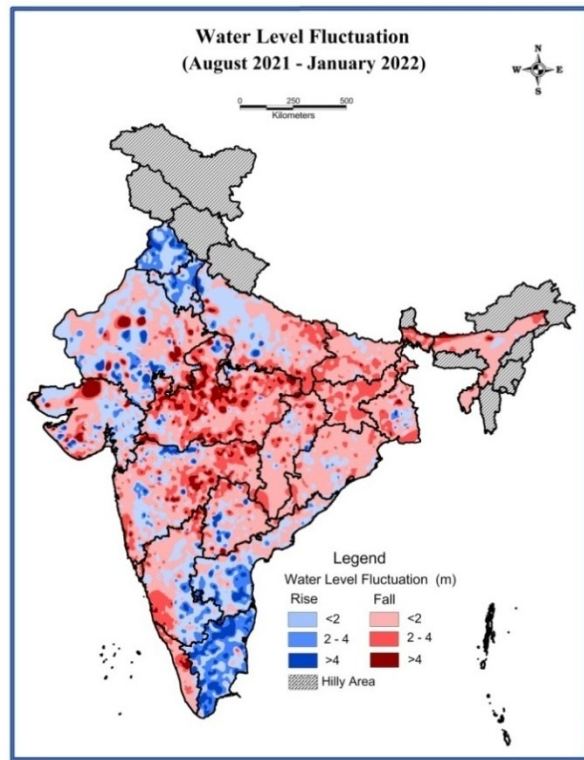
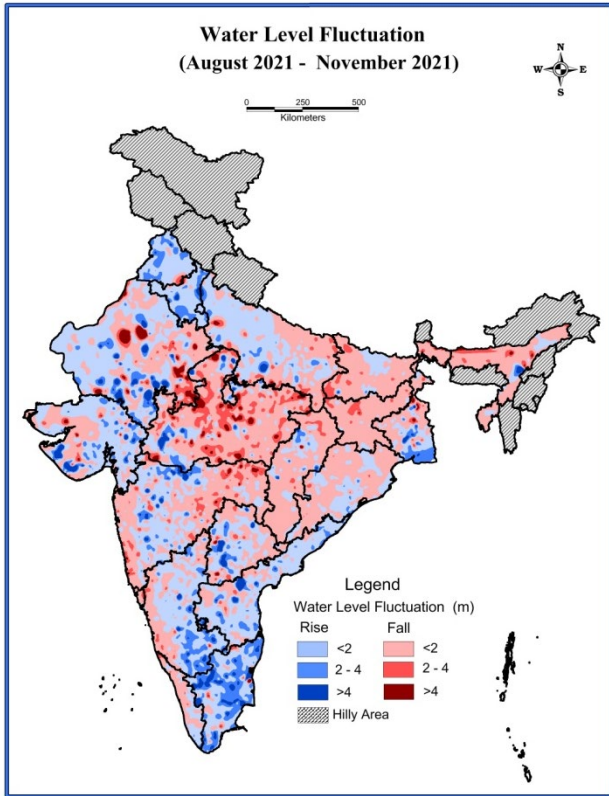


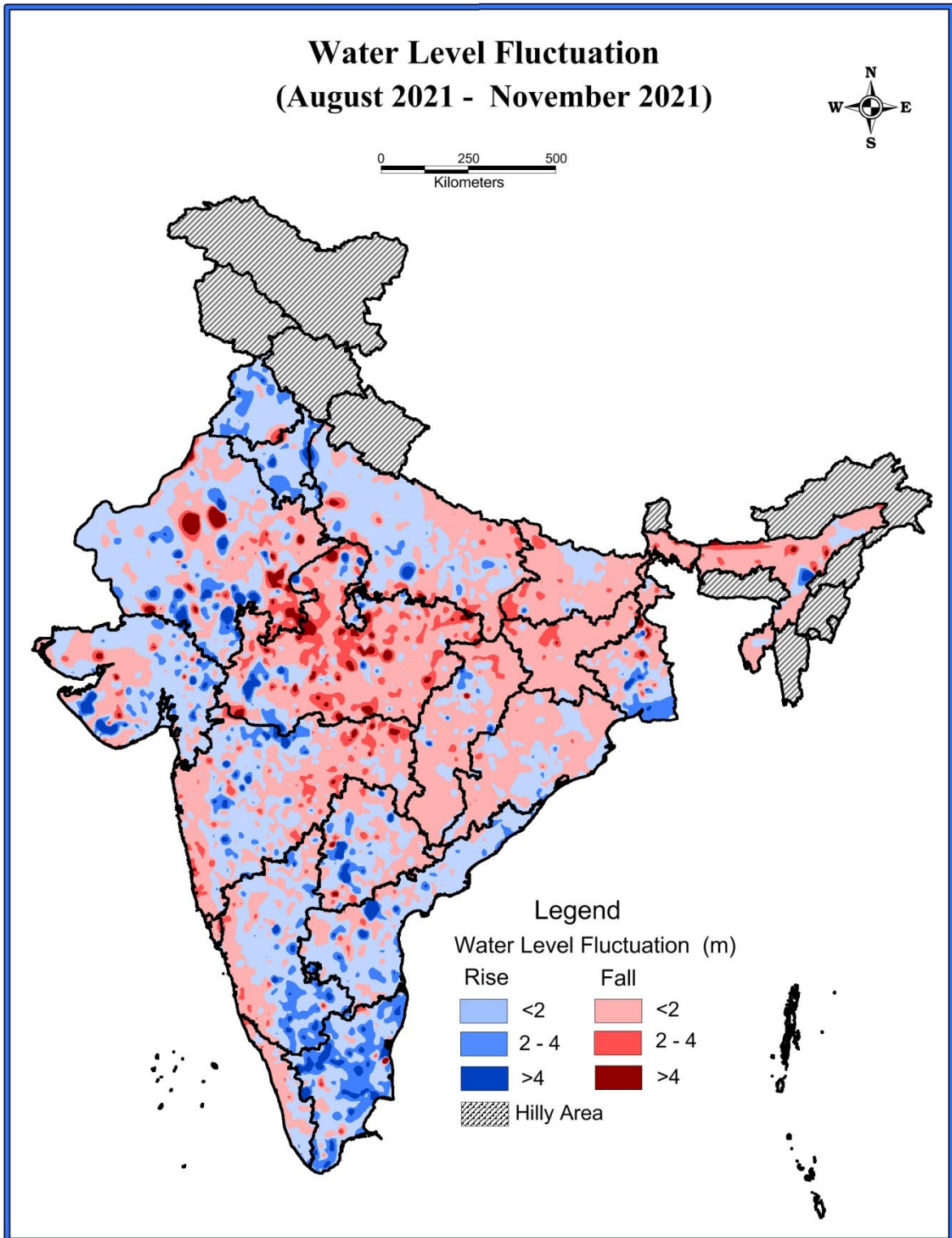
SEASONAL WATER LEVEL FLUCTUATION (JANUARY 2022- AUGUST 2021)

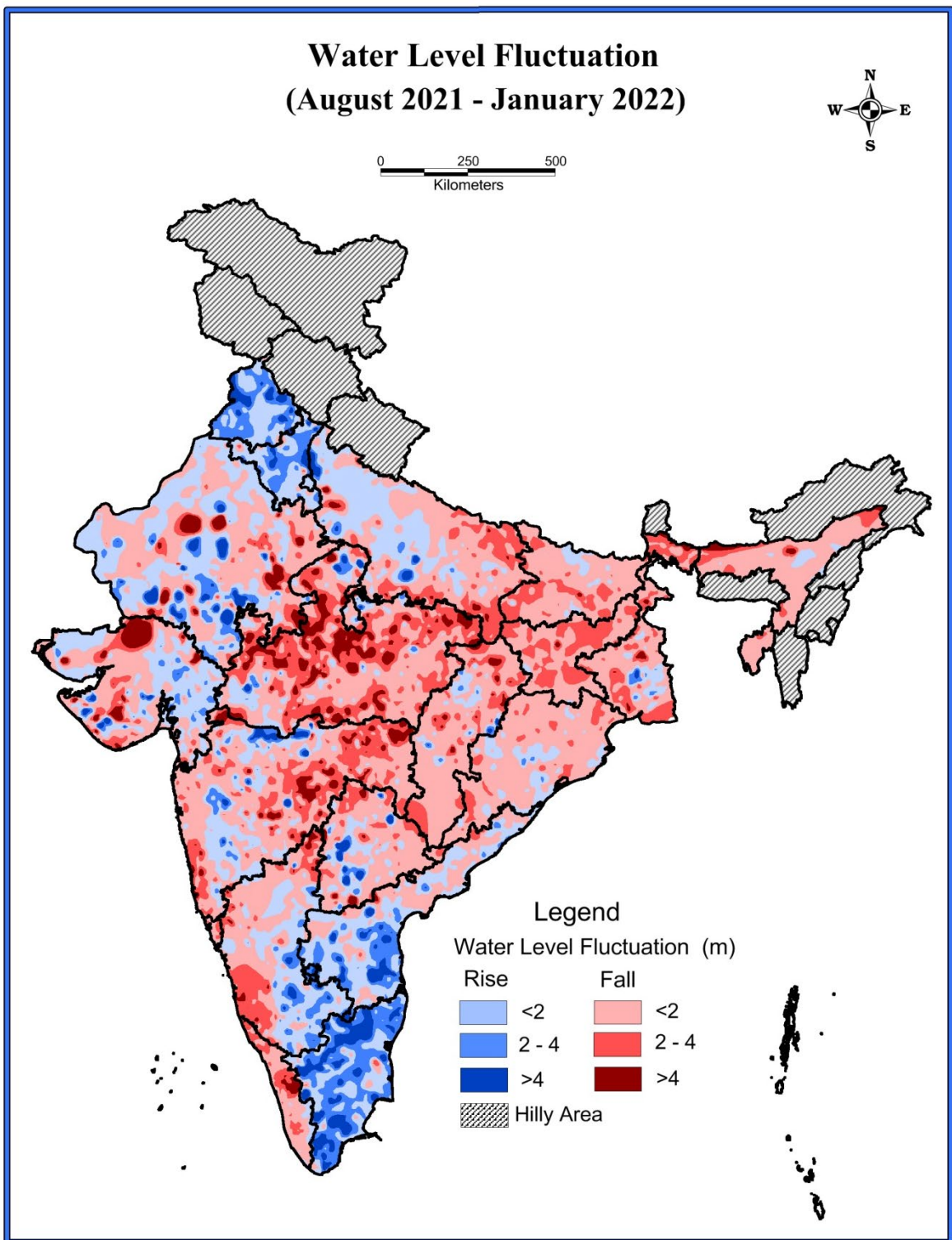
A comparison of depth to water level of August 2021 with January 2022 indicates that about 31% of wells (12827) analysed are showing rise in water levels, out of which 21.2% (2721) wells are showing rise of less than 2 m range. About 6 % (765) wells are showing rise in water level in the range of 2-4 m and another 3.9 % (503) wells are showing rise in water in range of more than 4 m. 68% of all wells are showing decline in water level, out of which 44.2 % wells (5664) are showing decline in water in the range of 0-2 m. 16.3 % (2085) are showing fall in the range of 2-4 m and 7.6 % (979) wells are showing fall of more than 4 m. Fall in water level ranging from 0-4 m is prominent in all the states of the country except Punjab, Haryana, Rajasthan, Andhra Pradesh, Tamil Nadu and eastern Karnataka (**Plate-XV, Annexure-VIII**)



SEASONAL WATER LEVEL FLUCTUATION AT A GLANCE



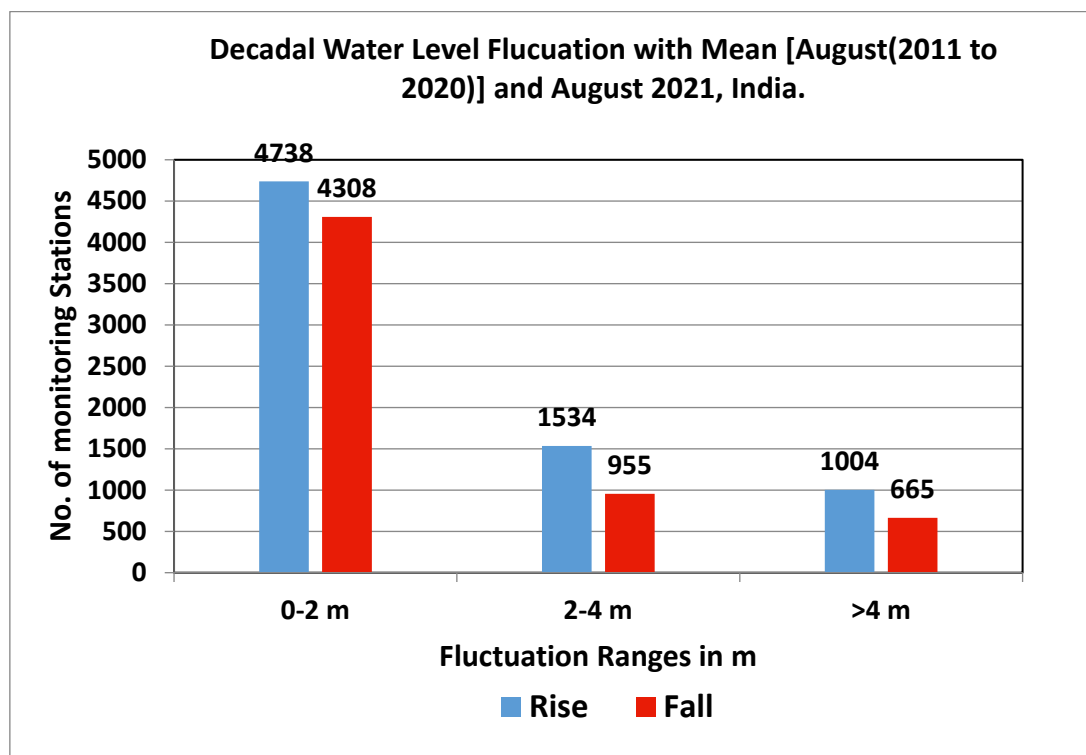




3.2.4 DECADAL WATER LEVEL FLUCTUATION

WATER LEVEL FLUCTUATION WITH DECADAL MEAN (AUGUST-2011 TO AUGUST-2020) TO AUGUST-2021

A comparison of depth to water level of August 2021 with decadal mean of August (2011-2020) indicate that, out of total 14060 wells analysed, about 57.8 % (8124) of wells are showing rise in water level, out of which 33.7% (4738) wells are showing rise of less than 2 m. About 10.9% (1534) wells are showing rise in water in the range of 2-4 m and about 7.1 % (1004) wells are showing rise in water level in the range of more than 4 m. About 42.2% (5928) wells are showing decline in water level, out of which 30.6% (4308) wells are showing decline in water in the range of 0-2 m. 6.8% (955) wells are showing decline in water level in 2-4 m range and remaining 4.7% (665) are in the range of more than 4 m. The rise in water level mostly in the range of 0-2 m was observed in southern peninsula covering Maharashtra, Telangana, Andhra Pradesh, Karnataka, Tamil Nadu and Kerala. There is also rise in southern Gujarat, eastern Uttar Pradesh, Jharkhand, Bihar and northern West Bengal. Decline in water level observed in Odisha, Jharkhand, Madhya Pradesh, Konkan area of Maharashtra, Punjab, Haryana, Rajasthan and eastern Gujarat. The range of fall is 0-4 m in general and more than 4 m in western India comprising of Delhi, Gujarat, Haryana, Punjab, Rajasthan. (Plate-XVII, Annexure-IX)

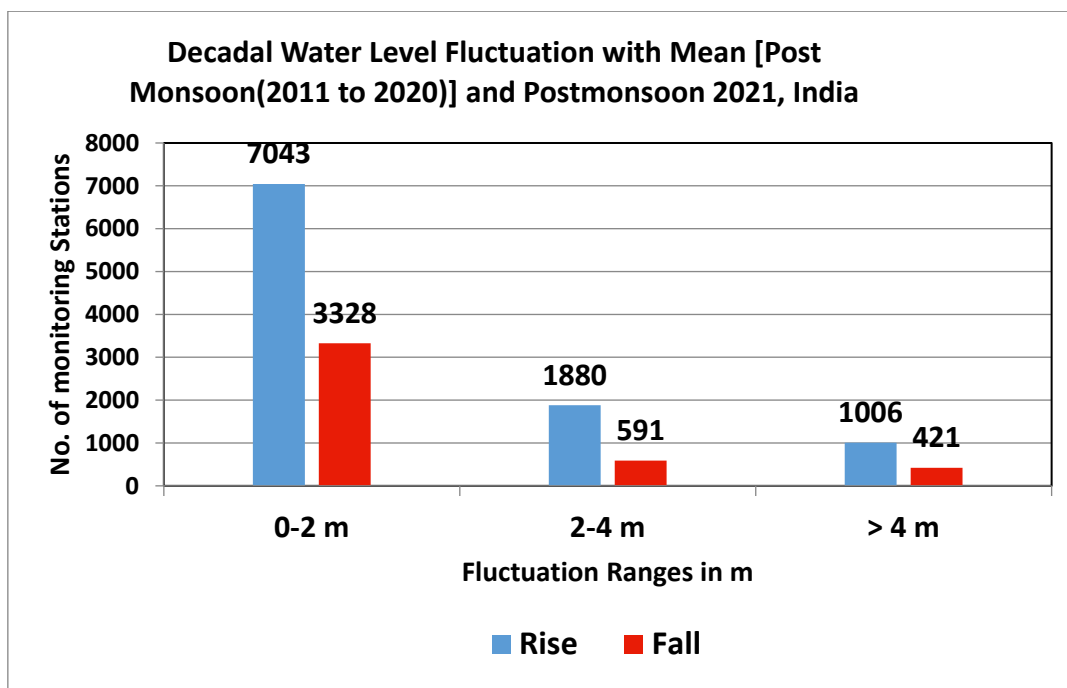


WATER LEVEL FLUCTUATION WITH DECADAL MEAN (POST- MONSOON-2011 TO POST-MONSOON-2020) TO POST-MONSOON-2021

A comparison of depth to water level of November 2021 with decadal mean of November (2011-2020) indicate that, out of 14275 wells analysed, 9929(70%) of wells are showing rise in water level, out of which 49.3% (7043) wells are showing rise of less than 2 m. About 13.2% (1880) wells are showing rise in water level in the range of 2-4 m and about 7% (1006) wells are showing rise in water level in the range of more than 4 m. Out of 4340 (about 30%) wells showing decline in water level, 23.3% (3328) wells are showing decline in water in the range of 0-2 m. 4.1%(591) wells are showing decline in water level in 2-4 m range and remaining 2.9% (421) are in the range of more than 4 m. (**Plate XVIII, Annexure-X**).

A comparison of depth to water level of November 2021 with decadal mean of November (2011-2020) indicates that 70% of the wells have registered rise in ground water level , mostly in the range of 0-2 m. Rise in water level is widespread in southern India comprising of Maharashtra, Telangana, Andhra Pradesh, Gujarat, Bihar, Jharkhand, eastern Uttar Pradesh, Tamil Nadu, Karnataka and Kerala.

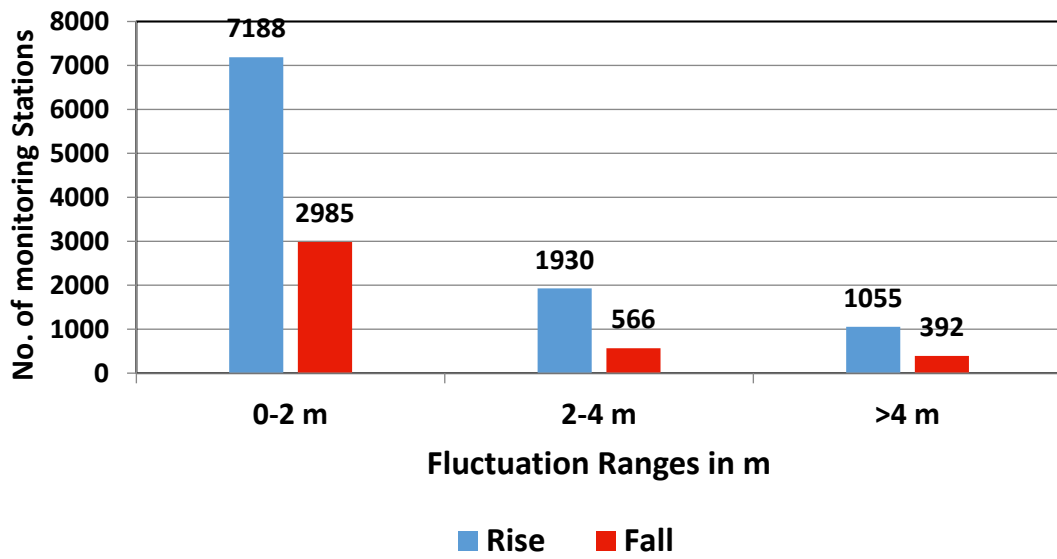
Fall in water level within 0-2 m range is observed in Madhya Pradesh, Maharashtra, Goa, Chhatisgarh, Odisha and parts of NE states in patches. Decline of **more than 4 m** has also been observed in pockets in the states/UTs of Chandigarh, Delhi, Gujarat, Haryana, Punjab, Rajasthan and western Uttar Pradesh.



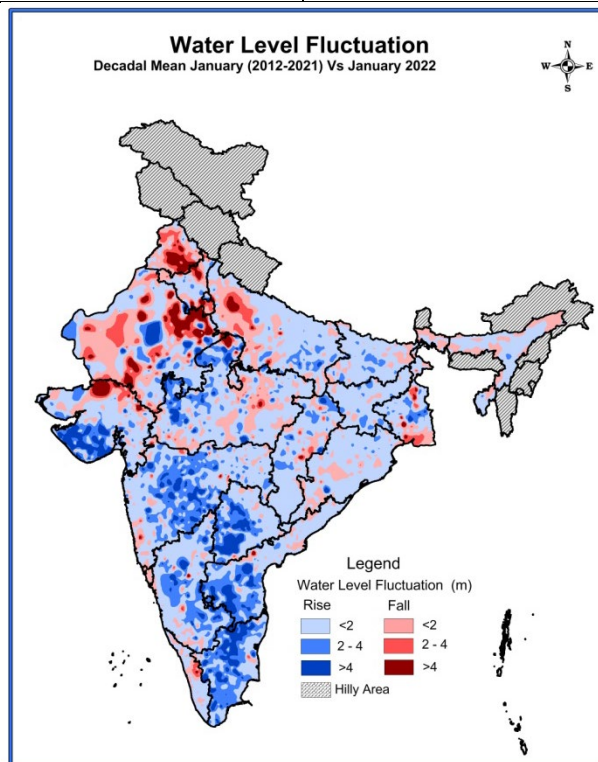
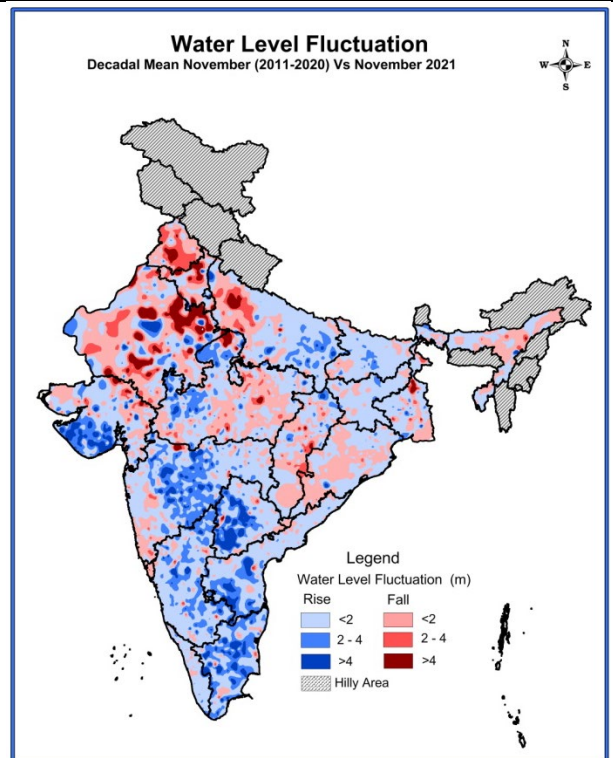
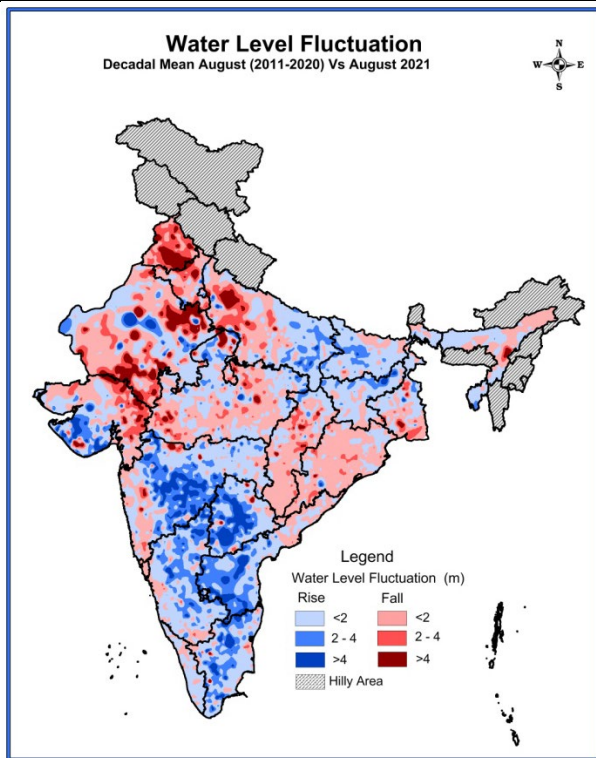
WATER LEVEL FLUCTUATION WITH DECADAL MEAN (JAN 2012 TO JAN 2021) TO JANUARY 2022

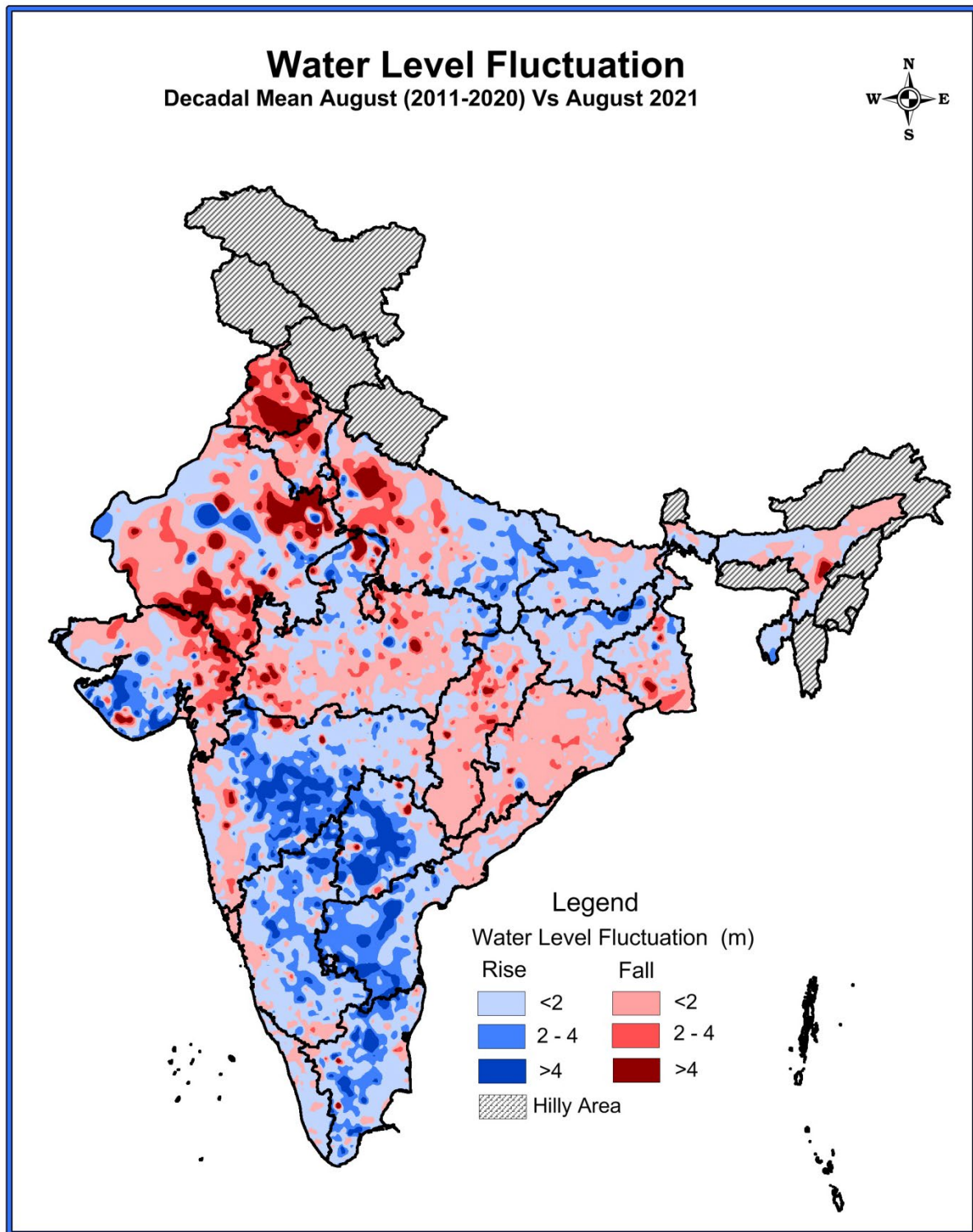
A comparison of depth to water level of January 2022 with decadal mean of January (2012-2021) indicates that 10173 (about 71.9%) of wells are showing rise in water level, out of which 50.8% (7188) wells are showing rise of less than 2 m. About 13.6% (1930) wells are showing rise in water level in the range of 2-4 m and only 7.5% (1055) wells are showing rise in the range of more than 4 m. Out of total 3943 (about 27.95%) wells showing decline in water level, 21.1% (2985) wells are showing decline in water in the range of 0-2 m. 4% (566) wells are showing decline in water level in 2-4 m range and remaining 2.8% (392) are in the range of more than 4 m. Rise in water level is observed in major portions of peninsular India in 0-4 m range and morethan 4 m is seen in southern states Telangana, Andhra Pradesh and Tamilnadu. Decline in water level is observed in north eastern states Arunachal Pradesh, Tripura, Assam. In rest of india fall in water level is recorded in Chandigarh, Goa, Punjab and Rajasthan (**Plate XIX, Annexure-XI**).

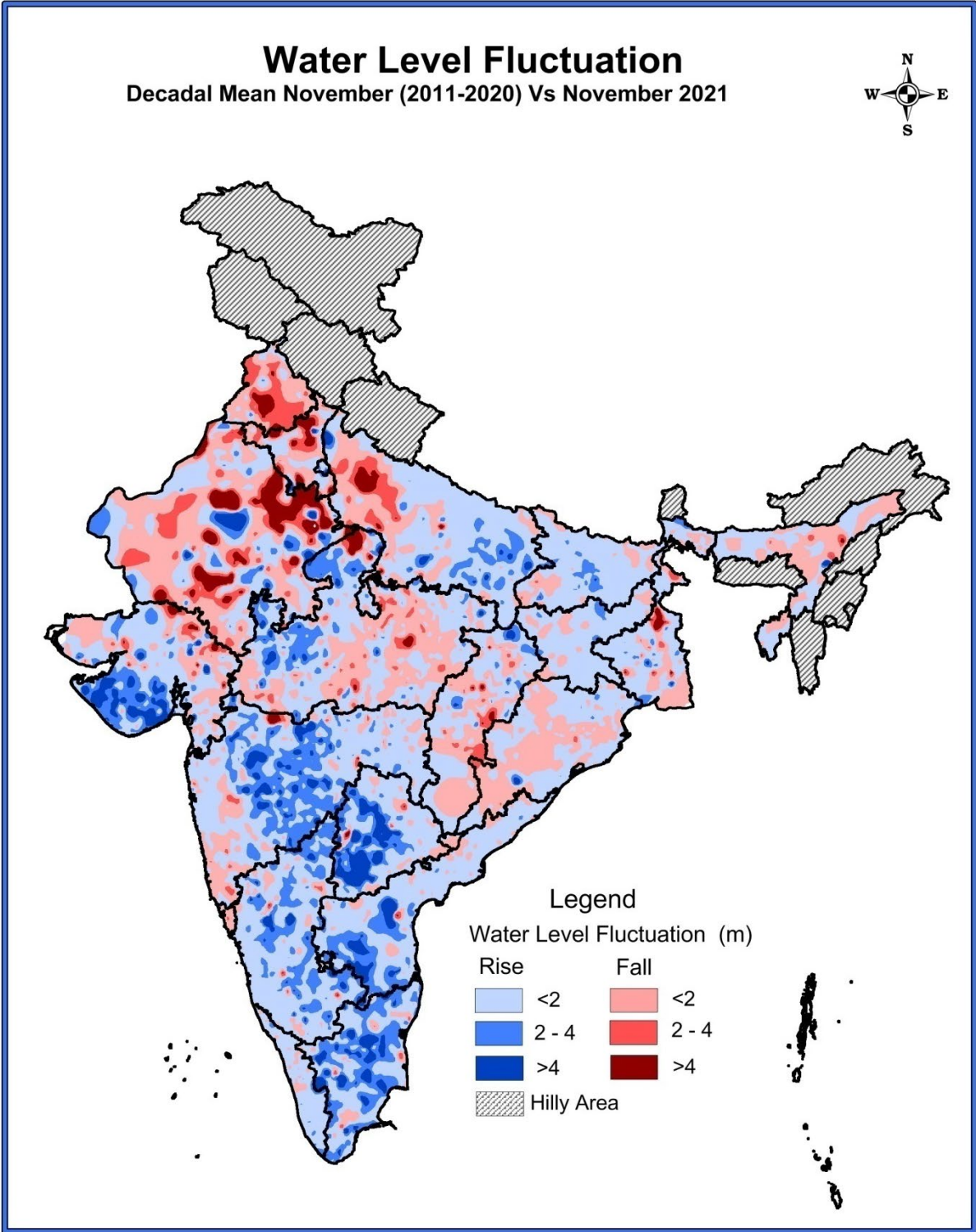
**Decadal Water Level Flucuation with
Mean [January(2012 to 2021)] and January 2022, India.**

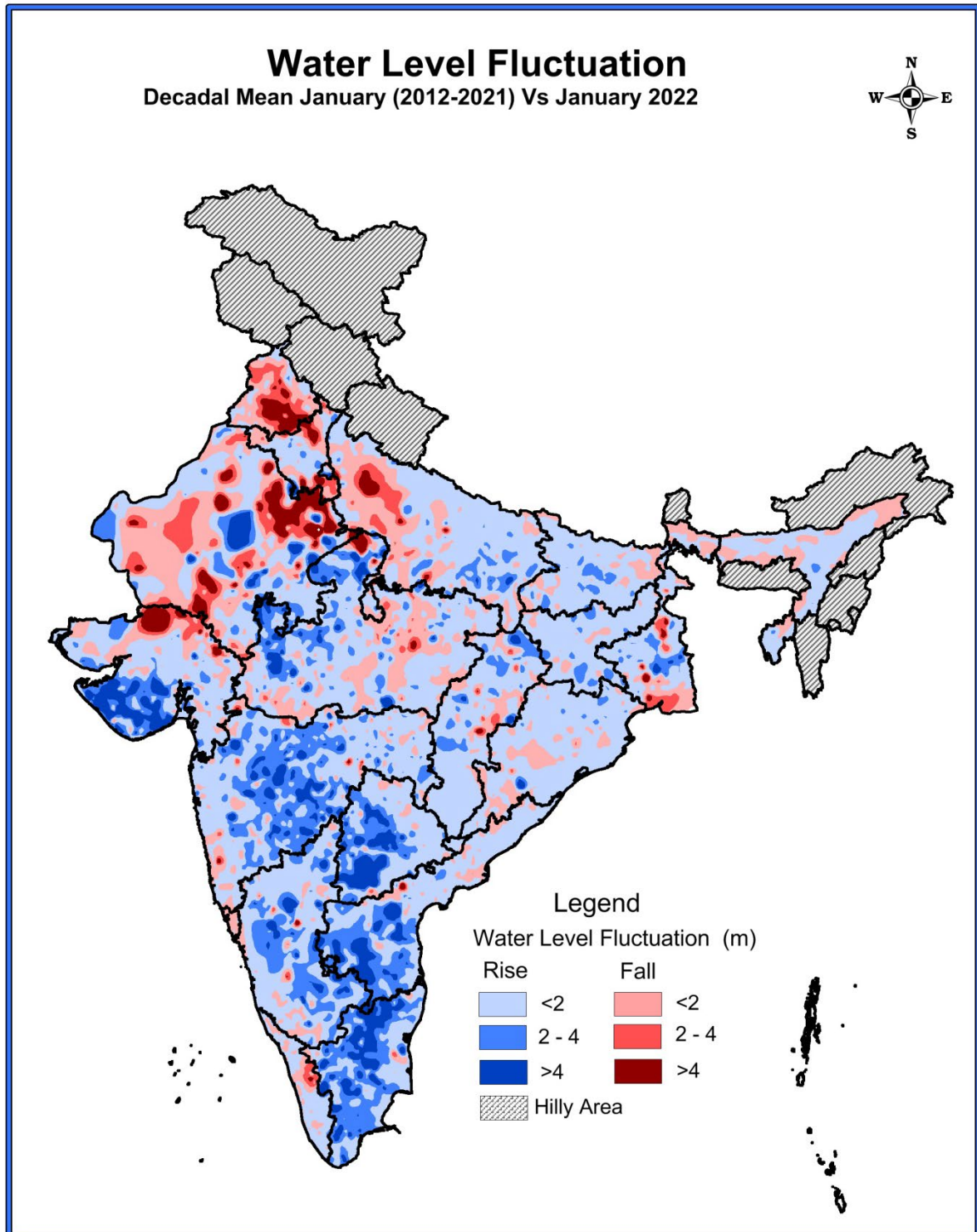


DECADAL WATER LEVEL FLUCTUATION AT A GLANCE







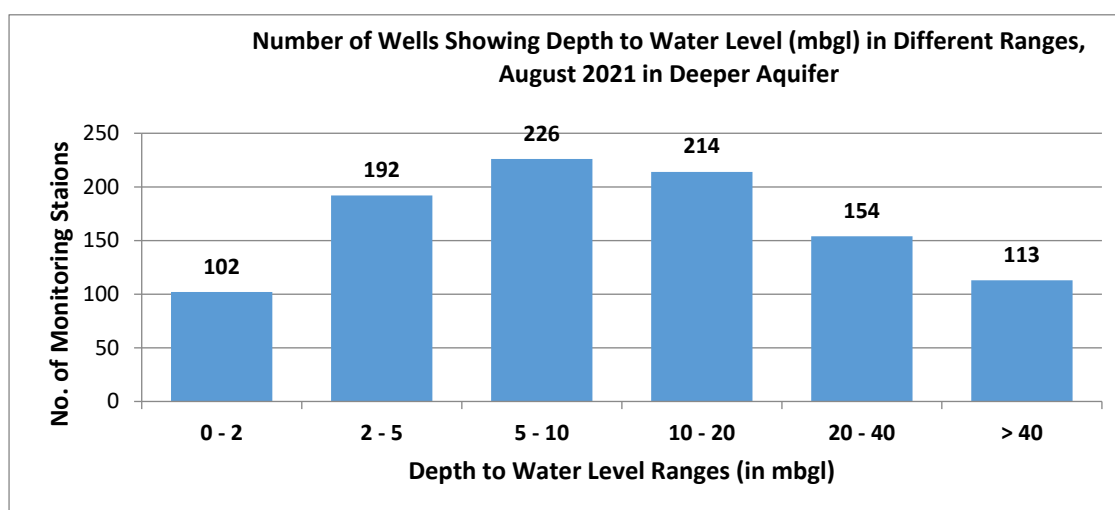


3.3 GROUND WATER REGIME IN DEEPER AQUIFER

3.3.1 DEPTH TO WATER LEVEL IN DEEPER AQUIFER

DEPTH TO WATER LEVEL – AUGUST 2021 IN DEEPER AQUIFER

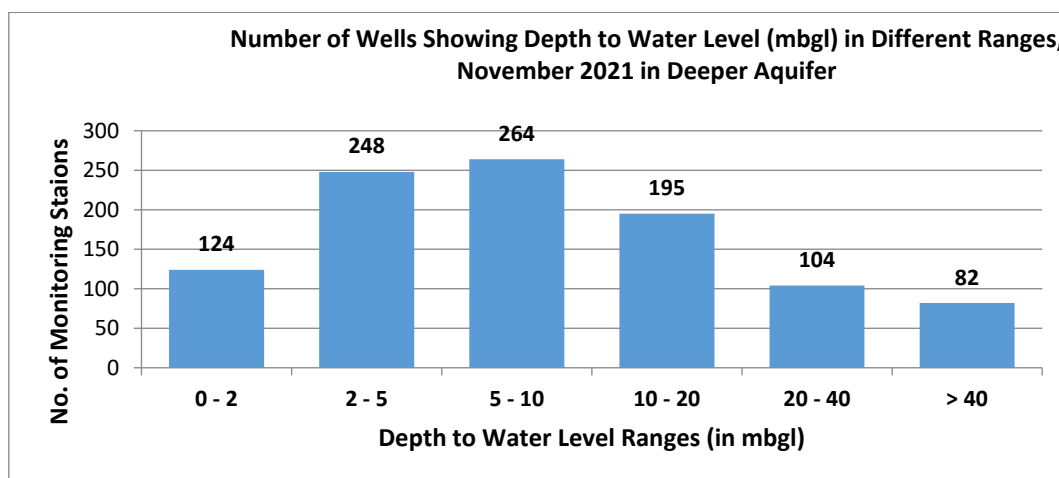
The ground water level data (*Annexure-XII*) of deeper aquifers for August 2021 indicates that out of the total 1001 wells analysed, 102 (10.2 %) wells are showing water level less than 2 m bgl, 192 (19.2%) wells are showing water level in the depth range of 2-5 m bgl, 226 (22.6%) wells are showing water level in the depth range of 5-10 m bgl, 214 (21.4%) wells are showing water level in the depth range of 10-20 m bgl, 154 (15.4%) wells are showing water level in the depth range of 20-40 m bgl and the remaining 113 (11.3 %) wells are showing water level more than 40 m bgl. Thus the general range of water level is between 5 to 20m. From the analysis of the data it's also revealed that deeper piezometric level of more than 40 m is observed in Chandigarh, Punjab, Haryana and Uttaranchal.



DEPTH TO WATER LEVEL – NOVEMBER 2021 IN DEEPER AQUIFER

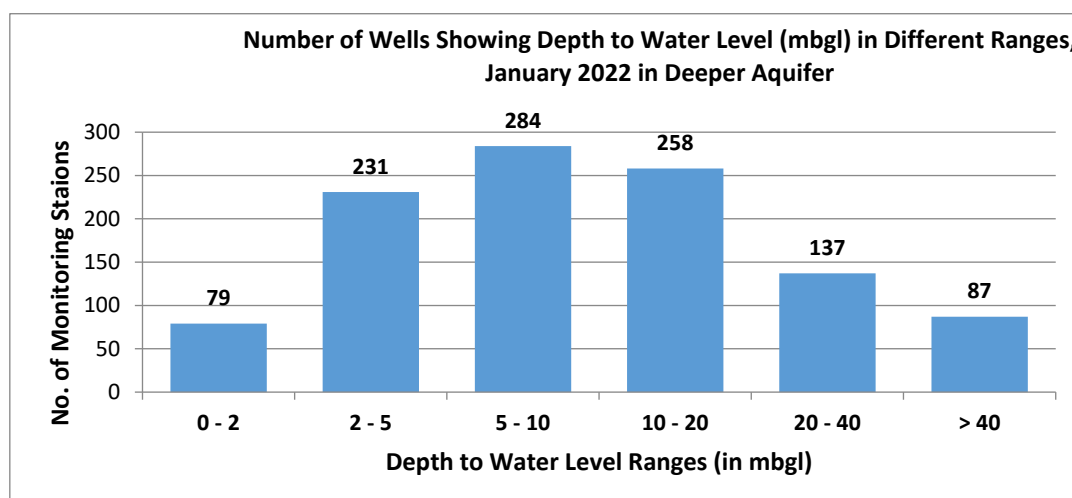
The ground water level data (*Annexure-XIII*) of deeper aquifers for November 2021 indicates that out of the total 1017 wells analysed, 124 (12.2 %) wells are showing water level less than 2 m bgl, 248 (24.4%) wells are showing water level in the depth range of 2-5 m bgl, 264 (26%) wells are showing water level in the depth range of 5-10 m bgl, 195 (19.2%) wells are showing water level in the depth range of 10-20 m bgl, 104 (10.2%) wells are showing water level in the depth range of 20-40 m bgl and the remaining 82 (8.1 %) wells are showing water level more than 40 m bgl. Thus the general range of water level is between 2 to 10m. From the

analysis of the data it's also revealed that deeper piezometric level of 20-40 m is observed in Chandigarh, Haryana, Pondicherry, Uttaranchal and more than 40m in Gujarat.



DEPTH TO WATER LEVEL – JANUARY 2022 IN DEEPER AQUIFER

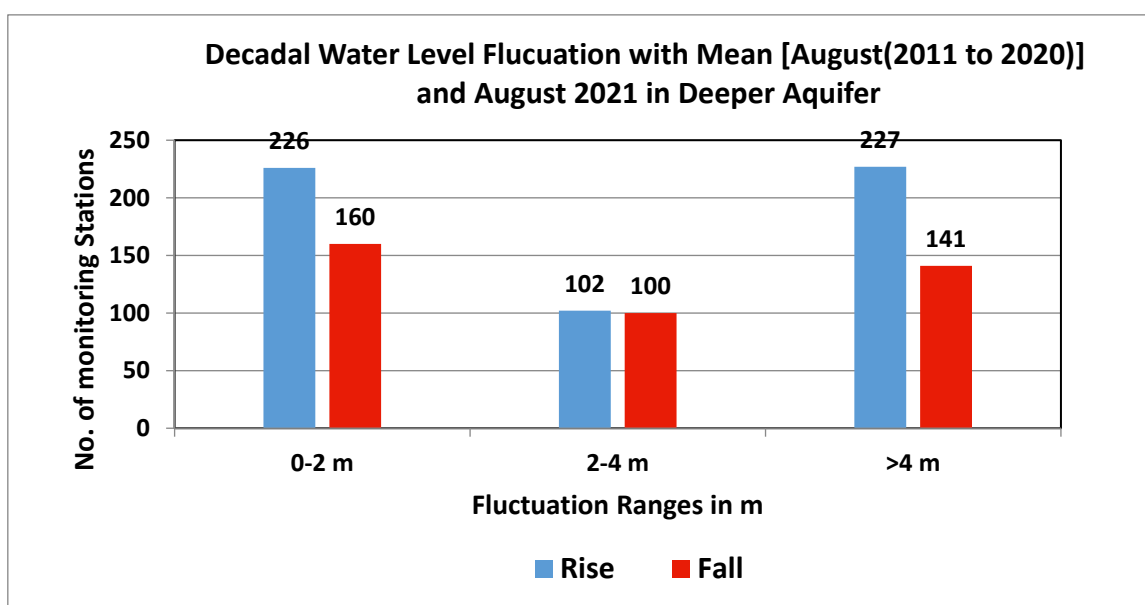
The ground water level data(*Annexure-XIV*)of deeper aquifers for January 2022, indicates that out of the total 1076 wells analysed, 79(7.3 %) wells are showing water level less than 2 m bgl, 231 (21.5 %) wells are showing water level in the depth range of 2-5 m bgl, 284 (26.4%) wells are showing water level in the depth range of 5-10 m bgl, 258 (24%) wells are showing water level in the depth range of 10-20 m bgl, 137 (12.72%) wells are showing water level in the depth range of 20-40 m bgl and the remaining 87 (8.1 %) wells are showing water level more than 40 m bgl. Thus the general range of water level is between 2 to 10m. From the analysis of the data it's also revealed that deeper piezometric level of 20-40 m is observed in Punjab, Haryana, Pondicherry, Uttaranchal and more than 40m in Gujarat and Chandigarh.



3.3.2 DECADAL WATER LEVEL FLUCTUATION IN DEEPER AQUIFER

WATER LEVEL FLUCTUATION WITH DECADAL MEAN (AUGUST-2011 TO AUGUST-2020) TO AUGUST-2021 IN DEEPER AQUIFER

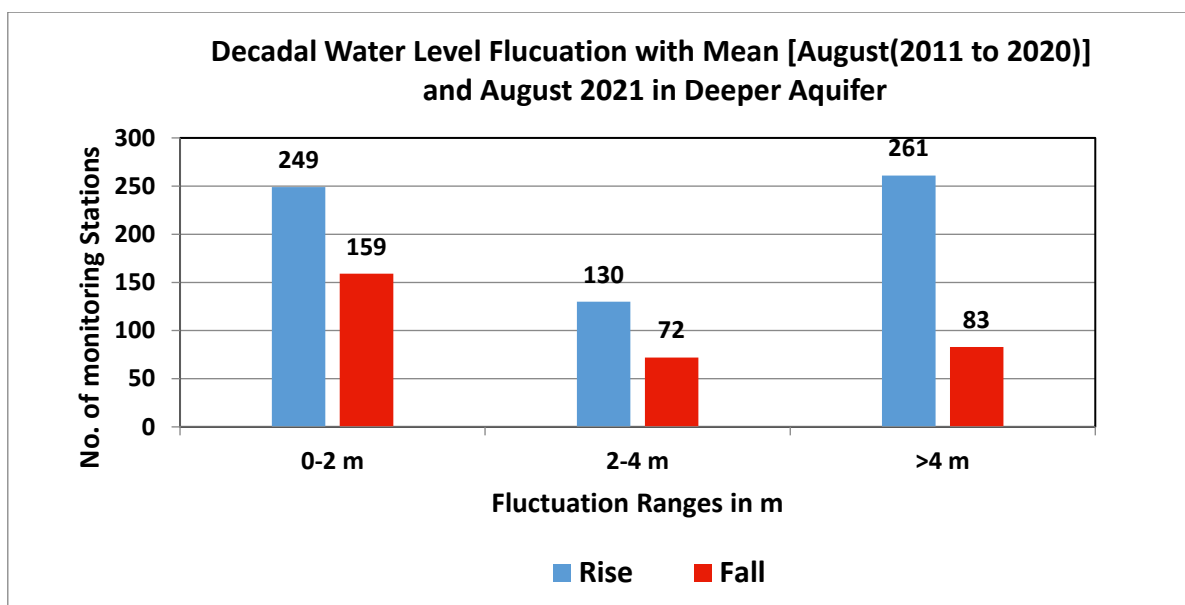
A comparison of depth to water level of August 2021 with decadal mean of August (2011-2020) indicates that, out of total 956 wells analysed(*Annexure-XV*), 555 (58.1%) of wells are showing rise in water level, among which 23.6% (226) wells are showing rise of less than 2 m. About 10.7% (102) wells are showing rise in water level in the range of 2-4 m and only 23.7% (227) wells are showing rise in the range of more than 4 m. Among the 401 (41.9%) wells showing decline in water level, 16.7% (160) wells are showing decline in water in the range of 0-2 m. 10.5% (100) wells are showing decline in water level in 2-4 m range and remaining 14.7% (141) are in the range of more than 4 m. Rise in water level in majority of wells observed in Andhra Pradesh, Bihar, Karnataka, Maharashtra, Telangana and Tamil Nadu. Similarly fall in significant number of wells is observed in Chandigarh, Chhatisgarh, Delhi, Gujarat, Haryana, Madhya Pradesh, Odisha, Pondichery, Punjab and Uttaranchal.



WATER LEVEL FLUCTUATION WITH DECADAL MEAN (NOVEMBER-2011 TO NOVEMBER-2020) TO NOVEMBER-2021 IN DEEPER AQUIFER

A comparison of depth to water level of November 2021 with decadal mean of November (2011-2020) indicates that, out of total 954 wells analysed(*Annexure-XVI*), 640 (67%) of wells are showing rise in water level, among which 26.1% (249) wells are showing rise of less

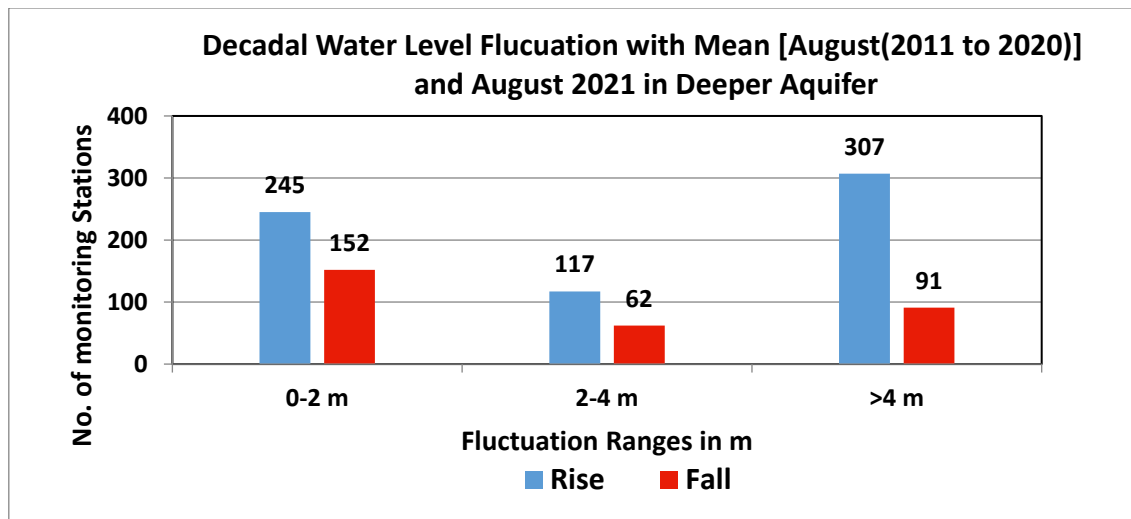
than 2 m. About 13.6% (130) wells are showing rise in water level in the range of 2-4 m and only 27.4% (261) wells are showing rise in the range of more than 4 m. Among the 314(33%) wells showing decline in water level, 16.7% (159) wells are showing decline in water in the range of 0-2 m. 7.5% (72) wells are showing decline in water level in 2-4 m range and remaining 8.7% (83) are in the range of more than 4 m. Rise in water level in majority of wells observed in Andhra Pradesh, Bihar, Karnataka, Kerala, Madhya Pradesh, Maharashtra, and Telangana. Similarly fall in significant number of wells is observed in Chhatisgarh, Gujarat, Haryana, Madhya Pradesh, Odisha, Punjab and Uttaranchal.



WATER LEVEL FLUCTUATION WITH DECADAL MEAN (JANUARY-2012 TO JANUARY-2021) TO JANUARY-2022 IN DEEPER AQUIFER

A comparison of depth to water level of January 2022 with decadal mean of January (2012-2021) indicates that, out of total 974 wells analysed(*Annexure-XVII*), 669 (68.7%) of wells are showing rise in water level, out of which 25.2% (248) wells are showing rise of less than 2 m. About 12% (117) wells are showing rise in water level in the range of 2-4 m and only 31.5% (307) wells are showing rise in the range of more than 4 m. Among the 305(31.3%) wells showing decline in water level, 15.6% (152) wells are showing decline in water in the range of 0-2 m. 6.4% (62) wells are showing decline in water level in 2-4 m range and remaining 9.3% (91) are in the range of more than 4 m. Rise in water level in majority of wells observed in Andhra Pradesh, Delhi, Jharkhand, Karnataka, Madhya Pradesh, Maharashtra and Tamil Nadu. Similarly fall in significant number of wells is observed in

Chandigarh, Chhatisgarh, Gujarat, Haryana, Madhya Pradesh, Pondicherry, Tripura and West Bengal.



4. GROUND WATER RESOURCE AVAILABILITY AND DEVELOPMENT STATUS

4.1 INTRODUCTION

Assessment of ‘Dynamic Ground Water Resources of the country is being carried out periodically to assess the annual ground water recharge and utilization and its availability for future use. The assessment has been carried out for the reference years 2004, 2009, 2011, 2013, 2017 & 2020 till now. The methodology recommended by the Ground Water Estimation Committee- 1997 (GEC- 97) was used for the assessment for the reference year 2004, 2009, 2011 & 2013 whereas the assessment for 2017 and 2020 were carried out following the methodology and norms recommended by Ground Water Estimation Committee- 2015 (GEC-2015).

As part of the assessment, ‘Annual Extractable Ground Water Resource’ as well as ‘Annual Ground Water Extraction are assessed for each assessment unit (block/taluka/mandal/tehsils/firka etc.). The ‘Stage of Ground Water Extraction’ is then computed as the ratio of ‘Annual Ground Water Extraction’ with respect to ‘Annual Extractable Ground Water Resource’ and is usually expressed in percentage. Based on the stage of extraction, the assessment units are categorized as Safe ($\leq 70\%$), Semi-Critical ($>70\%$ and $\leq 90\%$), Critical ($>90\%$ and $\leq 100\%$) and Over-Exploited ($>100\%$).

A Central Level Expert Group (CLEG) was constituted by the Department of Water Resources, RD & GR, Ministry of Jal Shakti, Government of India for over-all supervision of the re-assessment of ground water resources in the entire country with reference year 2020. The ground water resources assessment at the State/UT Levels was carried out jointly by Central Ground Water Board and State Nodal/Ground Water Departments under the guidance of respective State Level Committees (SLC) with over-all supervision of CLEG.

The National Compilation on Dynamic Ground Water Resources of India, 2020 has been published in June, 2021 (http://cgwb.gov.in/documents/2021-08-02-GWRA_India_2020.pdf) and the assessment has been carried out through a software/web-based application “INDIA-GROUNDWATER RESOURCE ESTIMATION SYSTEM (IN-GRES)” developed by CGWB through IIT-Hyderabad (<http://ingres.iith.ac.in>).

4.2 DYNAMIC GROUND WATER RESOURCES, 2020

As per the 2020 assessment of Dynamic Ground Water Resources, the Total Annual Ground Water Recharge for the entire country has been assessed as 436.15 billion cubic meter (bcm) and Total natural discharges works out to be 38.51 bcm. Hence, Annual Extractable Ground Water Resources for the entire country is 397.62 bcm.

Major source of ground water recharge is the monsoon rainfall, which is 249.65 bcm and about 57 % of the total annual ground water recharge. The contribution in Annual Ground Water Recharge from rainfall during monsoon season is more than 70% in the states/UT of Bihar, Goa, Gujarat, Jharkhand, Kerala, Madhya Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Andaman & Nicobar, Dadra & Nagar Haveli Daman & Diu and Lakshadweep. The overall contribution of rainfall (both monsoon & non-monsoon) recharge to country's total annual ground water recharge is 64 % and the share of recharge from 'Other sources' viz. canal seepage, return flow from irrigation, recharge from tanks, ponds and water conservation structures taken together is 36 %. State-wise Ground Water Resources of India (as in 2020) are given in *Annexure-XVIII* and the over-all scenario of ground water resource and extraction in the country is given in **Plate-XX and XXI**.

Volumetric estimates are dependent on the areal extent of the assessment units. In order to compare the ground water resource of different assessment units, the volumetric estimates of annual ground water recharge have been converted to depth units (m) by dividing the annual ground water recharge by the area of the respective assessment units (km^2). Spatial variation in annual ground water recharge (m) is shown in. Annual Ground Water Recharge is significantly high in the Indus-Ganga-Brahmaputra alluvial belt in the North, East and North East India covering the states of Punjab, Haryana, Uttar Pradesh, Bihar, West Bengal and valley areas of North Eastern States, where rainfall is plenty and thick piles of unconsolidated alluvial formations are conducive for recharge. Annual Ground Water Recharge in these regions varies from 0.25 to more than 0.5 m. The coastal alluvial belt particularly Eastern Coast also has relatively high annual ground water recharge, in the range 0.25 to more than 0.5 m. In western India, particularly Rajasthan and parts of northern Gujarat that have arid climate, the annual ground water recharge is scanty, mostly up to 0.025 m. Similarly, in major parts of the southern peninsula covered with hard-rock terrains, annual ground water recharge mostly ranges from 0.10 to 0.15 m. This is primarily because of comparatively low infiltration and storage capacity of the rock formations prevailing in the region. The

remaining part of Central India is mostly characterized by moderate recharge in the range of 0.10 to 0.25 m.

The overall estimate of Annual Ground Water Recharge for the entire country shows a increase of 4 bcm in the present assessment as compared to the last assessment i.e. 2017. The Annual Extractable Ground Water Resources shows an increase of 5 bcm. The Annual Ground Water Extraction for irrigation, domestic and Industrial uses, has also decreased by 4 bcm. The main reasons for these variations is attributed to refinement of parameters, refinement in well census data and changing ground water regime.

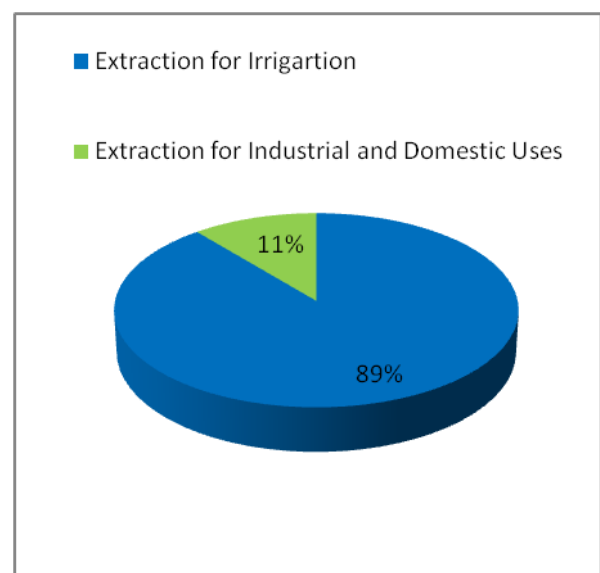
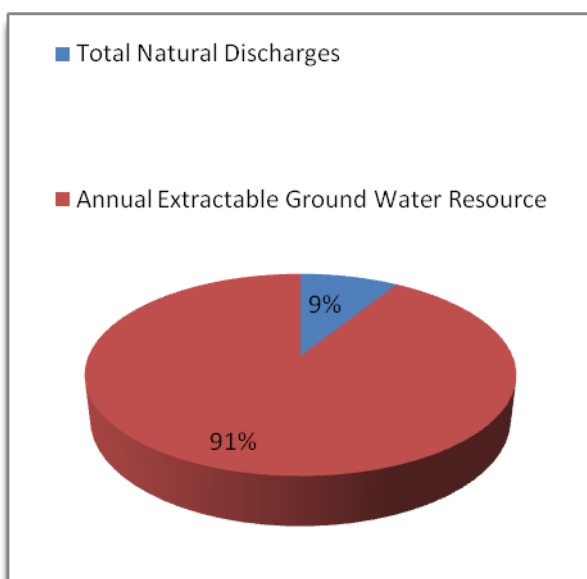
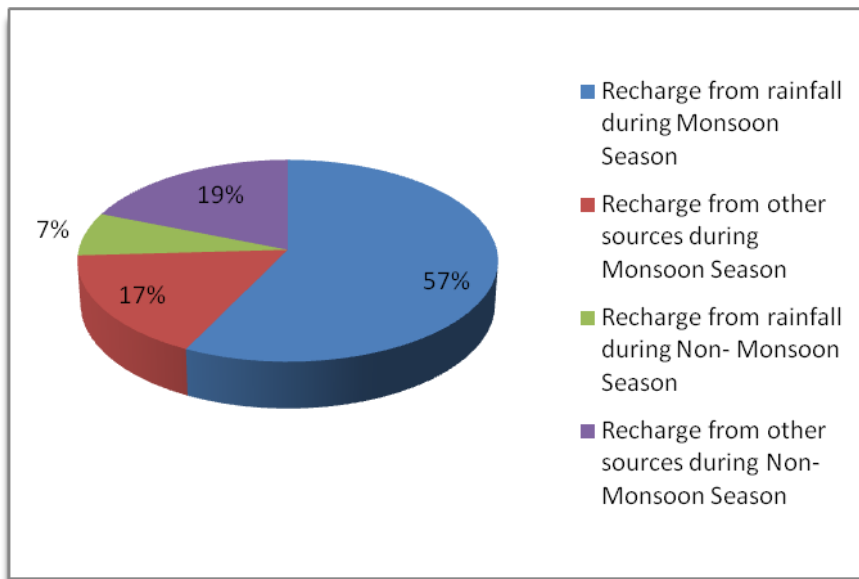
4.3 GROUND WATER EXTRACTION

The assessment of ground water extraction is carried out considering the Minor Irrigation Census data and sample surveys carried out by the State Ground Water Departments. The Total Annual Ground Water Extraction of the entire country for the year 2020 has been estimated as 244.92bcm. Agriculture sector is the predominant consumer of ground water resources. About 89 % of total annual ground water extraction i.e. 217.61 bcm is for irrigation use. Only 27.3 bcm is for Domestic & Industrial use, which is about 11 % of the total extraction. In the states of Arunachal Pradesh, Delhi, Goa, Kerala, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tripura, Andaman & Nicobar Island, Chandigarh, Dadra & Nagar Haveli, Jammu & Kashmir, Ladakh and Lakshadweep the ground water extraction for domestic uses is more than 40 % .

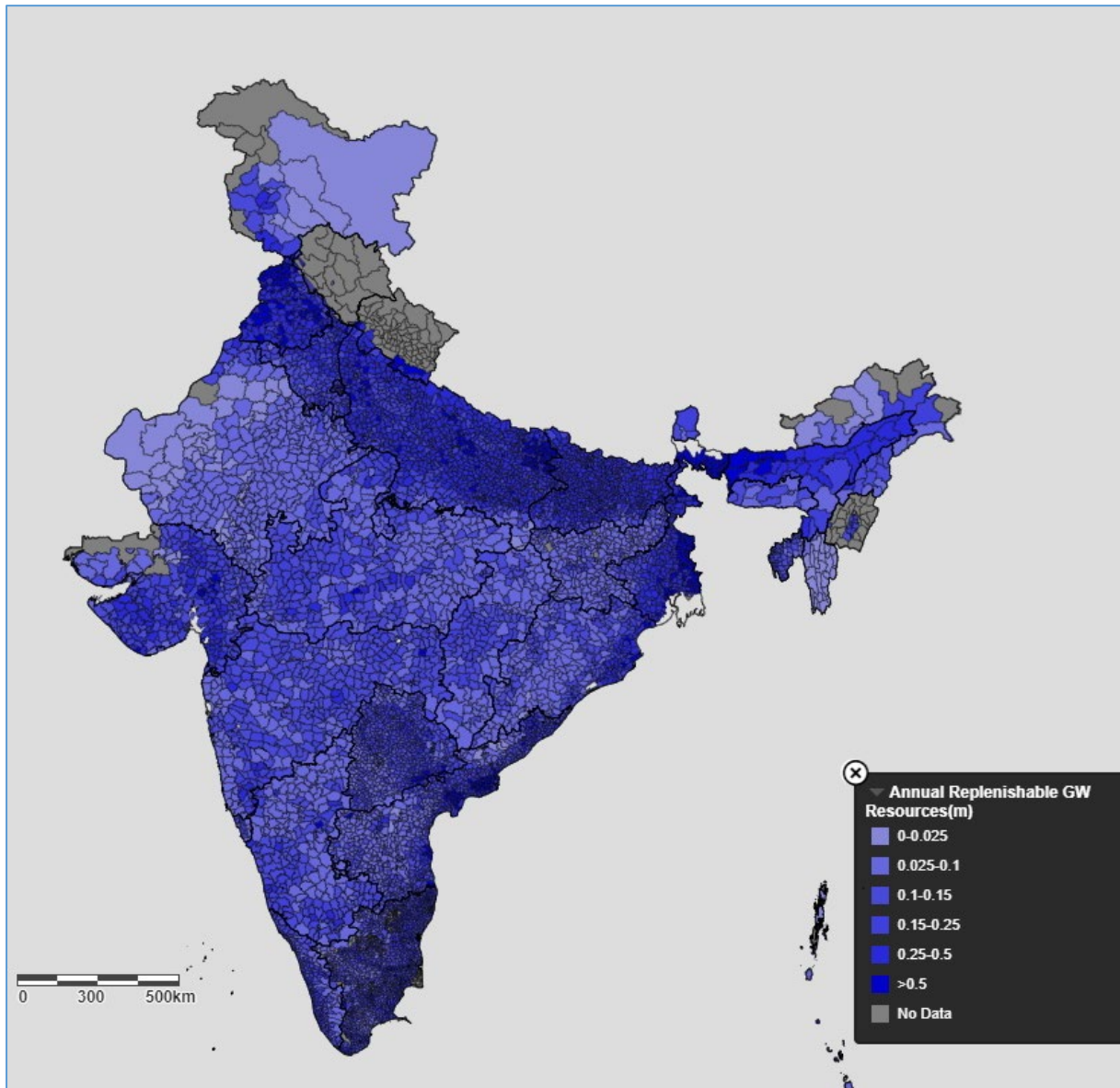
4.4 STAGE OF GROUND WATER EXTRACTION

The overall stage of groundwater development in the country is 61.6 %.The stage of ground water Extraction is very high in the states of Delhi, Haryana, Punjab and Rajasthan, where it is more than 100%, which implies that in these states the annual ground water consumption is more than annual extractable ground water resources. In the states of Tamil Nadu, Uttar Pradesh, Karnataka and UTs of Chandigarh and Puducherry, the stage of ground water Extraction is between 60-100%. In rest of the states, the stage of ground water extraction is below 60 %.

Ground Water Resources and Extraction Scenario in India, 2020



Spatial Variation in Annual Ground Water Recharge, 2020

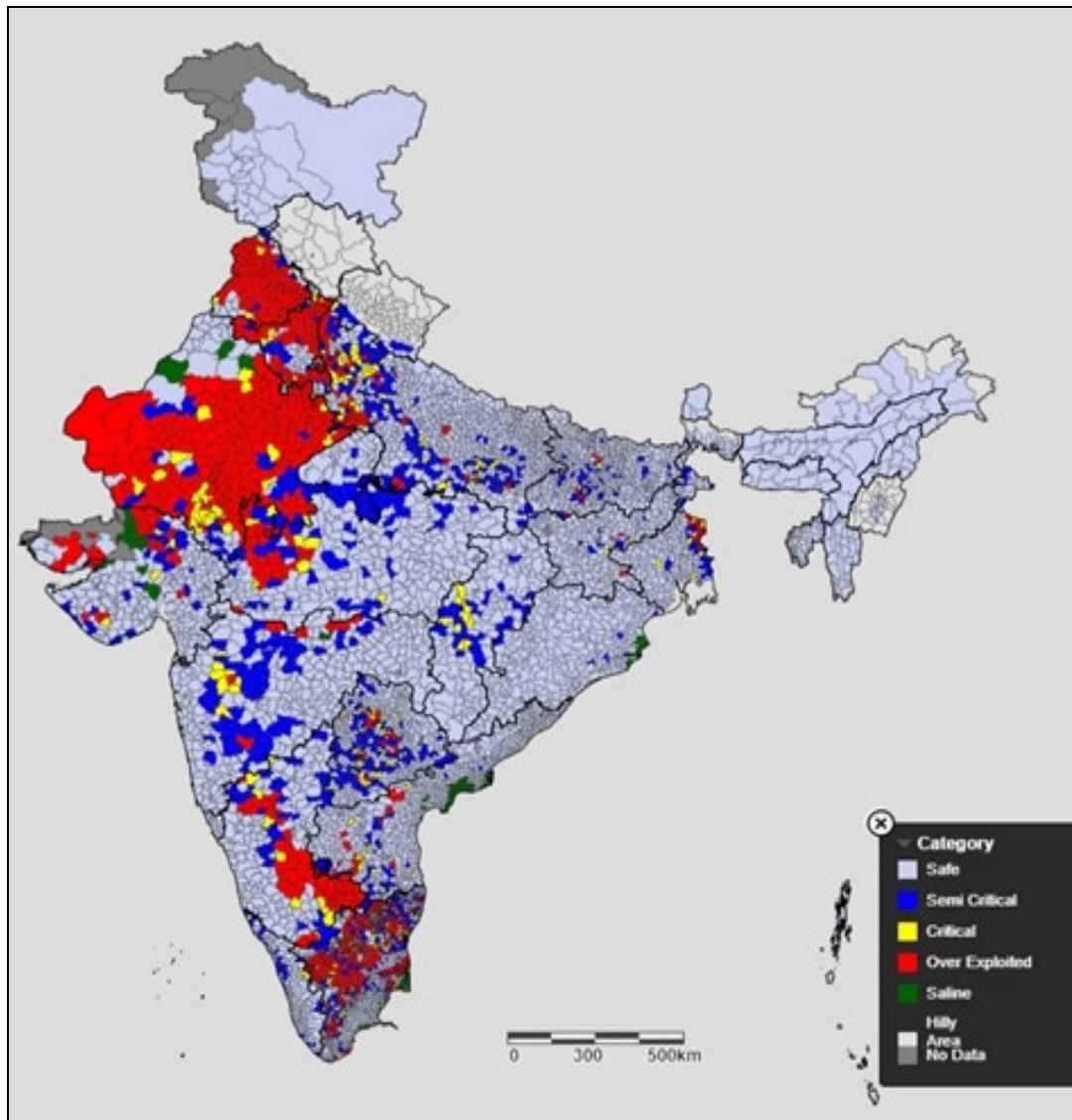


4.5 CATEGORISATION OF ASSESSMENT UNITS

Out of the total 6965 assessment units (Blocks/ Districts/ Mandals/ Talukas/Firkas) in the country, 1114 units in various States (16 %) have been categorized as ‘Over-Exploited’ indicating ground water extraction exceeding the annual extractable ground water resources (availability). A total of 270 (4 %) assessment units have been categorized as ‘Critical’, where the stage of ground water extraction is between 90-100 %. There are 1057 ‘Semi-Critical’ units (15 %), where the stage of ground water extraction is between 70 % and 90 % and 4427 (64 %) assessment units have been categorized as ‘Safe’ where the stage of Ground water extraction is less than 70 %. Apart from this, there are 97 assessment units (1 %), which have been categorized as ‘Saline’ as major part of the ground water in phreatic aquifers is brackish or saline. The Categorization Map of Assessment units of GWRA-2020 is given in **Plate- XXII**.

The state/UT wise details of categorization of assessment units as per the Assessment of Dynamic Ground Water Resources of India, 2020 are given in *Annexure - XVIII & XIX* respectively.

Categorization of Assessment Units



5. CHEMICAL QUALITY OF GROUND WATER IN INDIA

5.1 INTRODUCTION

The availability of fresh water for human consumption, irrigation, agricultural development and other activities is associated with the growing needs of modern living conditions but is decreasing day by day due to increase in population, urbanisation, industrialisation and erratic behavior of rains. To meet the requirement of fresh water, the dependency on ground water is increasing in comparison to surface water because during summer season most of the surface water bodies do not have sufficient water, while ground water is easily accessible throughout the year.

The quality of groundwater is affected in three ways i.e. physical, chemical and bacteriological, although the procedure is very slow and complex to understand. The quality of ground water in the phreatic aquifer depends on the nature of rocks, contact time, circulation and temperature. It is also dependent on the solubility of the minerals present in the rocks. To some extent the atmospheric precipitation (rain water) is also contributory factor for affecting the quality of ground water as during the rain fall most of the gases such as CO₂, SO₂ and NO₂ present in the atmosphere gets dissolved in the rain water during the course of downward travel and percolate down through the earth surface dissolving mainly calcium and magnesium present in the soil forming calcium bicarbonate. The pH plays an important role in the geochemical reactions as low pH tends to help faster dissolution of the minerals. The quality of ground water is also influenced by the excessive use of fertilizers and pesticides for agricultural production and also industrial activity.

Ground water due to its long standing with minerals and rocks is generally more mineralized than surface water. This was found to be confirmed largely for water in phreatic zones. The chemical quality of ground water in phreatic zones is also affected by anthropogenic sources at the ground surface, whether it is domestic, agriculture or industrial in nature.

5.2 METHODOLOGY

To evaluate the drinking water quality of ground water, 9060 water samples were collected from Ground Water Monitoring Stations (GWMS) during the A.A.P. 2021-22 from all states of India for basic analysis. **Due to Corona pandemic ground water samples from all network stations could not be collected.** The samples were analysed for the determination of pH, EC, CO₃, HCO₃, Cl, F, NO₃, SO₄, PO₄, SiO₂, T.H., Ca, Mg, Na & K. These water

samples were analysed as per standard methods (APHA 2005). Following standard methods (**Table-4**) have been adopted for the chemical analysis of different constituents in water samples.

TABLE-4:METHODS USED FOR CHEMICAL ANALYSIS OF GROUND WATER SAMPLES

Sl. No.	Constituents	Method Used
1.	pH	pH Meter
2.	EC	EC Meter
3.	Carbonate	Titrimetric method
4.	Bi-carbonate	-do-
5.	Chloride	Mohr's Method
6.	Fluoride	Spectrophotometric method
7.	Nitrate	-do-
8.	Sulphate	-do-
9.	Phosphate	-do-
10.	Silica	-do-
11.	Total Hardness	Titrimetric method
12.	Calcium	-do-
13.	Magnesium	Evaluation from TH and Ca
14.	Sodium	Flame emission photometric method
15.	Potassium	-do-

5.3 WATER QUALITY NORMS AND CRITERIA

Water quality standards and guidelines have been laid down by WHO (1984), Govt. of India, National High Tech Mission (1986) and BIS (2012) and many other organizations. These guidelines are exhaustive and it becomes very difficult to analyse ground water samples for all the constituents. The water quality is judged by a common man mainly by ENT (Eyes, nose and tongue) tests before using it for domestic purposes. They are-

E (Eyes) : Appearance - turbidity, particles, oily layer, color etc.

N (Nose) : Odor - no smell, rotten egg smell, fishy smell etc.

T (Tongue) : Taste - salinity, pH, temperature, soluble iron chloride etc.

The guidelines/standards laid down by BIS (2012) with regard to some constituents for domestic and potable purposes have been tabulated below in the **Table-5**:

TABLE-5: INDIAN STANDARD FOR DRINKING WATER SPECIFICATIONS (BIS 2012)

S. No.	Substance/ Characteristics	Desirable limit	Undesirable effect outside desirable limit	Permissible limit in absence of alternate source
1.	Colour (Hazen Units)	5	Above 5, consumer acceptance decreases	25
2.	Turbidity (NTU)	5	Above 5, consumer acceptance decreases	10
3.	pH value	6.5-8.5	Beyond this range water will effect mucous membrane.	No relaxation
4.	Dissolved solids mg/l max	500	Beyond this palatability decreases and may cause gastro intestinal irritation	2000
5.	Alkalinity mg/l max	200	Unpleasant taste	600
6.	Total hardness (as CaCO ₃) mg/l max	300	Encrustation in water supply structure and adverse effect on domestic use.	600
7.	Chloride (as Cl) mg/l max	250	Beyond this limit taste corrosion and palatability are effected	1000
8.	Calcium (as Ca) mg/l max	75	Encrustation in water supply structure and adverse effect on domestic use.	200
9.	Magnesium (as Mg) mg/l max	30	Encrustation in water supply structure and adverse effect on domestic use.	100
10.	Sulphate (as SO ₄) mg/l max	200	Beyond this limit gastrointestinal irritation occurs when Magnesium of sodium is present	400
11.	Nitrate (as NO ₃) mg/l max	45	Beyond this methemoglobinaemia takes place	45
12.	Fluoride (as F) mg/l max	1.0	Fluoride may be kept as low as possible. High fluoride may cause fluorosis	1.5

5.4 CHEMICAL QUALITY OF GROUND WATER IN INDIA

The chemical quality of ground water depends on various factors like source of water such as rainfall, erosion, dry fall out, weathering of rocks and as a result of chemical reactions taking place on and below the surface. Thus, the chemical quality of water is dependent on geological and hydrogeological conditions prevailing in the area, climate, topography, nature of soil, physicochemical characteristics of rocks, nature of plantation and finally the activities of man resulting in environmental pollution. The pollution of ground water may lead to abandonment of wells, so in order to deal with this problem it becomes necessary to assess its suitability for drinking and irrigation purpose before corrective measures are undertaken. Central Ground Water Board has been monitoring the chemical quality of ground water in the country since 1974. The chemical quality of shallow ground water is being monitored by Central Ground Water Board once in a year (April/May) through a network of around 15000 observation wells (as on 31.03.2019) located all over the country. The state-wise distribution of total observation wells being monitored by CGWB is given in Table 1. The present report is based on the scenario in water quality in hydrograph network observation wells of CGWB in year 2021. 9060 samples were collected for basic analysis and 9131 were collected for Uranium analysis from India. The state-wise monitoring stations are given in (Table-6).

TABLE-6: STATE-WISE DISTRIBUTION OF TOTAL WATER QUALITY MONITORING STATIONS

Sr.No.	State/ UT	No. of water quality monitoring stations (as on 31.03.2021)
1	Andhra Pradesh	573
2	Arunachal Pradesh	26
3	Assam	350
4	Bihar	745
5	Chhattisgarh	1424
6	Delhi	76
7	Goa	88
8	Gujarat	638
9	Haryana	460
10	Himachal Pradesh	128

Sr.No.	State/ UT	No.ofwaterqualitymonitoringstations (ason31.03.2021)
11	Jammu & Kashmir	287
12	Jharkhand	442
13	Karnataka	1413
14	Kerala	364
15	Madhya Pradesh	1038
16	Maharashtra	1724
17	Manipur	0
18	Meghalaya	54
19	Nagaland	21
20	Orissa	1600
21	Punjab	312
22	Rajasthan	643
23	Tamil Nadu	793
24	Telangana	336
25	Tripura	108
26	Uttar Pradesh	869
27	Uttarakhand	215
28	West Bengal	1215
	UT s	
1	Andaman & Nicobar	113
2	Chandigarh	16
3	Dadra & Nagar Haveli	17
4	Daman & Diu	11
5	Pondicherry	9
	TOTAL	16108

5.4.1 SUITABILITY OF GROUND WATER FOR POTABLE PURPOSES

The suitability of ground water for drinking purposes has been assessed according to the guidelines laid down by BIS (2012), Table –II for various analysed parameter. The chemical analysis for 9060 nos. of samples collected from GW monitoring Stations spread in India have been tabulated in TableIII.

The minimum, maximum of various constituents determined during chemical analysis have been summarized in following **Table-7**.

TABLE-7:HYDRO-CHEMICAL DATA OF GROUND WATER IN INDIA (AN OVERVIEW)

S.No	State	No. of Samples collected (NHS21-22)	EC in $\mu\text{S/cm}$ at 25° C		Cl(mg/l)		NO3(mg/l)		F(mg/l)	
			Max	Min	Max	Min	Max	Min	Max	Min
1	Chandigarh	8	582	254	55.6	6.9	25	0	0.6	0.2
2	Punjab	330	16910	130	4391	6.7	775	0	14	0.07
3	Haryana	464	5502	230	1260	7.1	185	0	2.8	0.05
4	Uttar Pradesh	840	37230	234	9018	7	1177	0	6.8	0
5	Himachal Pradesh	138	1751	127	188	7.1	143	1.2	1.7	0.01
6	Delhi	79	21200	220	4697	13	196	0	8.9	0.12
7	Rajasthan	774	17420	200	5388	14.2	1750	0.02	22.3	0.01
8	Telangana	139	4818	242	808	106	463	2.9	3.54	0.28
9	Tamil Nadu	620	19600	55	3616	6	378	0	3	0
10	Gujarat	565	26200	214	9075	14	372	0	7.2	0
11	Andhra Pradesh	55	3880	50	737	7.1	186	2.6	1.72	0.21
12	Odisha	715	3650	40	739	3	136	0	3.4	0.097
13	J&K	248	1953	204	217	5.4	276	0	2.5	0
14	Arunachal Pradesh	18	367	31	60	3.5	40	0	0.5	0.04
15	Assam	232	2181	27	337	3.5	42	0	2.3	0
16	Meghalaya	44	442	18	223	10.6	12	0	0.61	0.07
17	Tripura	90	841	51	142	7.1	10.7	0	1.4	0
18	MP	1153	3802	128	850	7.4	400	1	4.3	0.01
19	Chhattisgarh	856	2280	34.5	322	3.5	600	0	2.1	0
20	Jharkhand	132	2060	125	437	11	178	2.04	1.55	0
21	Bihar	277	2670	252	440	7.1	105	0	1.8	0
22	Kerala	351	1740	28	212	0.78	144	0	1.8	0
23	West Bengal	511	4377	63	1340	3.5	175	0	6.6	0
24	Maharashtra	104	2598	106	404	7.1	47	0	1.01	0.01
25	Uttarakhand	206	2000	90	362	7	110	0	1.4	0
26	Andaman & Nicobar	110	2501	147	560	14	15	0	1.2	0.08

HYDROGEN ION CONCENTRATION (pH)

The pH value of ground water in India. varies from 3.06 to 9.73. The pH value is generally well within the permissible limit and the water is slightly alkaline in nature except for a few location in Kerala and north eastern states where the water is acidic in nature at some locations.

CARBONATE AND BICARBONATE (CO₃& HCO₃)

The Carbonate has been observed to be nil in most of the cases however it has been found upto 384 mg/l & Bicarbonate has been observed in the range of 0 to 1915 mg/l. The highest value of 1915 mg/l bicarbonate was reported in a sample collected from Hamirpur, Tonk district, Rajasthan.

ELECTRICAL CONDUCTIVITY (EC)

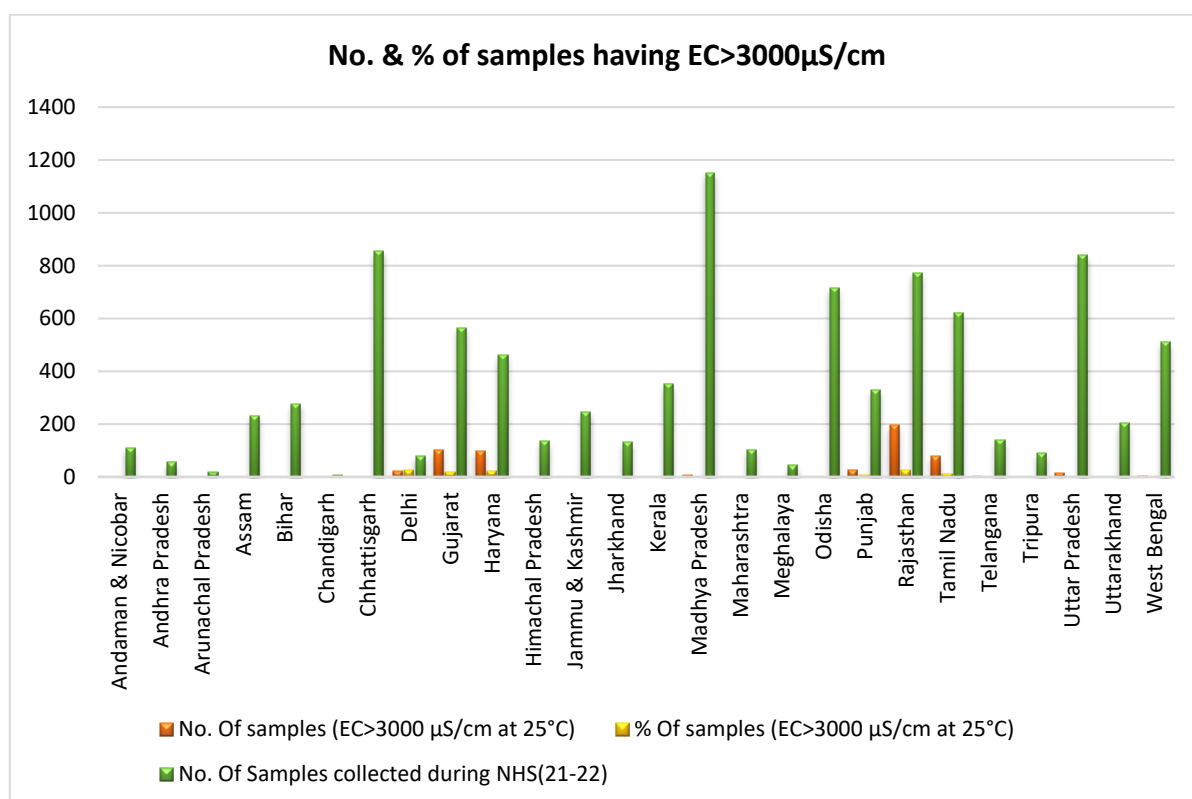
Electrical conductivity or Total dissolved solids or Salinity is the dissolved salt content of a water body. Different substances dissolve in water giving it taste and odor. In fact, human beings have developed senses, which are able to evaluate the potability of water. Electrical conductivity represents total number of cations and anions present in groundwater, indicating ionic mobility of different ions, total dissolved solids and saline nature of water.

In the study area EC ranges from 18 to 37230 μ Siemens/cm at 25°C. The number and percentage (%) of water samples having EC values above 3000 μ S/cm at 25°C in different states is given in **Table-8** below. The highest value of EC, 37230 μ S/cm at 25°C was observed in ground water from, Nandgaon old Aganwadi, Nandgaon block, Mathura district, Uttar Pradesh.

TABLE-8: NO. OF SAMPLES & % OF SAMPLES HAVING EC >3000 μ S/CM AT 25°C IN STATES OF INDIA

S.No.	State	No. Of Samples (%)	No. of Samples collected (NHS21-22)
		EC >3000 μ S/cm at 25°C	
1	Chandigarh	none	8
2	Punjab	26(7.87%)	330
3	Haryana	100(21.6%)	464
4	Uttar Pradesh	17(2.02%)	840
5	Himachal Pradesh	none	138
6	Delhi	22(27.8%)	79
7	Rajasthan	195(25.2%)	774
8	Telangana	3(2.15%)	139

S.No.	State	No. Of Samples (%)	No. of Samples collected (NHS21-22)
		EC >3000 $\mu\text{S}/\text{cm}$ at 25°C	
9	Tamil Nadu	78(12.6%)	620
10	Gujarat	104(18.4%)	565
11	Andhra Pradesh	1(1.8%)	55
12	Odisha	2(0.28%)	715
13	Jammu & Kashmir	none	248
14	Arunachal Pradesh	none	18
15	Assam	none	232
16	Meghalaya	none	44
17	Tripura	none	90
18	Madhya Pradesh	8(0.69%)	1153
19	Chhattisgarh	none	856
20	Jharkhand	none	132
21	Bihar	none	277
22	Kerala	none	351
23	West Bengal	5(0.98%)	511
24	Maharashtra	none	104
25	Uttarakhand	none	206
26	Andaman & Nicobar	none	110



CHLORIDE (Cl)

Chloride is present in all natural waters being highly soluble and moves freely through soil and rock. In groundwater Chloride content is mostly below 250 mg/l except in cases where inland salinity is prevalent and in coastal areas. BIS have recommended a desirable limit of 250mg/l of chloride in drinking water; this concentration limit can be extended to 1000 mg/l of chloride in cases where no alternative source of water with desired concentration is available.

The study reveals that concentration of chloride ion ranges from 0.78 to 9075 mg/l. Table III shows the Maximum and minimum values of Chloride in different states of India. The maximum value of 9075mg/l was observed in a sample collected from Kadegi, Kutiyana block, Porbandar district, Gujarat.

NITRATE (NO₃)

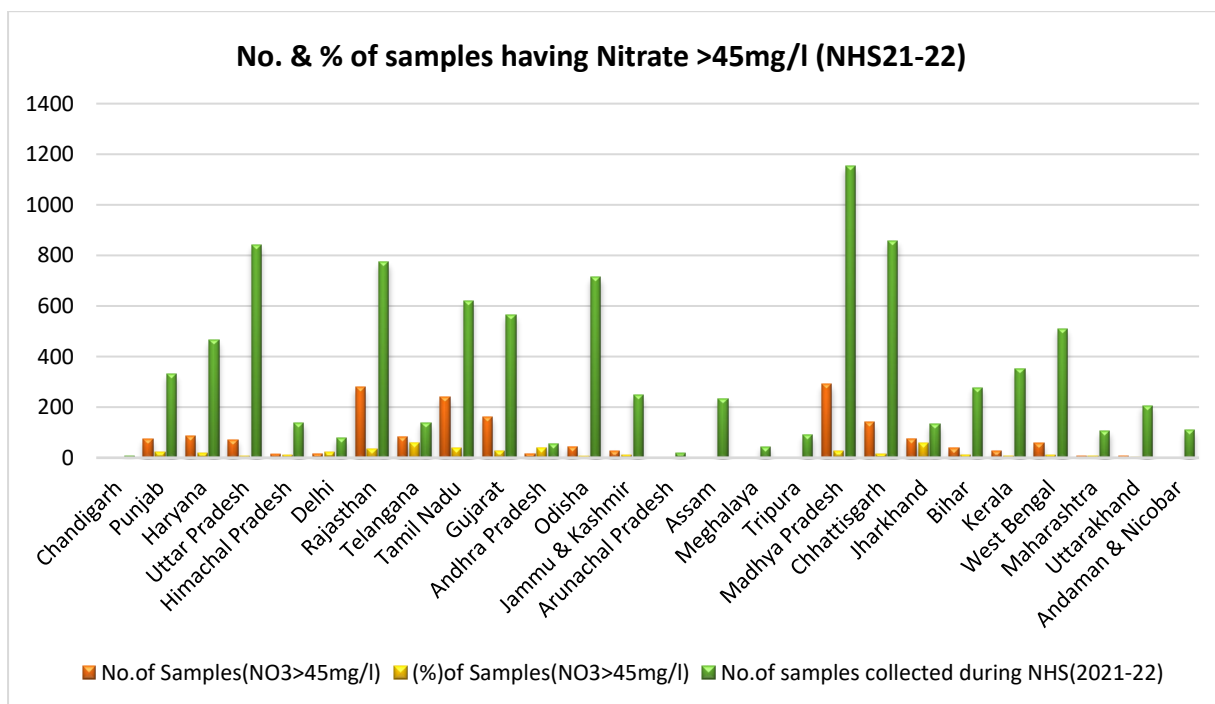
Nitrate is a naturally occurring compound that is formed in the soil when nitrogen and oxygen combine. The primary source of all nitrates is atmospheric nitrogen gas. This is converted into organic nitrogen by some plants by a process called nitrogen fixation. Dissolved nitrogen in the form of nitrate is the most common contaminant of groundwater.

Nitrate in groundwater generally originates from non-point sources such as leaching of chemical fertilizers and animal manure, groundwater pollution from septic and sewage discharges etc. It is difficult to identify the natural and man-made sources of nitrogen contamination of ground water. Some chemical and microbiological processes such as nitrification and denitrification also influence the nitrate concentration in ground water.

As per the BIS standard for drinking water the maximum desirable limit of nitrate concentration in groundwater is 45 mg/l. Though nitrate is considered relatively non-toxic, a high nitrate concentration in drinking water is an environmental health concern arising from increased risks of methaemoglobinaemia particularly to infants. Adults can tolerate little higher concentration. The concentration of Nitrate has been found varying widely. It ranges between not detectable to 1750 mg/l with the highest value 1750 mg/l recorded at Sohela, Tonk block, Tonk district Rajasthan. The number and percentage (%) of water samples which have Nitrate concentration above the permissible limit of 45 mg/l (BIS 2012) is given in **Table-9**.

TABLE-9: NO. OF SAMPLES & % OF SAMPLES HAVING NO₃(>45mg/L) IN STATES OF INDIA

S.No.	State	No. Of Samples (%)	No. of Samples collected (NHS21-22)
		NO ₃ >45mg/l	
1	Chandigarh	none	8
2	Punjab	74(22.4%)	330
3	Haryana	86(18.5%)	464
4	Uttar Pradesh	71(8.4%)	840
5	Himachal Pradesh	14(10.14%)	138
6	Delhi	17(21.5%)	79
7	Rajasthan	279(36%)	774
8	Telangana	83(59.7%)	139
9	Tamil Nadu	240(38.7%)	620
10	Gujarat	163(28.8%)	565
11	Andhra Pradesh	17(30.9%)	55
12	Odisha	45(6.2%)	715
13	Jammu&Kashmir	28(11.29%)	248
14	Arunachal Pradesh	none	18
15	Assam	none	232
16	Meghalaya	none	44
17	Tripura	none	90
18	Madhya Pradesh	292(25.3%)	1153
19	Chhattisgarh	140(16.3%)	856
20	Jharkhand	75(56.8%)	132
21	Bihar	37(13.3%)	277
22	Kerala	29(8.3%)	351
23	West Bengal	57(11.2%)	511
24	Maharashtra	8(7.7%)	104
25	Uttarakhand	7(3.4%)	206
26	Andaman & Nicobar	none	110



FLUORIDE (F)

Fluorine is a fairly common element but it does not occur in the elemental state in nature because of its high reactivity. Fluorine is the most electronegative and reactive of all elements that occur naturally within many types of rocks. It exists in the form of fluorides in a number of minerals of which Fluorspar, Cryolite, Fluorite & Fluorapatite are the most common.

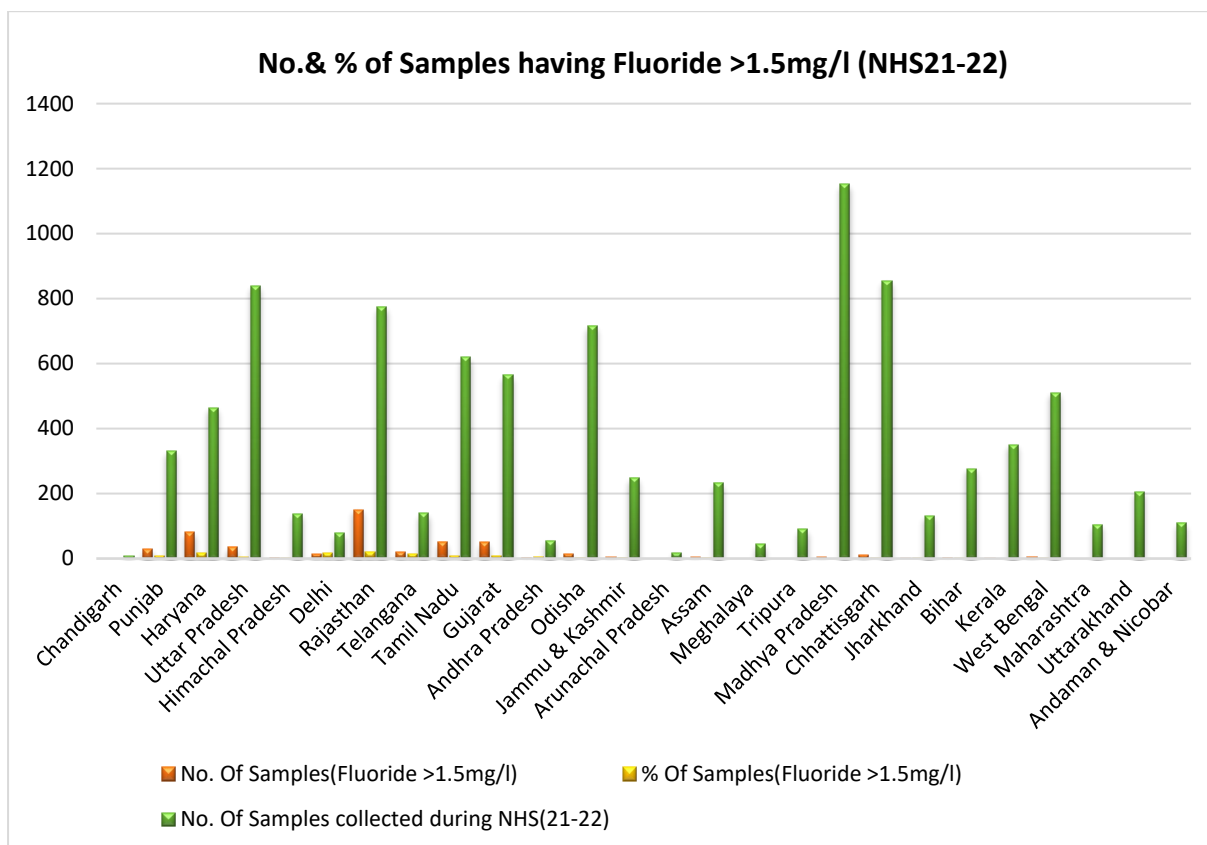
Most of the fluoride found in groundwater is naturally occurring from the breakdown of rocks and soils or weathering and deposition of atmospheric particles. Most of the fluorides are sparingly soluble and are present in groundwater in small amount. The type of rocks, climatic conditions, nature of hydro geological strata and time of contact between rock and the circulating groundwater affect the occurrence of fluoride in natural water. Presence of other ions particularly bicarbonate and calcium ions also affect the concentration of fluoride in groundwater.

It is well known that small amount of fluoride (>1.0 mg/l) have proven to be beneficial in reducing tooth decay. However, high concentrations (>1.5mg/l) have resulted in staining of tooth enamel while at still higher levels of fluoride (> 5.0 mg/l) further critical problems such as stiffness of bones occur. BIS has recommended a desirable limit of 1.0 mg/l of fluoride concentration in drinking water and maximum permissible limit of 1.5 mg/l in case no alternative source of drinking water is available. Water having fluoride concentration more than 1.5mg/l is not suitable for drinking purposes. High Fluoride >1.5mg/l is mainly

attributed due to geogenic conditions. The value of Fluoride concentration is found to range between not detectable to 22.3mg/l in samples collected during NHS 21-22. The number and % samples falling above the permissible limit of 1.5mg/l prescribed by BIS (2012) is given in **Table-10** below. The highest value of 22.3 mg/l, has been recorded in Arjansar, Lunkaransar block, Bikaner district, Rajasthan.

TABLE-10: NO. OF SAMPLES & % OF SAMPLES HAVING FLUORIDE(>1.5mg/L) IN STATES OF INDIA

S.No.	State	No. Of Samples (%)	No. of Samples collected (NHS21-22)
		Fluoride>1.5mg/l	
1	Chandigarh	none	8
2	Punjab	29(8.8%)	330
3	Haryana	82(17.7%)	464
4	Uttar Pradesh	35(4.2 %)	840
5	Himachal Pradesh	2(1.4%)	138
6	Delhi	13(16.5%)	79
7	Rajasthan	151(19.5%)	774
8	Telangana	21(15.1%)	139
9	Tamil Nadu	51(8.2%)	620
10	Gujarat	50(7.6%)	565
11	Andhra Pradesh	3(5.5%)	55
12	Odisha	14(1.95%)	715
13	Jammu&Kashmir	5(2.0%)	248
14	Arunachal Pradesh	none	18
15	Assam	4(1.7%)	232
16	Meghalaya	none	44
17	Tripura	none	90
18	Madhya Pradesh	4(0.35%)	1153
19	Chhattisgarh	11(1.28%)	856
20	Jharkhand	1(0.76%)	132
21	Bihar	2(0.72%)	277
22	Kerala	1(0.28%)	351
23	West Bengal	6(1.17%)	511
24	Maharashtra	none	104
25	Uttarakhand	none	206
26	Andaman & Nicobar	none	110



5.4.2 URANIUM OCCURENCE IN SHALLOW AQUIFER IN INDIA

India is the world's largest user of groundwater. More than 60 per cent of irrigated agriculture and 85 per cent of drinking water depend on the ground water resource. Recently, groundwater monitoring has shown elevated levels of uranium in several community water systems and in private wells. Uranium is a naturally occurring radioactive metal that occurs in low concentrations in nature. It is present in certain types of soils and rocks, especially granites. Most ingested uranium is due to food intake with lesser amounts accumulated from water or from the air. Uranium mostly is rapidly eliminated from the body, however a small amount is absorbed and carried through the blood stream. Studies show that elevated levels of uranium in drinking water can affect the kidneys. Bathing and showering with water that contains uranium is not considered a health concern. In general, most drinking water sources have radioactive contaminants at levels that are low enough to be considered a public health. However, elevated levels of Uranium in drinking water have been reported in many parts of

the world including India. U.S. EPA WHO and the BIS have set drinking water standards for Uranium in drinking water at 30 µg/L. Atomic Energy Regulatory Board, India has prescribed the maximum limit of U in drinking water at 60 µg/L (ppb). The occurrence and distribution of uranium in groundwater, is very poorly understood and warrants investigations in detail. Reports of uranium contamination in groundwater across India demand an urgent response. In view of the above, Central Ground Water Board has taken pro-active steps for monitoring of uranium contamination in shallow ground water through a network of 15851 observation wells (as on 31.03.2019) located all across the country. In 2021 due to corona pandemic only 9131 (Approx 60%) samples were collected from these observation wells.

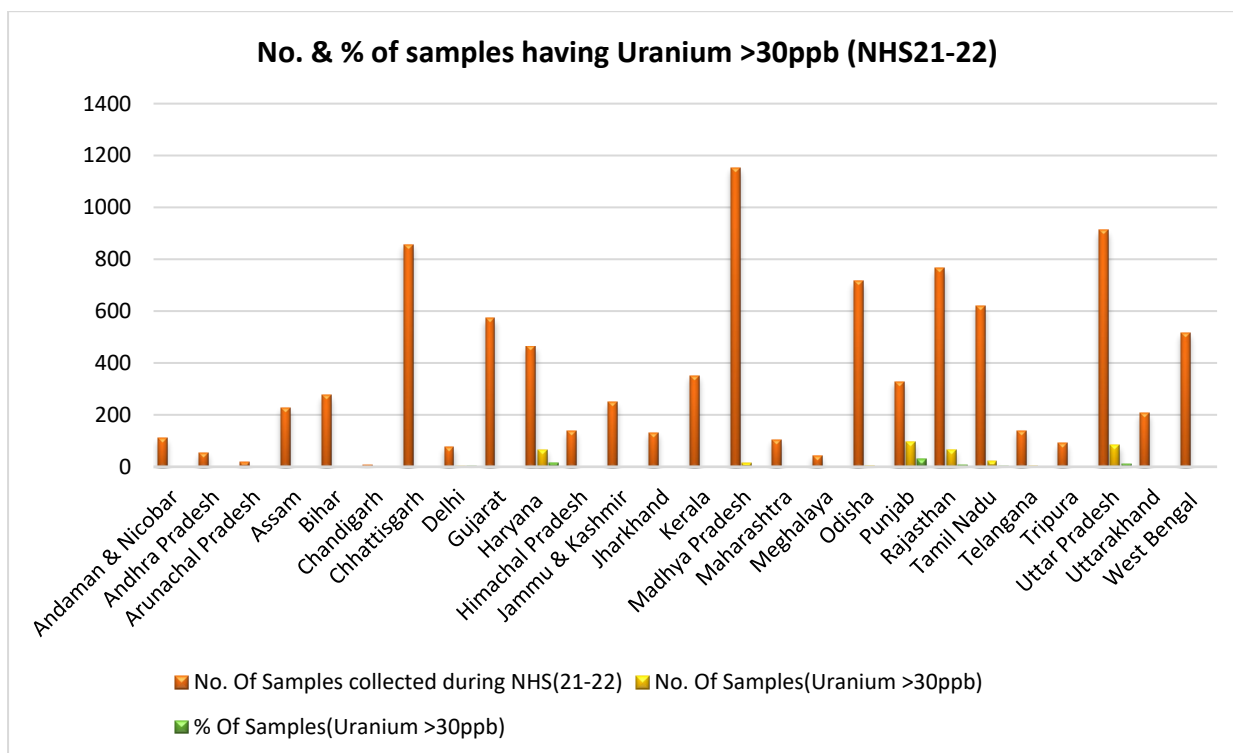
5.4.3 URANIUM CONCENTRATION AND SPATIAL DISTRIBUTION

Uranium concentrations in shallow ground water in India, shows a wide range from 0.0 to 532 µg/L, indicating that uranium concentrations in groundwater greatly vary by several orders of magnitude. The Bureau of Indian Standards (BIS) and the WHO have set drinking water standards for uranium in drinking water as 30 µg/L. A hydro-chemical evaluation reveals the following-

The most affected states in terms of percentage of wells found to have uranium concentration more than 30 µg/L (ppb) prescribed by BIS and World Health Organisation (WHO), are Punjab (where 29% wells have been observed to have Uranium concentration more than the limit of 30 ppb, Haryana (14.4 % wells are > 30 ppb), Delhi (3.9% wells are > 30 ppb), Rajasthan (8.6 % wells are > 30 ppb), and Uttar Pradesh (9.2% wells are > 30 ppb). Apart from above states, other states also have been found to have Uranium concentration above the threshold level of 30 µg/L in some localised pockets, such as Madhya Pradesh (1.3%), Tamil Nadu (3.4%), Chhattisgarh (0.12%), Gujrat (0.17%), Odisha (0.69%), Telangana (1.43%) and Bihar (0.36%). The details of partly affected districts in various states are tabulated in **Table-11** below

TABLE-11:THE DETAILS OF PARTLY AFFECTED DISTRICTS IN VARIOUS STATES

State	No. of Samples Analysed	No. of samples beyond permissible limit of BIS (U >30ppb)	Maximum value of Uranium observed (in ppb)
Andaman & Nicobar	110	0	8.8
Andhra Pradesh	55	0	1.3
Arunachal Pradesh	18	0	0.25
Assam	228	0	11.2
Bihar	277	1(0.36%)	31.4
Chandigarh	8	0	10.6
Chhattisgarh	856	1(0.12%)	32
Delhi	77	3(3.9%)	58.3
Gujarat	573	1(0.17%)	39
Haryana	464	67(14.4%)	518
Himachal Pradesh	138	0	8.7
Jammu & Kashmir	250	0	14.7
Jharkhand	132	0	26.6
Kerala	351	0	0
Madhya Pradesh	1153	15(1.3%)	149
Maharashtra	104	0	2.28
Meghalaya	44	0	1.5
Odisha	715	5(0.69%)	61.4
Punjab	329	96(29%)	532
Rajasthan	765	66(8.6%)	186
Tamil Nadu	620	21(3.4%)	159
Telangana	139	2(1.43%)	36.1
Tripura	90	0	0.56
Uttar Pradesh	913	84(9.2%)	239
Uttarakhand	206	0	14.7
West Bengal	516	0	23.3



5.5 CONCLUSION ON GROUND WATER QUALITY IN INDIA

By and large, as per available analyzed chemical parameter data (as per BIS 2012) it has been observed that as far as basic parameters (Salinity, Chloride, Nitrate & Fluoride) and Uranium concentration is concerned that the chemical quality of ground water of phreatic zone in majority of water samples collected from observation wells of Central Ground Water Board (NHS21-22) in a major part of India are found to be suitable for drinking purposes as they fall under desirable or permissible category. However, presence of some constituents beyond the permissible limit at some locations renders the water unfit for public water supply. Such waters are not fit for human consumption and are likely to be harmful to health on continuous use. The deterioration in groundwater quality in the country may be geogenic or due to anthropogenic sources.

State-wise Depth to water Level and Distribution of Percentage of Wells for the Period of August-2021 in Unconfined Aquifer

S. No.	Name of State/ UT	No. of wells Analysed	Depth to Water Level (m bgl)		Number & Percentage of Wells Showing Depth to Water Level (m bgl) in the Range of											
					0-2		2-5		5-10		10-20		20-40		> 40	
			Min	Max	No	%	No	%	No	%	No	%	No	%	No	%
1	Andhra Pradesh	726	0.00	53.73	279	38.4	297	40.9	109	15.0	29	4.0	8	1.1	4	0.6
2	Arunachal Pradesh	9	1.93	3.81	2	22.2	7	77.8	0	0.0	0	0.0	0	0.0	0	0.0
3	Assam	116	0.05	19.50	73	62.9	36	31.0	6	5.2	1	0.9	0	0.0	0	0.0
4	Bihar	542	0.05	11.40	297	54.8	219	40.4	23	4.2	3	0.6	0	0.0	0	0.0
5	Chandigarh	11	3.42	52.70	0	0.0	3	27.3	1	9.1	3	27.3	3	27.3	1	9.1
6	Chhattisgarh	629	0.11	33.00	187	29.7	277	44.0	136	21.6	24	3.8	5	0.8	0	0.0
7	Dadra & Nagar Haveli	17	0.40	5.40	12	70.6	4	23.5	1	5.9	0	0.0	0	0.0	0	0.0
8	Daman & Diu	4	0.05	6.41	1	25.0	1	25.0	2	50.0	0	0.0	0	0.0	0	0.0
9	Delhi	77	0.31	65.48	15	19.5	10	13.0	21	27.3	14	18.2	9	11.7	8	10.4
10	Goa	65	0.81	15.84	12	18.5	34	52.3	16	24.6	3	4.6	0	0.0	0	0.0
11	Gujarat	728	0.00	52.31	137	18.8	237	32.6	187	25.7	119	16.3	44	6.0	4	0.5
12	Haryana	249	1.08	55.28	17	6.8	35	14.1	64	25.7	65	26.1	54	21.7	14	5.6
13	Himachal Pradesh	86	0.05	32.35	25	29.1	30	34.9	16	18.6	12	14.0	3	3.5	0	0.0
14	Jammu & Kashmir	258	0.24	32.10	95	36.8	110	42.6	37	14.3	8	3.1	8	3.1	0	0.0
15	Jharkhand	217	0.50	12.25	79	36.4	117	53.9	20	9.2	1	0.5	0	0.0	0	0.0
16	Karnataka	1267	0.01	30.70	413	32.6	494	39.0	283	22.3	73	5.8	4	0.3	0	0.0
17	Kerala	1353	0.02	34.35	386	28.5	468	34.6	405	29.9	87	6.4	7	0.5	0	0.0
18	Madhya Pradesh	1268	0.02	49.57	392	30.9	501	39.5	281	22.2	81	6.4	11	0.9	2	0.2

State-wise Depth to water Level and Distribution of Percentage of Wells for the Period of August-2021 in Unconfined Aquifer

S. No.	Name of State/ UT	No. of wells Analysed	Depth to Water Level (m bgl)		Number & Percentage of Wells Showing Depth to Water Level (m bgl) in the Range of											
					0-2		2-5		5-10		10-20		20-40		> 40	
			Min	Max	No	%	No	%	No	%	No	%	No	%	No	%
19	Maharashtra	1762	0.01	80.00	772	43.8	614	34.8	263	14.9	87	4.9	21	1.2	5	0.3
20	Meghalaya	5	1.15	4.82	2	40.0	3	60.0	0	0.0	0	0.0	0	0.0	0	0.0
21	Nagaland	4	1.60	5.32	1	25.0	2	50.0	1	25.0	0	0.0	0	0.0	0	0.0
22	Odisha	1231	0.01	13.74	590	47.9	505	41.0	126	10.2	10	0.8	0	0.0	0	0.0
23	Pondicherry	5	2.05	4.10	0	0.0	5	100.0	0	0.0	0	0.0	0	0.0	0	0.0
24	Punjab	202	1.34	48.23	4	2.0	32	15.8	40	19.8	51	25.2	59	29.2	16	7.9
25	Rajasthan	908	0.10	116.93	89	9.8	140	15.4	168	18.5	177	19.5	172	18.9	162	17.8
26	Tamil Nadu	516	0.00	67.36	54	10.5	198	38.4	193	37.4	57	11.0	12	2.3	2	0.4
27	Telangana	531	0.00	48.91	164	30.9	197	37.1	112	21.1	42	7.9	15	2.8	1	0.2
28	Tripura	11	0.16	6.94	5	45.5	5	45.5	1	9.1	0	0.0	0	0.0	0	0.0
29	Uttar Pradesh	639	0.00	43.97	253	39.6	161	25.2	125	19.6	76	11.9	21	3.3	3	0.5
30	Uttarakhand	41	0.84	56.30	8	19.5	12	29.3	12	29.3	5	12.2	2	4.9	2	4.9
31	West Bengal	719	0.01	28.00	356	49.5	193	26.8	75	10.4	79	11.0	16	2.2	0	0.0
	Total	14196	0.00	116.93	4720	33.25	4947	34.85	2724	19.19	1107	7.80	474	3.34	224	1.6

State-wise Depth to water Level and Distribution of Percentage of Wells for the Period of November-2021 in Unconfined Aquifer

S. No.	Name of State/UT	No. of wells Analyzed	Depth to Water Level (mbgl)		Number & Percentage of Wells Showing Depth to Water Level (mbgl) in the Range of											
					0-2		2-5		5-10		10-20		20-40		> 40	
			Min	Max	No	%	No	%	No	%	No	%	No	%	No	%
1	Andaman & Nicobar	94	0.07	7.04	82	87.2	10	10.6	2	2.1	0	0.0	0	0.0	0	0.0
2	Andhra Pradesh	724	0.00	49.99	367	50.7	225	31.1	98	13.5	27	3.7	6	0.8	1	0.1
3	Arunachal Pradesh	10	1.25	6.80	1	10.0	8	80.0	1	10.0	0	0.0	0	0.0	0	0.0
4	Assam	169	0.02	16.67	65	38.5	84	49.7	17	10.1	3	1.8	0	0.0	0	0.0
5	Bihar	593	0.00	10.69	232	39.1	326	55.0	33	5.6	2	0.3	0	0.0	0	0.0
6	Chandigarh	12	2.80	51.31	0	0.0	3	25.0	1	8.3	4	33.3	3	25.0	1	8.3
7	Chhattisgarh	694	0.31	22.00	110	15.9	390	56.2	162	23.3	29	4.2	3	0.4	0	0.0
8	Dadra & Nagar Haveli	17	1.17	7.05	4	23.5	11	64.7	2	11.8	0	0.0	0	0.0	0	0.0
9	Daman & Diu	5	0.14	6.35	1	20.0	2	40.0	2	40.0	0	0.0	0	0.0	0	0.0
10	Delhi	87	0.14	65.67	15	17.2	18	20.7	23	26.4	15	17.2	8	9.2	8	9.2
11	Goa	68	1.10	15.70	6	8.8	32	47.1	24	35.3	6	8.8	0	0.0	0	0.0
12	Gujarat	747	0.00	52.33	170	22.8	276	36.9	177	23.7	88	11.8	33	4.4	3	0.4
13	Haryana	183	0.63	76.50	14	7.7	40	21.9	34	18.6	50	27.3	35	19.1	10	5.5
14	Himachal Pradesh	86	0.24	32.85	23	26.7	29	33.7	18	20.9	14	16.3	2	2.3	0	0.0
15	Jammu & Kashmir	213	0.32	31.80	79	37.1	80	37.6	39	18.3	9	4.2	6	2.8	0	0.0
16	Jharkhand	205	0.35	10.09	26	12.7	145	70.7	33	16.1	1	0.5	0	0.0	0	0.0
17	Karnataka	1290	0.01	26.58	502	38.9	454	35.2	287	22.2	46	3.6	1	0.1	0	0.0

State-wise Depth to water Level and Distribution of Percentage of Wells for the Period of November-2021 in Unconfined Aquifer

S. No.	Name of State/UT	No. of wells Analyzed	Depth to Water Level (mbgl)		Number & Percentage of Wells Showing Depth to Water Level (mbgl) in the Range of											
					0-2		2-5		5-10		10-20		20-40		> 40	
			Min	Max	No	%	No	%	No	%	No	%	No	%	No	%
18	Kerala	1304	0.01	53.60	330	25.3	459	35.2	425	32.6	83	6.4	6	0.5	1	0.1
19	Madhya Pradesh	1296	0.08	37.76	168	13.0	588	45.4	422	32.6	105	8.1	13	1.0	0	0.0
20	Maharashtra	1757	0.01	54.70	512	29.1	839	47.8	315	17.9	71	4.0	18	1.0	2	0.1
21	Meghalaya	24	0.20	4.80	10	41.7	14	58.3	0	0.0	0	0.0	0	0.0	0	0.0
22	Nagaland	2	3.58	6.05	0	0.0	1	50.0	1	50.0	0	0.0	0	0.0	0	0.0
23	Odisha	1253	0.06	13.60	503	40.1	602	48.0	139	11.1	9	0.7	0	0.0	0	0.0
24	Pondicherry	6	0.83	2.50	4	66.7	2	33.3	0	0.0	0	0.0	0	0.0	0	0.0
25	Punjab	176	0.02	42.00	13	7.4	43	24.4	34	19.3	48	27.3	36	20.5	2	1.1
26	Rajasthan	919	0.25	116.98	59	6.4	171	18.6	185	20.1	177	19.3	162	17.6	165	18.0
27	Tamil Nadu	541	0.05	62.50	230	42.5	142	26.2	113	20.9	42	7.8	7	1.3	7	1.3
28	Telangana	545	0.00	50.14	154	28.3	252	46.2	100	18.3	29	5.3	9	1.7	1	0.2
29	Tripura	22	0.31	6.58	6	27.3	13	59.1	3	13.6	0	0.0	0	0.0	0	0.0
30	Uttar Pradesh	650	0.00	43.95	233	35.8	202	31.1	115	17.7	81	12.5	16	2.5	3	0.5
31	Uttarakhand	45	0.04	55.16	7	15.6	11	24.4	15	33.3	6	13.3	4	8.9	2	4.4
	Total	14470	0.00	116.98	4191	29.0	5755	39.8	2923	20.2	1011	7.0	384	2.7	206	1.4

State-wise Depth to water Level and Distribution of Percentage of Wells for the Period of January 2022 in Unconfined Aquifer

S. No.	Name of State/ UT	No. of wells Analyzed	Depth to Water Level (m bgl)		Number & Percentage of Wells Showing Depth to Water Level (m bgl) in the Range of											
					0-2		2-5		5-10		10-20		20-40		> 40	
			Min	Max	No	%	No	%	No	%	No	%	No	%	No	%
1	Andhra Pradesh	731	0.00	48.79	338	46.2	288	39.4	75	10.3	20	2.7	8	1.1	2	0.3
2	Arunachal Pradesh	10	2.34	10.00	0	0.0	5	50.0	5	50.0	0	0.0	0	0.0	0	0.0
3	Assam	158	0.29	19.00	37	23.4	98	62.0	19	12.0	4	2.5	0	0.0	0	0.0
4	Bihar	618	0.00	10.76	135	21.8	410	66.3	71	11.5	2	0.3	0	0.0	0	0.0
5	Chandigarh	12	2.65	53.43	0	0.0	3	25.0	2	16.7	3	25.0	3	25.0	1	8.3
6	Chhattisgarh	664	0.77	25.67	57	8.6	325	48.9	237	35.7	39	5.9	6	0.9	0	0.0
7	Dadra & Nagar Haveli	17	1.80	8.05	2	11.8	11	64.7	4	23.5	0	0.0	0	0.0	0	0.0
8	Daman & Diu	3	2.85	6.97	0	0.0	1	33.3	2	66.7	0	0.0	0	0.0	0	0.0
9	Delhi	83	0.60	65.54	12	14.5	17	20.5	20	24.1	16	19.3	10	12.0	8	9.6
10	Goa	68	1.10	15.70	6	8.8	32	47.1	24	35.3	6	8.8	0	0.0	0	0.0
11	Gujarat	736	0.00	51.53	112	15.2	256	34.8	224	30.4	105	14.3	36	4.9	3	0.4
12	Haryana	285	0.07	96.00	46	16.1	56	19.6	46	16.1	73	25.6	50	17.5	14	4.9
13	Himachal Pradesh	100	0.24	36.55	23	23.0	33	33.0	20	20.0	19	19.0	5	5.0	0	0.0
14	Jammu & Kashmir	206	0.11	35.50	73	35.4	80	38.8	34	16.5	11	5.3	8	3.9	0	0.0
15	Jharkhand	254	0.30	11.85	16	6.3	155	61.0	79	31.1	4	1.6	0	0.0	0	0.0
16	Karnataka	1057	0.00	20.80	258	24.4	400	37.8	311	29.4	87	8.2	1	0.1	0	0.0
17	Kerala	1305	0.00	55.50	156	12.0	375	28.7	579	44.4	186	14.3	8	0.6	1	0.1

State-wise Depth to water Level and Distribution of Percentage of Wells for the Period of January 2022 in Unconfined Aquifer

S. No.	Name of State/ UT	No. of wells Analyzed	Depth to Water Level (m bgl)		Number & Percentage of Wells Showing Depth to Water Level (m bgl) in the Range of											
					0-2		2-5		5-10		10-20		20-40		> 40	
			Min	Max	No	%	No	%	No	%	No	%	No	%	No	%
18	Madhya Pradesh	1300	0.10	32.60	102	7.8	483	37.2	531	40.8	170	13.1	14	1.1	0	0.0
19	Maharashtra	1658	0.01	80.00	228	13.8	789	47.6	511	30.8	102	6.2	24	1.4	4	0.2
20	Meghalaya	13	1.40	5.88	1	7.7	10	76.9	2	15.4	0	0.0	0	0.0	0	0.0
21	Nagaland	2	3.92	4.04	0	0.0	2	100.0	0	0.0	0	0.0	0	0.0	0	0.0
22	Odisha	1252	0.06	14.20	353	28.2	695	55.5	193	15.4	11	0.9	0	0.0	0	0.0
23	Pondicherry	4	1.60	2.70	1	25.0	3	75.0	0	0.0	0	0.0	0	0.0	0	0.0
24	Punjab	238	0.50	44.76	18	7.6	41	17.2	42	17.6	63	26.5	66	27.7	8	3.4
25	Rajasthan	916	0.04	129.20	57	6.2	176	19.2	183	20.0	176	19.2	159	17.4	165	18.0
26	Tamil Nadu	553	0.02	46.18	243	43.9	214	38.7	70	12.7	23	4.2	1	0.2	2	0.4
27	Telangana	549	0.00	69.35	85	15.5	254	46.3	158	28.8	45	8.2	4	0.7	3	0.5
28	Tripura	14	0.55	7.58	4	28.6	5	35.7	5	35.7	0	0.0	0	0.0	0	0.0
29	Uttar Pradesh	679	0.13	44.13	110	16.2	311	45.8	145	21.4	90	13.3	20	2.9	3	0.4
30	Uttarakhand	23	0.93	16.83	5	21.7	8	34.8	7	30.4	3	13.0	0	0.0	0	0.0
31	West Bengal	741	0.09	28.65	127	17.1	355	47.9	146	19.7	85	11.5	28	3.8	0	0.0
	Total	14249	0.00	129.20	2605	18.3	5891	41.3	3745	26.3	1343	9.4	451	3.2	214	1.5

State-wise Annual Fluctuation & Frequency Distribution of Different Ranges from August 2020 to August 2021 in Unconfined Aquifer

S. No.	Name of State/ UT	No. of wells Analysed	Rise						Fall						Total			
			0-2 m		2-4 m		>4 m		0-2 m		2-4 m		>4 m		Rise		Fall	
			No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
1	Andhra Pradesh	51	21	41.2	0	0.0	0	0.0	25	49.0	3	5.9	1	2.0	21	41.2	29	56.9
2	Assam	11	3	27.3	0	0.0	0	0.0	8	72.7	0	0.0	0	0.0	3	27.3	8	72.7
3	Bihar	246	125	50.8	40	16.3	9	3.7	61	24.8	9	3.7	1	0.4	174	70.7	71	28.9
4	Chandigarh	11	1	9.1	0	0.0	0	0.0	9	81.8	1	9.1	0	0.0	1	9.1	10	90.9
5	Chhatisgarh	476	91	19.1	18	3.8	8	1.7	229	48.1	67	14.1	57	12.0	117	24.6	353	74.2
6	Delhi	71	42	59.2	7	9.9	3	4.2	14	19.7	1	1.4	2	2.8	52	73.2	17	23.9
7	Daman & Diu	3	2	66.7	0	0.0	0	0.0	0	0.0	1	33.3	0	0.0	2	66.7	1	33.3
8	Gujarat	619	95	15.3	13	2.1	6	1.0	217	35.1	123	19.9	158	25.5	114	18.4	498	80.5
9	Haryana	192	21	10.9	5	2.6	5	2.6	99	51.6	46	24.0	15	7.8	31	16.1	160	83.3
10	Himachal Pradesh	85	11	12.9	0	0.0	1	1.2	60	70.6	10	11.8	2	2.4	12	14.1	72	84.7
11	Jammu & Kashmir	192	45	23.4	3	1.6	1	0.5	123	64.1	18	9.4	1	0.5	49	25.5	142	74.0
12	Jharkhand	81	27	33.3	5	6.2	1	1.2	39	48.1	8	9.9	1	1.2	33	40.7	48	59.3
13	Karnataka	199	91	45.7	13	6.5	11	5.5	69	34.7	10	5.0	2	1.0	115	57.8	81	40.7
14	Kerala	0																
15	Madhya Pradesh	1194	345	28.9	75	6.3	45	3.8	487	40.8	151	12.6	75	6.3	465	38.9	713	59.7
16	Maharashtra	172	61	35.5	7	4.1	6	3.5	67	39.0	9	5.2	6	3.5	74	43.0	82	47.7
17	Odisha	505	163	32.3	4	0.8	1	0.2	241	47.7	63	12.5	16	3.2	168	33.3	320	63.4

S. No.	Name of State/ UT	No. of wells Analysed	Rise						Fall						Total			
			0-2 m		2-4 m		>4 m		0-2 m		2-4 m		>4 m		Rise		Fall	
			No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
18	Pondicherry	3	1	33.3	0	0.0	0	0.0	2	66.7	0	0.0	0	0.0	1	33.3	2	66.7
19	Punjab	178	8	4.5	0	0.0	5	2.8	96	53.9	53	29.8	16	9.0	13	7.3	165	92.7
20	Rajasthan	862	214	24.8	36	4.2	41	4.8	315	36.5	136	15.8	111	12.9	291	33.8	562	65.2
21	Tamil Nadu	427	141	33.0	56	13.1	59	13.8	118	27.6	29	6.8	24	5.6	256	60.0	171	40.0
22	Telangana	67	11	16.4	4	6.0	9	13.4	19	28.4	16	23.9	7	10.4	24	35.8	42	62.7
23	Tripura	1	1	100.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	100.0	0	0.0
24	Uttaranchal	11	4	36.4	0	0.0	1	9.1	6	54.5	0	0.0	0	0.0	5	45.5	6	54.5
25	Uttar Pradesh	366	146	39.9	20	5.5	8	2.2	161	44.0	28	7.7	3	0.8	174	47.5	192	52.5
26	West Bengal	540	184	34.1	13	2.4	21	3.9	273	50.6	24	4.4	17	3.1	218	40.4	314	58.1
	Total	6563	1854	28.2	319	4.9	241	3.7	2738	41.7	806	12.3	515	7.8	2414	36.8	4059	61.8

N.B. 90 monitoring wells (1.4%) show no change in Water Level.

State-wise Annual Fluctuation & Frequency Distribution of Different Ranges from November 2020 to November 2021 (Post-Monsoon) in Unconfined Aquifer

S. No.	Name of State/ UT	No. of wells Analysed	Rise						Fall						Total			
			0-2 m		2-4 m		>4 m		0-2 m		2-4 m		>4 m		Rise		Fall	
			No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
1	Andhra Pradesh	680	287	42.2	40	5.9	30	4.4	264	38.8	37	5.4	15	2.2	357	53	316	46
2	Arunachal Pradesh	3	0	0.0	0	0.0	0	0.0	3	100.0	0	0.0	0	0.0	0	0	3	100
3	Assam	145	26	17.9	1	0.7	0	0.0	107	73.8	4	2.8	5	3.4	27	19	116	80
4	Bihar	480	325	67.7	27	5.6	12	2.5	106	22.1	5	1.0	0	0.0	364	76	111	23
5	Chandigarh	10	3	30.0	2	20.0	0	0.0	4	40.0	1	10.0	0	0.0	5	50	5	50
6	Chhattisgarh	571	254	44.5	64	11.2	27	4.7	158	27.7	45	7.9	17	3.0	345	60	220	39
7	Dadra & Nagar Haveli	17	13	76.5	2	11.8	0	0.0	0	0.0	0	0.0	0	0.0	15	88	0	0
8	Daman & Diu	3	1	33.3	1	33.3	0	0.0	1	33.3	0	0.0	0	0.0	2	67	1	33
9	Delhi	76	20	26.3	34	44.7	20	26.3	2	2.6	0	0.0	0	0.0	74	97	2	3
10	Goa	62	35	56.5	1	1.6	0	0.0	22	35.5	3	4.8	1	1.6	36	58	26	42
11	Gujarat	645	238	36.9	52	8.1	35	5.4	208	32.2	59	9.1	42	6.5	325	50	309	48
12	Haryana	154	69	44.8	13	8.4	9	5.8	53	34.4	5	3.2	3	1.9	91	59	61	40
13	Himachal Pradesh	86	48	55.8	1	1.2	4	4.7	31	36.0	1	1.2	1	1.2	53	62	33	38
14	Jammu & Kashmir	143	69	48.3	12	8.4	3	2.1	53	37.1	2	1.4	3	2.1	84	59	58	41
15	Jharkhand	174	70	40.2	4	2.3	0	0.0	84	48.3	8	4.6	5	2.9	74	43	97	56
16	Karnataka	1195	632	52.9	117	9.8	51	4.3	306	25.6	48	4.0	24	2.0	800	67	378	32

Annexure-V

S. No.	Name of State/ UT	No. of wells Analysed	Rise						Fall						Total			
			0-2 m		2-4 m		>4 m		0-2 m		2-4 m		>4 m		Rise		Fall	
			No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
17	Kerala	1180	757	64.2	157	13.3	37	3.1	187	15.8	17	1.4	9	0.8	951	81	213	18
18	Madhya Pradesh	1249	470	37.6	142	11.4	93	7.4	403	32.3	68	5.4	52	4.2	705	56	523	42
19	Maharashtra	834	382	45.8	61	7.3	28	3.4	275	33.0	45	5.4	26	3.1	471	56	346	41
20	Meghalaya	23	8	34.8	0	0.0	0	0.0	12	52.2	0	0.0	0	0.0	8	35	12	52
21	Nagaland	2	0	0.0	1	50.0	0	0.0	1	50.0	0	0.0	0	0.0	1	50	1	50
22	Odisha	1128	505	44.8	12	1.1	2	0.2	536	47.5	44	3.9	8	0.7	519	46	588	52
23	Pondicherry	6	5	83.3	0	0.0	1	16.7	0	0.0	0	0.0	0	0.0	6	100	0	0
24	Punjab	161	50	31.1	3	1.9	4	2.5	97	60.2	3	1.9	2	1.2	57	35	102	63
25	Rajasthan	879	314	35.7	56	6.4	47	5.3	267	30.4	87	9.9	90	10.2	417	47	444	51
26	Tamil Nadu	467	176	37.7	96	20.6	106	22.7	66	14.1	9	1.9	14	3.0	378	81	89	19
27	Telangana	515	146	28.3	25	4.9	14	2.7	271	52.6	33	6.4	22	4.3	185	36	326	63
28	Tripura	20	3	15.0	0	0.0	0	0.0	17	85.0	0	0.0	0	0.0	3	15	17	85
29	Uttar Pradesh	545	369	67.7	69	12.7	15	2.8	79	14.5	6	1.1	5	0.9	453	83	90	17
30	Uttaranchal	43	23	53.5	3	7.0	4	9.3	8	18.6	1	2.3	3	7.0	30	70	12	28
31	West Bengal	515	227	44.1	60	11.7	44	8.5	120	23.3	29	5.6	34	6.6	331	64	183	36
	Total	12011	5525	46.0	1056	8.8	586	4.9	3741	31.1	560	4.7	381	3.2	7167	59.7	4682	39.0

N.B. 162 monitoring wells (1.3%) show no change in Water Level.

State-wise Annual Fluctuation & Frequency Distribution of Different Ranges from January 2021 to January 2022 in Unconfined Aquifer

S. No.	Name of State/ UT	No. of wells Analysed	Rise						Fall						Total			
			0-2 m		2-4 m		>4 m		0-2 m		2-4 m		>4 m		Rise		Fall	
			No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
1	Andhra Pradesh	697	294	42.2	41	5.9	27	3.9	290	41.6	22	3.2	13	1.9	362	51.9	325	46.6
2	Arunachal Pradesh	10	1	10.0	0	0.0	0	0.0	9	90.0	0	0.0	0	0.0	1	10.0	9	90.0
3	Assam	140	52	37.1	10	7.1	2	1.4	74	52.9	0	0.0	1	0.7	64	45.7	75	53.6
4	Bihar	555	331	59.6	49	8.8	23	4.1	142	25.6	7	1.3	2	0.4	403	72.6	151	27.2
5	Chandigarh	12	3	25.0	0	0.0	0	0.0	6	50.0	2	16.7	1	8.3	3	25.0	9	75.0
6	Chhatisgarh	501	236	47.1	87	17.4	24	4.8	106	21.2	35	7.0	11	2.2	347	69.3	152	30.3
7	Dadra & Nagar Haveli	17	14	82.4	1	5.9	0	0.0	2	11.8	0	0.0	0	0.0	15	88.2	2	11.8
8	Delhi	75	32	42.7	29	38.7	2	2.7	10	13.3	0	0.0	1	1.3	63	84.0	11	14.7
9	Goa	58	6	10.3	2	3.4	1	1.7	46	79.3	1	1.7	1	1.7	9	15.5	48	82.8
10	Daman & Diu	2	0	0.0	0	0.0	0	0.0	2	100.0	0	0.0	0	0.0	0	0.0	2	100.0
11	Gujarat	667	272	40.8	56	8.4	38	5.7	211	31.6	51	7.6	33	4.9	366	54.9	295	44.2
12	Haryana	234	129	55.1	16	6.8	6	2.6	73	31.2	6	2.6	4	1.7	151	64.5	83	35.5
13	Himachal Pradesh	103	52	50.5	2	1.9	4	3.9	36	35.0	7	6.8	2	1.9	58	56.3	45	43.7
14	Jammu & Kashmir	190	79	41.6	8	4.2	2	1.1	80	42.1	19	10.0	1	0.5	89	46.8	100	52.6
15	Jharkhand	184	100	54.3	25	13.6	6	3.3	37	20.1	7	3.8	6	3.3	131	71.2	50	27.2
16	Karnataka	973	440	45.2	77	7.9	43	4.4	321	33.0	38	3.9	30	3.1	560	57.6	389	40.0

S. No.	Name of State/ UT	No. of wells Analysed	Rise						Fall						Total			
			0-2 m		2-4 m		>4 m		0-2 m		2-4 m		>4 m		Rise		Fall	
			No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
17	Kerala	1190	475	39.9	40	3.4	13	1.1	525	44.1	69	5.8	53	4.5	528	44.4	647	54.4
18	Madhya Pradesh	1272	532	41.8	174	13.7	114	9.0	347	27.3	69	5.4	28	2.2	820	64.5	444	34.9
19	Maharashtra	1558	778	49.9	152	9.8	98	6.3	416	26.7	53	3.4	32	2.1	1028	66.0	501	32.2
20	Meghalaya	12	2	16.7	0	0.0	0	0.0	8	66.7	2	16.7	0	0.0	2	16.7	10	83.3
21	Nagaland	2	0	0.0	0	0.0	0	0.0	2	100.0	0	0.0	0	0.0	0	0.0	2	100.0
22	Odisha	1201	756	62.9	49	4.1	9	0.7	329	27.4	23	1.9	4	0.3	814	67.8	356	29.6
23	Pondicherry	4	3	75.0	0	0.0	0	0.0	1	25.0	0	0.0	0	0.0	3	75.0	1	25.0
24	Punjab	207	72	34.8	8	3.9	2	1.0	114	55.1	7	3.4	3	1.4	82	39.6	124	59.9
25	Rajasthan	873	263	30.1	106	12.1	87	10.0	267	30.6	77	8.8	62	7.1	456	52.2	406	46.5
26	Tamil Nadu	506	191	37.7	68	13.4	53	10.5	175	34.6	13	2.6	4	0.8	312	61.7	192	37.9
27	Telangana	520	211	40.6	31	6.0	19	3.7	221	42.5	25	4.8	7	1.3	261	50.2	253	48.7
28	Tripura	14	4	28.6	1	7.1	0	0.0	8	57.1	1	7.1	0	0.0	5	35.7	9	64.3
29	Uttaranchal	21	14	66.7	3	14.3	2	9.5	2	9.5	0	0.0	0	0.0	19	90.5	2	9.5
30	Uttar Pradesh	616	441	71.6	59	9.6	14	2.3	93	15.1	7	1.1	2	0.3	514	83.4	102	16.6
31	West Bengal	644	372	57.8	68	10.6	53	8.2	104	16.1	17	2.6	26	4.0	493	76.6	147	22.8
	Total	13058	6155	47.1	1162	8.9	642	4.9	4057	31.1	558	4.3	327	2.5	7959	61.0	4942	37.8

N.B. 157 monitoring wells (1.2%) show no change in Water Level.

State-wise Seasonal Fluctuation & Frequency Distribution of Different Ranges from August 2021 to November 2021 in Unconfined Aquifer

S. No.	Name of State / UT	No. of wells Analy sed	Range in m				Rise						Fall						Total			
			Rise		Fall		0-2 m		2-4 m		>4 m		0-2 m		2-4 m		>4 m		Rise		Fall	
			Min	Max	Min	Max	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
1	Andhra Pradesh	710	0.01	22.17	0.01	7.5	259	36.5	83	11.7	52	7.3	278	39.2	25	3.5	8	1.1	394	55.5	311	43.8
2	Arunachal Pradesh	9			1.90	6.4	0	0.0	0	0.0	0	0.0	2	22.2	5	55.6	2	22.2	0	0.0	9	100.0
3	Assam	105	0.04	2.53	0.09	5.8	12	11.4	1	1.0	0	0.0	68	64.8	21	20.0	3	2.9	13	12.4	92	87.6
4	Bihar	488	0.02	4.62	0.01	6.0	68	13.9	3	0.6	1	0.2	300	61.5	100	20.5	15	3.1	72	14.8	415	85.0
5	Chandigarh	12	0.46	1.86	0.73	1.2	10	83.3	0	0.0	0	0.0	2	16.7	0	0.0	0	0.0	10	83.3	2	16.7
6	Chhatisgarh	549	0.03	11.87	0.05	9.9	82	14.9	18	3.3	10	1.8	280	51.0	106	19.3	52	9.5	110	20.0	438	79.8
7	Dadra & Nagar Haveli	17	1.30	1.30	0.58	3.9	1	5.9	0	0.0	0	0.0	8	47.1	7	41.2	0	0.0	1	5.9	15	88.2
7	Delhi	67	0.01	10.72	0.06	11.4	34	50.7	13	19.4	2	3.0	15	22.4	0	0.0	3	4.5	49	73.1	18	26.9
8	Goa	62	0.06	1.26	0.02	7.2	4	6.5	0	0.0	0	0.0	40	64.5	10	16.1	7	11.3	4	6.5	57	91.9
9	Daman & Diu	3			0.56	2.8	0	0.0	0	0.0	0	0.0	2	66.7	1	33.3	0	0.0	0	0.0	3	100.0
10	Gujarat	665	0.01	24.95	0.01	15.7	223	33.5	57	8.6	45	6.8	223	33.5	67	10.1	38	5.7	325	48.9	328	49.3
11	Haryana	219	0.05	21.03	0.11	8.3	104	47.5	70	32.0	19	8.7	15	6.8	7	3.2	4	1.8	193	88.1	26	11.9
12	Himachal Pradesh	85	0.01	3.32	0.01	9.7	25	29.4	1	1.2	0	0.0	41	48.2	7	8.2	9	10.6	26	30.6	57	67.1
13	Jammu & Kashmir	192	0.03	3.62	0.01	11.1	73	38.0	5	2.6	0	0.0	93	48.4	14	7.3	6	3.1	78	40.6	113	58.9
14	Jharkhand	189	0.02	2.55	0.09	8.7	9	4.8	1	0.5	0	0.0	105	55.6	64	33.9	10	5.3	10	5.3	179	94.7
15	Karnataka	968	0.01	11.25	0.01	19.6	222	22.9	61	6.3	53	5.5	358	37.0	168	17.4	87	9.0	336	34.7	613	63.3
16	Kerala	1201	0.01	29.34	0.01	17.0	124	10.3	15	1.2	6	0.5	633	52.7	290	24.1	132	11.0	145	12.1	1055	87.8

Annexure-VII

S. No.	Name of State / UT	No. of wells Analy sed	Range in m				Rise						Fall						Total			
			Rise		Fall		0-2 m		2-4 m		>4 m		0-2 m		2-4 m		>4 m		Rise		Fall	
			Min	Max	Min	Max	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
17	Madhya Pradesh	1248	0.02	32.11	0.01	21.6	140	11.2	38	3.0	19	1.5	478	38.3	311	24.9	253	20.3	197	15.8	1042	83.5
18	Maharashtra	1590	0.01	25.78	0.02	37.6	267	16.8	67	4.2	44	2.8	641	40.3	364	22.9	187	11.8	378	23.8	1192	75.0
19	Meghalaya	5			1.06	1.8	0	0.0	0	0.0	0	0.0	5	100.0	0	0.0	0	0.0	0	0.0	5	100.0
20	Nagaland	2	1.28	1.28	0.29	0.3	1	50.0	0	0.0	0	0.0	1	50.0	0	0.0	0	0.0	1	50.0	1	50.0
21	Odisha	1180	0.02	8.15	0.01	6.0	201	17.0	24	2.0	4	0.3	784	66.4	138	11.7	17	1.4	229	19.4	939	79.6
22	Pondicherry	3	0.45	1.22			3	100.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	3	100.0	0	0.0
23	Punjab	183	0.03	12.30	0.05	2.3	88	48.1	53	29.0	30	16.4	10	5.5	1	0.5	0	0.0	171	93.4	11	6.0
24	Rajasthan	866	0.01	26.94	0.01	19.4	259	29.9	49	5.7	47	5.4	367	42.4	78	9.0	48	5.5	355	41.0	493	56.9
25	Tamil Nadu	446	0.04	23.27	0.08	7.9	157	35.2	128	28.7	126	28.3	29	6.5	3	0.7	2	0.4	411	92.2	34	7.6
26	Telangana	515	0.02	28.25	0.01	26.3	107	20.8	30	5.8	27	5.2	253	49.1	80	15.5	16	3.1	164	31.8	349	67.8
27	Tripura	7			0.48	3.8	0	0.0	0	0.0	0	0.0	5	71.4	2	28.6	0	0.0	0	0.0	7	100.0
28	Uttaranchal	17	0.06	5.40	0.16	10.9	2	11.8	1	5.9	2	11.8	9	52.9	1	5.9	2	11.8	5	29.4	12	70.6
29	Uttar Pradesh	596	0.01	8.53	0.01	9.1	169	28.4	22	3.7	5	0.8	280	47.0	93	15.6	25	4.2	196	32.9	398	66.8
30	West Bengal	628	0.01	9.17	0.02	15.2	77	12.3	25	4.0	11	1.8	339	54.0	122	19.4	53	8.4	113	18.0	514	81.8
	Total	13058					6155	47.1	1162	8.9	642	4.9	4057	31.1	558	4.3	327	2.5	7959	61.0	4942	37.8

N. B. 110 monitoring wells (0.9 %) show no change in Water Level.

State-wise Seasonal Fluctuation & Frequency Distribution of Different Ranges from August 2021 to January 2022 in Unconfined Aquifer

S. No.	Name of State /UT	No. of wells Analy sed	Range in m				Rise						Fall						Total			
			Rise		Fall		0-2 m		2-4 m		>4 m		0-2 m		2-4 m		>4 m		Rise		Fall	
			Min	Max	Min	Max	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
1	Andhra Pradesh	710	0.01	22.17	0.01	7.5	259	36.5	83	11.7	52	7.3	278	39.2	25	3.5	8	1.1	394	55.5	311	43.8
2	Arunachal Pradesh	9			1.90	6.4	0	0.0	0	0.0	0	0.0	2	22.2	5	55.6	2	22.2	0	0.0	9	100.0
3	Assam	105	0.04	2.53	0.09	5.8	12	11.4	1	1.0	0	0.0	68	64.8	21	20.0	3	2.9	13	12.4	92	87.6
4	Bihar	488	0.02	4.62	0.01	6.0	68	13.9	3	0.6	1	0.2	300	61.5	100	20.5	15	3.1	72	14.8	415	85.0
5	Chandigarh	12	0.46	1.86	0.73	1.2	10	83.3	0	0.0	0	0.0	2	16.7	0	0.0	0	0.0	10	83.3	2	16.7
6	Chhatisgarh	549	0.03	11.87	0.05	9.9	82	14.9	18	3.3	10	1.8	280	51.0	106	19.3	52	9.5	110	20.0	438	79.8
7	Dadra & Nagar Haveli	17	1.30	1.30	0.58	3.9	1	5.9	0	0.0	0	0.0	8	47.1	7	41.2	0	0.0	1	5.9	15	88.2
7	Delhi	67	0.01	10.72	0.06	11.4	34	50.7	13	19.4	2	3.0	15	22.4	0	0.0	3	4.5	49	73.1	18	26.9
8	Goa	62	0.06	1.26	0.02	7.2	4	6.5	0	0.0	0	0.0	40	64.5	10	16.1	7	11.3	4	6.5	57	91.9
9	Daman & Diu	3			0.56	2.8	0	0.0	0	0.0	0	0.0	2	66.7	1	33.3	0	0.0	0	0.0	3	100.0
10	Gujarat	665	0.01	24.95	0.01	15.7	223	33.5	57	8.6	45	6.8	223	33.5	67	10.1	38	5.7	325	48.9	328	49.3
11	Haryana	219	0.05	21.03	0.11	8.3	104	47.5	70	32.0	19	8.7	15	6.8	7	3.2	4	1.8	193	88.1	26	11.9
12	Himachal Pradesh	85	0.01	3.32	0.01	9.7	25	29.4	1	1.2	0	0.0	41	48.2	7	8.2	9	10.6	26	30.6	57	67.1
13	Jammu & Kashmir	192	0.03	3.62	0.01	11.1	73	38.0	5	2.6	0	0.0	93	48.4	14	7.3	6	3.1	78	40.6	113	58.9
14	Jharkhand	189	0.02	2.55	0.09	8.7	9	4.8	1	0.5	0	0.0	105	55.6	64	33.9	10	5.3	10	5.3	179	94.7
15	Karnataka	968	0.01	11.25	0.01	19.6	222	22.9	61	6.3	53	5.5	358	37.0	168	17.4	87	9.0	336	34.7	613	63.3
16	Kerala	1201	0.01	29.34	0.01	17.0	124	10.3	15	1.2	6	0.5	633	52.7	290	24.1	132	11.0	145	12.1	1055	87.8

Annexure-VIII

S. No.	Name of State /UT	No. of wells Analy sed	Range in m				Rise						Fall						Total			
			Rise		Fall		0-2 m		2-4 m		>4 m		0-2 m		2-4 m		>4 m		Rise		Fall	
			Min	Max	Min	Max	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
17	Madhya Pradesh	1248	0.02	32.11	0.01	21.6	140	11.2	38	3.0	19	1.5	478	38.3	311	24.9	253	20.3	197	15.8	1042	83.5
18	Maharashtra	1590	0.01	25.78	0.02	37.6	267	16.8	67	4.2	44	2.8	641	40.3	364	22.9	187	11.8	378	23.8	1192	75.0
19	Meghalaya	5			1.06	1.8	0	0.0	0	0.0	0	0.0	5	100.0	0	0.0	0	0.0	0	0.0	5	100.0
20	Nagaland	2	1.28	1.28	0.29	0.3	1	50.0	0	0.0	0	0.0	1	50.0	0	0.0	0	0.0	1	50.0	1	50.0
21	Odisha	1180	0.02	8.15	0.01	6.0	201	17.0	24	2.0	4	0.3	784	66.4	138	11.7	17	1.4	229	19.4	939	79.6
22	Pondicherry	3	0.45	1.22			3	100.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	3	100.0	0	0.0
23	Punjab	183	0.03	12.30	0.05	2.3	88	48.1	53	29.0	30	16.4	10	5.5	1	0.5	0	0.0	171	93.4	11	6.0
24	Rajasthan	866	0.01	26.94	0.01	19.4	259	29.9	49	5.7	47	5.4	367	42.4	78	9.0	48	5.5	355	41.0	493	56.9
25	Tamil Nadu	446	0.04	23.27	0.08	7.9	157	35.2	128	28.7	126	28.3	29	6.5	3	0.7	2	0.4	411	92.2	34	7.6
26	Telangana	515	0.02	28.25	0.01	26.3	107	20.8	30	5.8	27	5.2	253	49.1	80	15.5	16	3.1	164	31.8	349	67.8
27	Tripura	7			0.48	3.8	0	0.0	0	0.0	0	0.0	5	71.4	2	28.6	0	0.0	0	0.0	7	100.0
28	Uttaranchal	17	0.06	5.40	0.16	10.9	2	11.8	1	5.9	2	11.8	9	52.9	1	5.9	2	11.8	5	29.4	12	70.6
29	Uttar Pradesh	596	0.01	8.53	0.01	9.1	169	28.4	22	3.7	5	0.8	280	47.0	93	15.6	25	4.2	196	32.9	398	66.8
30	West Bengal	628	0.01	9.17	0.02	15.2	77	12.3	25	4.0	11	1.8	339	54.0	122	19.4	53	8.4	113	18.0	514	81.8
	Total	12827	0.01	32.11	0.01	37.64	2721	21.2	765	6.0	503	3.9	5664	44.2	2085	16.3	979	7.6	3989	31.1	8728	68.0

N. B. 110 monitoring wells (0.9 %) show no change in Water Level.

State-wise Decadal Water Level Fluctuation With Mean [August (2011 to 2020)] and August 2021 in Unconfined Aquifer

S. No.	Name of State/ UT	No. of wells Analysed	Rise						Fall						Total			
			0-2 m		2-4 m		>4 m		0-2 m		2-4 m		>4 m		Rise		Fall	
			No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
1	Andhra Pradesh	695	293	42.2	105	15.1	102	14.7	164	23.6	22	3.2	9	1.3	500	71.9	195	28.1
2	Arunachal Pradesh	9	4	44.4	0	0.0	0	0.0	5	55.6	0	0.0	0	0.0	4	44.4	5	55.6
3	Assam	113	27	23.9	3	2.7	0	0.0	51	45.1	1	0.9	1	0.9	60	53.1	53	46.9
4	Bihar	539	293	54.4	117	21.7	15	2.8	107	19.9	5	0.9	2	0.4	425	78.8	114	21.2
5	Chandigarh	12	1	0.0	0	0.0	0	0.0	8	66.7	1	8.3	2	16.7	1	8.3	11	91.7
6	Chhatisgarh	623	153	2.0	26	4.2	17	2.7	279	44.8	92	14.8	56	9.0	196	31.5	427	68.5
7	Delhi	75	31	41.3	9	12.0	7	9.3	13	17.3	9	12.0	6	8.0	47	62.7	28	37.3
8	Goa	65	6	9.2	0	0.0	1	1.5	49	75.4	8	12.3	1	1.5	7	10.8	58	89.2
9	Daman & Diu	4	2	50.0	0	0.0	0	0.0	2	50.0	0	0.0	0	0.0	2	50.0	2	50.0
10	Gujarat	723	170	23.5	82	11.3	67	9.3	210	29.0	89	12.3	105	14.5	319	44.1	404	55.9
11	Haryana	232	37	15.9	7	3.0	4	1.7	98	42.2	55	23.7	31	13.4	48	20.7	184	79.3
12	Himachal Pradesh	86	21	24.4	4	4.7	2	2.3	45	52.3	12	14.0	2	2.3	27	31.4	59	68.6
13	Jammu & Kashmir	256	77	30.1	1	0.4	0	0.0	155	60.5	19	7.4	3	1.2	78	30.5	177	69.1
14	Jharkhand	214	118	55.1	33	15.4	8	3.7	47	22.0	6	2.8	2	0.9	159	74.3	55	25.7
15	Karnataka	1263	551	43.6	250	19.8	143	11.3	255	20.2	38	3.0	25	2.0	944	74.7	318	25.2
16	Kerala	1353	8	0.6	57	4.2	9	0.7	424	31.3	26	1.9	10	0.7	892	65.9	460	34.0
17	Madhya Pradesh	1277	509	39.9	94	7.4	42	3.3	488	38.2	97	7.6	47	3.7	645	50.5	632	49.5

Annexure-IX

S. No.	Name of State/ UT	No. of wells Analysed	Rise						Fall						Total			
			0-2 m		2-4 m		>4 m		0-2 m		2-4 m		>4 m		Rise		Fall	
			No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
18	Maharashtra	1744	787	45.1	285	16.3	238	13.6	350	20.1	46	2.6	36	2.1	1310	75.1	432	24.8
19	Meghalaya	5	1	20.0	0	0.0	0	0.0	3	60.0	1	20.0	0	0.0	1	20.0	4	80.0
20	Nagaland	4	1	25.0	0	0.0	0	0.0	3	75.0	0	0.0	0	0.0	1	25.0	3	75.0
21	Odisha	1214	402	33.1	16	1.3	2	0.2	658	54.2	114	9.4	21	1.7	420	34.6	793	65.3
22	Pondicherry	5	1	0.0	0	0.0	0	0.0	4	80.0	0	0.0	0	0.0	1	20.0	4	80.0
23	Punjab	201	14	7.0	3	1.5	0	0.0	74	36.8	57	28.4	53	26.4	17	8.5	184	91.5
24	Rajasthan	907	209	23.0	64	7.1	49	5.4	278	30.7	135	14.9	171	18.9	322	35.5	584	64.4
25	Tamil Nadu	514	204	39.7	129	25.1	69	13.4	87	16.9	14	2.7	11	2.1	402	78.2	112	21.8
26	Telangana	531	164	30.9	109	20.5	179	33.7	59	11.1	11	2.1	8	1.5	452	85.1	78	14.7
27	Tripura	11	7	63.6	1	9.1	0	0.0	2	18.2	0	0.0	1	9.1	8	72.7	3	27.3
28	Uttaranchal	40	9	22.5	2	5.0	4	10.0	15	37.5	5	12.5	5	12.5	15	37.5	25	62.5
29	Uttar Pradesh	638	268	42.0	75	11.8	24	3.8	193	30.3	54	8.5	24	3.8	367	57.5	271	42.5
30	West Bengal	707	370	52.3	62	8.8	22	3.1	182	25.7	38	5.4	33	4.7	454	64.2	253	35.8
	Total	14060	4738	33.7	1534	10.9	1004	7.1	4308	30.6	955	6.8	665	4.7	8124	57.8	5928	42.2

N. B. 8 monitoring wells (0.1 %) show no change in Water Level.

State-wise Decadal Water Level Fluctuation With Mean November (2011 to 2020) and November 2021 (Post-Monsoon) in Unconfined Aquifer

S. No.	Name of State/ UT	No. of wells Analysed	Rise						Fall						Total			
			0-2 m		2-4 m		>4 m		0-2 m		2-4 m		>4 m		Rise		Fall	
			No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
1	Andhra Pradesh	706	419	59.3	87	12.3	50	7.1	124	17.6	14	2.0	11	1.6	556	79	149	21
2	Arunachal Pradesh	10	2	20.0	0	0.0	0	0.0	8	80.0	0	0.0	0	0.0	2	20	8	80
3	Assam	167	71	42.5	3	1.8	1	0.6	83	49.7	6	3.6	3	1.8	75	45	92	55
4	Bihar	593	395	66.6	78	13.2	11	1.9	102	17.2	7	1.2	0	0.0	484	82	109	18
5	Chandigarh	12	4	33.3	2	16.7	1	8.3	3	25.0	1	8.3	1	8.3	7	58	5	42
6	Chhattisgarh	687	290	42.2	66	9.6	30	4.4	230	33.5	45	6.6	26	3.8	386	56	301	44
7	Dadra & Nagar Haveli	17	15	88.2	0	0.0	0	0.0	2	11.8	0	0.0	0	0.0	15	88	2	12
8	Daman & Diu	5	2	40.0	1	20.0	1	20.0	1	20.0	0	0.0	0	0.0	4	80	1	20
9	Delhi	86	29	33.7	21	24.4	15	17.4	12	14.0	3	3.5	6	7.0	65	76	21	24
10	Goa	68	9	13.2	0	0.0	1	1.5	52	76.5	5	7.4	1	1.5	10	15	58	85
11	Gujarat	746	278	37.3	122	16.4	112	15.0	140	18.8	50	6.7	44	5.9	512	69	234	31
12	Haryana	183	66	36.1	6	3.3	8	4.4	65	35.5	19	10.4	19	10.4	80	44	103	56
13	Himachal Pradesh	86	40	46.5	5	5.8	2	2.3	36	41.9	1	1.2	1	1.2	47	55	38	44
14	Jammu & Kashmir	213	100	46.9	4	1.9	3	1.4	99	46.5	4	1.9	3	1.4	107	50	106	50
15	Jharkhand	198	132	66.7	17	8.6	1	0.5	45	22.7	3	1.5	0	0.0	150	76	48	24
16	Karnataka	1290	709	55.0	265	20.5	123	9.5	159	12.3	20	1.6	14	1.1	1097	85	193	15

S. No.	Name of State/ UT	No. of wells Analysed	Rise						Fall						Total			
			0-2 m		2-4 m		>4 m		0-2 m		2-4 m		>4 m		Rise		Fall	
			No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
17	Kerala	1304	868	66.6	145	11.1	39	3.0	227	17.4	17	1.3	8	0.6	1052	81	252	19
18	Madhya Pradesh	1297	590	45.5	164	12.6	97	7.5	345	26.6	70	5.4	31	2.4	851	66	446	34
19	Maharashtra	1727	856	49.6	321	18.6	161	9.3	317	18.4	47	2.7	24	1.4	1338	77	388	22
20	Meghalaya	24	10	41.7	1	4.2	0	0.0	13	54.2	0	0.0	0	0.0	11	46	13	54
21	Nagaland	2	1	50.0	0	0.0	0	0.0	0	0.0	1	50.0	0	0.0	1	50	1	50
22	Odisha	1245	650	52.2	32	2.6	2	0.2	517	41.5	35	2.8	8	0.6	684	55	560	45
23	Pondicherry	6	3	50.0	1	16.7	0	0.0	2	33.3	0	0.0	0	0.0	4	67	2	33
24	Punjab	176	46	26.1	7	4.0	1	0.6	74	42.0	38	21.6	10	5.7	54	31	122	69
25	Rajasthan	918	248	27.0	80	8.7	44	4.8	290	31.6	114	12.4	141	15.4	372	41	545	59
26	Tamil Nadu	538	201	37.4	146	27.1	113	21.0	54	10.0	13	2.4	11	2.0	460	86	78	14
27	Telangana	537	203	37.8	114	21.2	133	24.8	73	13.6	5	0.9	9	1.7	450	84	87	16
28	Tripura	22	8	36.4	0	0.0	0	0.0	11	50.0	3	13.6	0	0.0	8	36	14	64
29	Uttar Pradesh	646	358	55.4	102	15.8	21	3.3	118	18.3	32	5.0	15	2.3	481	74	165	26
30	Uttarakhand	45	23	51.1	3	6.7	2	4.4	9	20.0	4	8.9	4	8.9	28	62	17	38
31	West Bengal	721	417	57.8	87	12.1	34	4.7	117	16.2	34	4.7	31	4.3	538	75	182	25
	Total	14275	7043	49.3	1880	13.2	1006	7.0	3328	23.3	591	4.1	421	2.9	9929	70	4340	30

N. B. 6 monitoring wells (0.04 %) show no change in Water Level.

State-wise Decadal Water Level Fluctuation With Mean [January (2012 to 2021)] and January 2022 in Unconfined Aquifer

S. No.	Name of State/ UT	No. of wells Analysed	Rise						Fall						Total			
			0-2 m		2-4 m		>4 m		0-2 m		2-4 m		>4 m		Rise		Fall	
			No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
1	Andhra Pradesh	712	398	55.9	108	15.2	73	10.3	113	15.9	11	1.5	9	1.3	579	81.3	133	18.7
2	Arunachal Pradesh	10	3	30.0	0	0.0	0	0.0	6	60.0	1	10.0	0	0.0	3	30.0	7	70.0
3	Assam	150	78	52.0	5	3.3	3	2.0	60	40.0	3	2.0	1	0.7	86	57.3	64	42.7
4	Bihar	618	381	61.7	101	16.3	16	2.6	114	18.4	5	0.8	1	0.2	498	80.6	120	19.4
5	Chandigarh	13	4	30.8	0	0.0	1	7.7	5	38.5	2	15.4	1	7.7	5	38.5	8	61.5
6	Chhatisgarh	656	338	51.5	104	15.9	25	3.8	144	22.0	26	4.0	19	2.9	467	71.2	189	28.8
7	Delhi	82	25	30.5	18	22.0	14	17.1	13	15.9	4	4.9	8	9.8	57	69.5	25	30.5
8	Goa	67	7	10.4	2	3.0	0	0.0	52	77.6	5	7.5	1	1.5	9	13.4	58	86.6
9	Daman & Diu	3	3	100.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	3	100.0	0	0.0
10	Gujarat	731	284	38.9	135	18.5	130	17.8	116	15.9	30	4.1	35	4.8	549	75.1	181	24.8
11	Haryana	277	128	46.2	19	6.9	7	2.5	77	27.8	25	9.0	21	7.6	154	55.6	123	44.4
12	Himachal Pradesh	104	47	45.2	7	6.7	4	3.8	40	38.5	4	3.8	2	1.9	58	55.8	46	44.2
13	Jammu & Kashmir	205	96	46.8	11	5.4	1	0.5	89	43.4	7	3.4	1	0.5	108	52.7	97	47.3
14	Jharkhand	253	171	67.6	37	14.6	4	1.6	35	13.8	5	2.0	1	0.4	212	83.8	41	16.2
15	Karnataka	1058	555	52.5	192	18.1	105	9.9	158	14.9	22	2.1	24	2.3	852	80.5	204	19.3
16	Kerala	1304	771	59.1	29	2.2	22	1.7	365	28.0	77	5.9	39	3.0	822	63.0	481	36.9
17	Madhya Pradesh	1300	593	45.6	218	16.8	124	9.5	295	22.7	52	4.0	16	1.2	935	71.9	363	27.9

S. No.	Name of State/ UT	No. of wells Analysed	Rise						Fall						Total			
			0-2 m		2-4 m		>4 m		0-2 m		2-4 m		>4 m		Rise		Fall	
			No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
18	Maharashtra	1633	802	49.1	347	21.2	176	10.8	239	14.6	42	2.6	27	1.7	1325	81.1	308	18.9
19	Meghalaya	13	2	15.4	0	0.0	0	0.0	11	84.6	0	0.0	0	0.0	2	15.4	11	84.6
20	Nagaland	2	0	0.0	0	0.0	0	0.0	2	100.0	0	0.0	0	0.0	0	0.0	2	100.0
21	Odisha	1243	824	66.3	73	5.9	10	0.8	314	25.3	20	1.6	1	0.1	907	73.0	335	27.0
22	Pondicherry	4	2	50.0	0	0.0	0	0.0	1	25.0	0	0.0	0	0.0	2	50.0	1	25.0
23	Punjab	237	62	26.2	5	2.1	4	1.7	84	35.4	48	20.3	34	14.3	71	30.0	166	70.0
24	Rajasthan	915	274	29.9	94	10.3	67	7.3	253	27.7	107	11.7	119	13.0	435	47.5	479	52.3
25	Tamil Nadu	553	248	44.8	146	26.4	108	19.5	40	7.2	5	0.9	3	0.5	502	90.8	48	8.7
26	Telangana	550	237	43.1	119	21.6	117	21.3	54	9.8	4	0.7	5	0.9	473	86.0	63	11.5
27	Tripura	14	7	50.0	1	7.1	0	0.0	5	35.7	1	7.1	0	0.0	8	57.1	6	42.9
28	Uttaranchal	23	16	69.6	2	8.7	1	4.3	3	13.0	1	4.3	0	0.0	19	82.6	4	17.4
29	Uttar Pradesh	679	400	58.9	70	10.3	6	0.9	164	24.2	30	4.4	7	1.0	476	70.1	201	29.6
30	West Bengal	742	432	58.2	87	11.7	37	5.0	133	17.9	29	3.9	17	2.3	556	74.9	179	24.1
	Total	14151	7188	50.8	1930	13.6	1055	7.5	2985	21.1	566	4.0	392	2.8	10173	71.9	3943	27.9

N. B. 35 monitoring wells (0.2 %) show no change in Water Level.

State-wise Depth to water Level and Distribution of Percentage of Wells for the Period of August 2021 in Deeper Aquifer

SI No	State	No of station	Depth to Water Level (mbgl)													
			Min	Max	0 - 2		2 - 5		5 - 10		10 - 20		20 - 40		> 40	
					No	%	No	%	No	%	No	%	No	%	No	%
1	Andhra Pradesh	86	-0.36	199.35	8	9.3	15	17.4	29	33.7	16	18.6	9	10.5	9	10.5
2	Bihar	4	2.2	10.65	0	0.0	2	50.0	1	25.0	1	25.0	0	0.0	0	0.0
3	Chandigarh	6	16.6	65.1	0	0.0	0	0.0	0	0.0	1	16.7	2	33.3	3	50.0
4	Chhatisgarh	33	1.01	25	7	21.2	8	24.2	10	30.3	6	18.2	2	6.1	0	0.0
5	Delhi	2	5.3	12.76	0	0.0	0	0.0	1	50.0	1	50.0	0	0.0	0	0.0
6	Gujarat	107	1.01	186.32	3	2.8	7	6.5	13	12.1	11	10.3	21	19.6	52	48.6
7	Haryana	59	1.35	70.73	1	1.7	5	8.5	6	10.2	12	20.3	21	35.6	14	23.7
8	Himachal Pradesh	2	1.04	4.8	1	50.0	1	50.0	0	0.0	0	0.0	0	0.0	0	0.0
9	Jammu & Kashmir	2	4.43	4.76	0	0.0	2	100.0	0	0.0	0	0.0	0	0.0	0	0.0
10	Jharkhand	6	2.15	13.54	0	0.0	1	16.7	4	66.7	1	16.7	0	0.0	0	0.0
11	Karnataka	194	0.25	188.79	16	8.2	40	20.6	34	17.5	48	24.7	41	21.1	15	7.7
12	Kerala	61	0	47.44	11	18.0	9	14.8	21	34.4	16	26.2	3	4.9	1	1.6
13	Madhya Pradesh	129	0.22	71.8	13	10.1	30	23.3	34	26.4	36	27.9	11	8.5	5	3.9
14	Maharashtra	45	0.5	50	11	24.4	16	35.6	8	17.8	4	8.9	5	11.1	1	2.2
15	Odisha	19	0.86	12.84	4	21.1	9	47.4	5	26.3	1	5.3	0	0.0	0	0.0
16	Pondichery	5	2.15	27	0	0.0	1	20.0	0	0.0	0	0.0	4	80.0	0	0.0
17	Punjab	55	3.7	57.2	0	0.0	2	3.6	1	1.8	18	32.7	26	47.3	8	14.5
18	Tamil Nadu	7	6.46	17.08	0	0.0	0	0.0	3	42.9	2	28.6	1	14.3	1	14.3
19	Tripura	1	6.15	6.15	0	0.0	0	0.0	1	100.0	0	0.0	0	0.0	0	0.0
20	Telangana	122	-0.4	100.1	20	16.4	32	26.2	43	35.2	18	14.8	7	5.7	2	1.6
21	Uttaranchal	3	32.98	67.11	0	0.0	0	0.0	0	0.0	0	0.0	1	33.3	2	66.7
22	West Bengal	53	0.12	18.2	7	13.2	12	22.6	12	22.6	22	41.5	0	0.0	0	0.0
	Total	1001	-0.40	199.35	102	10.2	192	19.2	226	22.6	214	21.4	154	15.4	113	11.3

State-wise Depth to water Level and Distribution of Percentage of Wells for the Period of November 2021 in Deeper Aquifer

Sl No	State	No of station	Depth to Water Level (mbgl)													
			Min	Max	0 - 2		2 - 5		5 - 10		10 - 20		20 - 40		> 40	
					No	%	No	%	No	%	No	%	No	%	No	%
1	Andhra Pradesh	97	-0.4	99.4	14	14.4	28	28.9	27	27.8	16	16.5	7	7.2	5	5.2
2	Bihar	9	3	9.05	0	0.0	2	22.2	7	77.8	0	0.0	0	0.0	0	0.0
3	Chandigarh	2	15.24	22.08	0	0.0	0	0.0	0	0.0	1	50.0	1	50.0	0	0.0
4	Chhatisgarh	40	1.2	19.71	7	17.5	8	20.0	15	37.5	10	25.0	0	0.0	0	0.0
5	Delhi	2	5.77	12.17	0	0.0	0	0.0	1	50.0	1	50.0	0	0.0	0	0.0
6	Gujarat	109	1.58	191.73	3	2.8	12	11.0	13	11.9	11	10.1	16	14.7	54	49.5
7	Haryana	45	0.75	69.35	1	2.2	3	6.7	5	11.1	9	20.0	13	28.9	14	31.1
8	Himachal Pradesh	1	1.54	1.54	1	100.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
9	Jharkhand	3	3.23	8	0	0.0	1	33.3	2	66.7	0	0.0	0	0.0	0	0.0
10	Karnataka	194	0.2	79.89	26	13.4	48	24.7	44	22.7	49	25.3	23	11.9	4	2.1
11	Kerala	58	0	45.36	10	17.2	12	20.7	24	41.4	9	15.5	2	3.4	1	1.7
12	Madhya Pradesh	134	0.63	87.8	5	3.7	37	27.6	44	32.8	38	28.4	8	6.0	2	1.5
13	Maharashtra	42	1.05	39.8	8	19.0	18	42.9	8	19.0	4	9.5	4	9.5	0	0.0
14	Odisha	24	0.98	10.76	3	12.5	12	50.0	7	29.2	2	8.3	0	0.0	0	0.0
15	Pondichery	5	20.25	24.64	0	0.0	0	0.0	0	0.0	0	0.0	5	100.0	0	0.0
16	Punjab	40	1.97	49.37	2	5.0	1	2.5	2	5.0	15	37.5	19	47.5	1	2.5
17	Tamilnadu	6	2	31.55	1	16.7	2	33.3	1	16.7	1	16.7	1	16.7	0	0.0
18	Tripura	4	8.21	27.21	0	0.0	0	0.0	1	25.0	1	25.0	2	50.0	0	0.0
19	Telangana	145	-0.17	69.5	30	20.7	54	37.2	41	28.3	18	12.4	1	0.7	1	0.7
20	Uttaranchal	2	28	30.29	0	0.0	0	0.0	0	0.0	0	0.0	2	100.0	0	0.0
21	West Bengal	55	0.13	15.96	13	23.6	10	18.2	22	40.0	10	18.2	0	0.0	0	0.0
	Total	1017	-0.4	191.73	124	12.2	248	24.4	264	26.0	195	19.2	104	10.2	82	8.1

State-wise Depth to water Level and Distribution of Percentage of Wells for the Period of January 2022 in Deeper Aquifer

SI No	State	No of station	Depth to Water Level (mbgl)													
			Min	Max	0 - 2		2 - 5		5 - 10		10 - 20		20 - 40		> 40	
					No	%	No	%	No	%	No	%	No	%	No	%
1	Andhra Pradesh	101	-0.24	55.06	19	18.8	30	29.7	28	27.7	14	13.9	5	5.0	5	5.0
2	Chandigarh	5	-0.24	194.20	0	0.0	0	0.0	0	0.0	1	20.0	1	20.0	3	60.0
3	Chhatisgarh	37	1.29	25.80	1	2.7	11	29.7	15	40.5	7	18.9	3	8.1	0	0.0
4	Delhi	2	6.30	11.30	0	0.0	0	0.0	1	50.0	1	50.0	0	0.0	0	0.0
5	Gujarat	103	1.56	194.20	1	1.0	10	9.7	11	10.7	15	14.6	15	14.6	51	49.5
6	Haryana	59	1.06	80.00	3	5.1	2	3.4	6	10.2	17	28.8	20	33.9	11	18.6
7	Jharkhand	9	2.82	12.04	0	0.0	3	33.3	5	55.6	1	11.1	0	0.0	0	0.0
8	Karnataka	183	0.30	84.25	12	6.6	34	18.6	50	27.3	60	32.8	24	13.1	3	1.6
9	Kerala	70	0.40	46.75	5	7.1	15	21.4	20	28.6	22	31.4	7	10.0	1	1.4
10	Madhya Pradesh	129	1.10	51.44	1	0.8	23	17.8	48	37.2	41	31.8	13	10.1	3	2.3
11	Maharashtra	45	1.90	153.00	1	2.2	11	24.4	19	42.2	8	17.8	4	8.9	2	4.4
12	Odisha	25	0.68	10.50	1	4.0	15	60.0	6	24.0	3	12.0	0	0.0	0	0.0
13	Pondichery	5	17.42	21.98	0	0.0	0	0.0	0	0.0	1	20.0	4	80.0	0	0.0
14	Punjab	59	1.77	51.09	1	1.7	2	3.4	3	5.1	15	25.4	34	57.6	4	6.8
15	Tamilnadu	8	1.66	63.24	1	12.5	4	50.0	1	12.5	1	12.5	0	0.0	1	12.5
16	Tripura	3	2.67	21.20	0	0.0	1	33.3	1	33.3	0	0.0	1	33.3	0	0.0
17	Telangana	173	0.12	68.04	23	13.3	61	35.3	48	27.7	32	18.5	6	3.5	3	1.7
18	West Bengal	60	0.53	18.15	10	16.7	9	15.0	22	36.7	19	31.7	0	0.0	0	0.0
	Total	1076	-0.24	194.2	79	7.3	231	21.5	284	26.4	258	24.0	137	12.7	87	8.1

State-wise Decadal Water Level Fluctuation With Mean [August (2011 to 2020)] and August 2021 in Deeper Aquifer

S. No.	Name of State	No. of wells Analyzed	Range in m				Rise						Fall						Total			
			Rise		Fall		0-2 m		2-4 m		>4 m		0-2 m		2-4 m		>4 m		Rise		Fall	
			Min	Max	Min	Max	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
1	Andhra Pradesh	84	0.09	96.13	0.3	171.21	12	14.3	11	13.1	49	58.3	2	2.4	5	6.0	5	6.0	72	85.7	12	14.3
2	Bihar	3	1.09	1.54	1.96	1.96	2	66.7	0	0.0	0	0.0	1	33.3	0	0.0	0	0.0	2	66.7	1	33.3
3	Chandigarh	6	27.27	32.33	0.33	14.22	0	0.0	0	0.0	2	33.3	1	16.7	0	0.0	3	50.0	2	33.3	4	66.7
4	Chhatisgarh	32	0.36	5.8	0.07	16.92	4	12.5	6	18.8	1	3.1	12	37.5	4	12.5	5	15.6	11	34.4	21	65.6
5	Delhi	2	1.20	1.20	0.46	0.46	1	50.0	0	0.0	0	0.0	1	50.0	0	0.0	0	0.0	1	50.0	1	50.0
6	Gujarat	103	0.1	48.26	0.05	58.46	16	15.5	11	10.7	19	18.4	16	15.5	14	13.6	27	26.2	46	44.7	57	55.3
7	Haryana	51	0.13	13.63	0.23	26.58	7	13.7	2	3.9	2	3.9	16	31.4	13	25.5	11	21.6	11	21.6	40	78.4
8	Jharkhand	6	1.28	3.46	0.38	3.25	1	16.7	2	33.3	0	0.0	2	33.3	1	16.7	0	0.0	3	50.0	3	50.0
9	Karnataka	193	0.04	71.65	0.01	57.02	54	28.0	39	20.2	54	28.0	23	11.9	10	5.2	13	6.7	147	76.2	46	23.8
10	Kerala	61	0.01	10.2	0.02	9.13	27	44.3	2	3.3	4	6.6	19	31.1	3	4.9	6	9.8	33	54.1	28	45.9
11	Madhya Pradesh	129	0.03	29.13	0.02	36.06	40	31.0	14	10.9	16	12.4	22	17.1	13	10.1	24	18.6	70	54.3	59	45.7
12	Maharashtra	44	0.06	28.55	1.18	17.88	15	34.1	4	9.1	17	38.6	1	2.3	3	6.8	4	9.1	36	81.8	8	18.2
13	Odisha	15	0.06	2.13	0.62	11.46	5	33.3	1	6.7	0	0.0	5	33.3	1	6.7	3	20.0	6	40.0	9	60.0
14	Pondicherry	4	3.61	3.61	2.29	3.88	0	0.0	1	25.0	0	0.0	0	0.0	3	75.0	0	0.0	1	25.0	3	75.0
15	Punjab	51	45.99	45.99	0.11	15.75	0	0.0	0	0.0	1	2.0	14	27.5	12	23.5	24	47.1	1	2.0	50	98.0
16	Tamil Nadu	6	0.22	5.56	2.09	7.64	1	16.7	0	0.0	3	50.0	0	0.0	1	16.7	1	16.7	4	66.7	2	33.3
17	Telangana	109	0.21	45.89	0.42	22.54	25	22.9	8	7.3	57	52.3	11	10.1	3	2.8	5	4.6	90	82.6	19	17.4
18	Tripura	1	10.87	10.87	-	-	0	0.0	0	0.0	1	100.0	0	0.0	0	0.0	0	0.0	1	100.0	0	0.0
19	Uttaranchal	3	1.7	1.7	7.53	19.87	1	33.3	0	0.0	0	0.0	0	0.0	0	0.0	2	66.7	1	33.3	2	66.7
20	West Bengal	53	0.08	5.6	0.05	10.88	15	28.3	1	1.9	1	1.9	14	26.4	14	26.4	8	15.1	17	32.1	36	67.9
TOTAL		956	0.01	96.13	0.01	171.21	226	23.6	102	10.7	227	23.7	160	16.7	100	10.5	141	14.7	555	58.1	401	41.9

State-wise Decadal Water Level Fluctuation With Mean [November (2011 to 2020)] and November 2021 in Deeper Aquifer

S. No	Name of State	No. of wells Analyzed	Range in m				Rise						Fall						Total			
			Rise		Fall		0-2 m		2-4 m		>4 m		0-2 m		2-4 m		>4 m		Rise		Fall	
			Min	Max	Min	Max	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
1	Andhra Pradesh	84	0.36	75.83	0.01	35.76	14	16.7	14	16.7	42	50.0	7	8.3	0	0.0	7	8.3	70	83.3	14	16.7
2	Bihar	9	0.11	3.70	-	-	6	66.7	3	33.3	0	0.0	0	0.0	0	0.0	0	0.0	9	100.0	0	0.0
3	Chandigarh	2	1.42	26.13	-	-	1	50.0	0	0.0	1	50.0	0	0.0	0	0.0	0	0.0	2	100.0	0	0.0
4	Chhatisgarh	39	0.06	14.54	0.04	8.31	10	25.6	5	12.8	2	5.1	16	41.0	4	10.3	2	5.1	17	43.6	22	56.4
5	Delhi	2	0.87	1.54			2	100.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	2	100.0	0	0.0
6	Gujarat	106	0.12	22.34	0.07	88.32	23	21.7	14	13.2	20	18.9	16	15.1	6	5.7	27	25.5	57	53.8	49	46.2
7	Haryana	45	0.51	3.55	0.08	11.9	10	22.2	2	4.4	0	0.0	14	31.1	11	24.4	8	17.8	12	26.7	33	73.3
8	Himachal Pradesh	1	0.08	0.08	-	-	1	100.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	100.0	0	0.0
9	Jharkhand	3	1.03	7.65			2	66.7	0	0.0	1	33.3	0	0.0	0	0.0	0	0.0	3	100.0	0	0.0
10	Karnataka	193	0.02	102.4	0.05	23.46	54	28.0	28	14.5	75	38.9	22	11.4	5	2.6	9	4.7	157	81.3	36	18.7
11	Kerala	58	0.05	16.46	0.03	3.61	29	50.0	8	13.8	9	15.5	7	12.1	5	8.6	0	0.0	46	79.3	12	20.7
12	Madhya Pradesh	134	0.01	30.49	0.01	51.33	30	22.4	33	24.6	34	25.4	23	17.2	9	6.7	5	3.7	97	72.4	37	27.6
13	Maharashtra	40	0.11	20.51	0.19	22.14	10	25.0	5	12.5	16	40.0	2	5.0	4	10.0	3	7.5	31	77.5	9	22.5
14	Odisha	18	0.95	1.55	0.08	7.93	6	33.3	0	0.0	0	0.0	7	38.9	3	16.7	2	11.1	6	33.3	12	66.7
15	Pondicherry	5	0.94	3.54	0.25	4.95	1	20.0	1	20.0	0	0.0	1	20.0	0	0.0	2	40.0	2	40.0	3	60.0
16	Punjab	39	0.40	1.62	0.35	9.98	5	12.8	0	0.0	0	0.0	13	33.3	12	30.8	9	23.1	5	12.8	34	87.2
17	Tamil Nadu	6	1.53	7.68	1	3.31	1	16.7	0	0.0	3	50.0	1	16.7	1	16.7	0	0.0	4	66.7	2	33.3
18	Telangana	110	0.03	27.48	0.01	53.34	21	19.1	15	13.6	56	50.9	13	11.8	2	1.8	3	2.7	92	83.6	18	16.4
19	Tripura	4	0.26	0.54	1.37	1.6	2	50.0	0	0.0	0	0.0	2	50.0	0	0.0	0	0.0	2	50.0	2	50.0
20	Uttaranchal	2	1.35	1.35	5.95	5.95	1	50.0	0	0.0	0	0.0	0	0.0	0	0.0	1	50.0	1	50.0	1	50.0
21	West Bengal	54	0.02	11.71	0.01	10.96	20	37.0	2	3.7	2	3.7	15	27.8	10	18.5	5	9.3	24	44.4	30	55.6
TOTAL		954	0.01	102.40	0.01	88.32	249	26.1	130	13.6	261	27.4	159	16.7	72	7.5	83	8.7	640	67.1	314	32.9

State-wise Decadal Water Level Fluctuation With Mean [January (2012 to 2021)] and January 2022in Deeper Aquifer

S. No	Name of State	No. of wells Analyzed	Range in m				Rise						Fall						Total			
			Rise		Fall		0-2 m		2-4 m		>4 m		0-2 m		2-4 m		>4 m		Rise		Fall	
			Min	Max	Min	Max	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
1	Andhra Pradesh	88	0.08	54.71	0.22	14.04	15	17.0	11	12.5	54	61.4	5	5.7	1	1.1	2	2.3	80	90.9	8	9.1
2	Chandigarh	5	1.29	28.86	4.11	5.11	1	20.0	0	0.0	2	40.0	0	0.0	0	0.0	2	40.0	3	60.0	2	40.0
3	Chhatisgarh	36	0.16	22.68	0.28	6.95	12	33.3	4	11.1	5	13.9	8	22.2	2	5.6	5	13.9	21	58.3	15	41.7
4	Delhi	2	1.47	1.82			2	100.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	2	100.0	0	0.0
5	Gujarat	102	0.06	29.69	0.01	53.22	29	28.4	7	6.9	20	19.6	18	17.6	5	4.9	23	22.5	56	54.9	46	45.1
6	Haryana	55	0.01	9.53	0.03	19.64	15	27.3	6	10.9	3	5.5	13	23.6	8	14.5	10	18.2	24	43.6	31	56.4
7	Jharkhand	8	1.38	18.6			2	25.0	4	50.0	2	25.0	0	0.0	0	0.0	0	0.0	8	100.0	0	0.0
8	Karnataka	183	0.05	82.96	0.04	20.29	47	25.7	28	15.3	81	44.3	20	10.9	1	0.5	6	3.3	156	85.2	27	14.8
9	Kerala	68	0.15	34.8	0.01	4.7	24	35.3	11	16.2	6	8.8	18	26.5	5	7.4	4	5.9	41	60.3	27	39.7
10	Madhya Pradesh	129	0.05	33.16	0.48	14.22	30	23.3	16	12.4	60	46.5	12	9.3	2	1.6	9	7.0	106	82.2	23	17.8
11	Maharashtra	43	0.12	30.64	0.16	135.3	15	34.9	4	9.3	14	32.6	1	2.3	5	11.6	4	9.3	33	76.7	10	23.3
12	Odisha	18	0.37	2.12	0.14	6.55	5	27.8	2	11.1	0	0.0	7	38.9	2	11.1	2	11.1	7	38.9	11	61.1
13	Pondicherry	5	1.53	2.62	2.54	3.97	1	20.0	2	40.0	0	0.0	0	0.0	2	40.0	0	0.0	3	60.0	2	40.0
14	Punjab	55	0.31	4.70	0.22	12.27	3	5.5	1	1.8	1	1.8	24	43.6	14	25.5	12	21.8	5	9.1	50	90.9
15	Tamil Nadu	6	2.01	7.06	1.13	2.73	0	0.0	3	50.0	1	16.7	1	16.7	1	16.7	0	0.0	4	66.7	2	33.3
16	Telangana	108	0.18	71.15	0.2	29.9	22	20.4	13	12.0	58	53.7	9	8.3	2	1.9	4	3.7	93	86.1	15	13.9
17	Tripura	3	0.72	0.72	0.48	1.64	1	33.3	0	0.0	0	0.0	2	66.7	0	0.0	0	0.0	1	33.3	2	66.7
18	West Bengal	60	0.13	3.47	0.07	11.4	21	35.0	5	8.3	0	0.0	14	23.3	12	20.0	8	13.3	26	43.3	34	56.7
TOTAL		956	0.01	96.13	0.01	171.21	226	23.6	102	10.7	227	23.7	160	16.7	100	10.5	141	14.7	555	58.1	401	41.9

STATE-WISE GROUND WATER RESOURCES OF INDIA, 2020															
(inbcm)															
S. No.	States / Union Territories	Ground Water Recharge					Total Natural Discharges	Annual Extractable Ground Water Resource	Current Annual Ground Water Extraction				Annual GW Allocation for for Domestic Use as on	Net Ground Water Availability for future use	Stage of Ground Water Extraction (%)
		Monsoon Season		Non-monsoon Season		Total Annual Ground Water			Irrigation	Industrial	Domestic	Total			
		Recharge from	Recharge from other	Recharge from	Recharge from other										
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	Andhra	8.93	8.54	0.85	5.83	24.15	1.21	22.94	6.60	0.15	0.88	7.63	1.31	15.91	33.26
2	Arunachal	2.01	0.07	1.11	0.002	3.19	0.27	2.92	0.003	0.0002	0.01	0.01	0.01	2.90	0.36
3	Assam	17.92	0.96	7.64	0.53	27.05	5.09	21.97	1.97	0.01	0.60	2.58	0.66	19.33	11.73
4	Bihar	21.02	3.32	1.29	2.42	28.05	2.60	25.46	10.33	0.65	2.04	13.02	2.29	12.23	51.14
5	Chhattisgarh	8.33	1.38	1.11	1.84	12.65	1.11	11.55	4.53	0.10	0.71	5.35	0.84	6.25	46.34
6	Delhi	0.05	0.13	0.004	0.13	0.32	0.03	0.29	0.07	0.04	0.18	0.29	0.19	0.02	101.40
7	Goa	0.34	0.02	0.003	0.04	0.40	0.08	0.32	0.02	0.004	0.05	0.08	0.05	0.24	23.48
8	Gujarat	19.59	2.89	0.00	4.32	26.81	1.90	24.91	12.65	0.03	0.62	13.30	0.78	12.52	53.39
9	Haryana	3.24	2.81	0.58	2.90	9.53	0.90	8.63	10.47	0.53	0.62	11.61	0.57	0.97	134.56
10	Himachal	0.66	0.13	0.13	0.14	1.07	0.10	0.97	0.20	0.05	0.10	0.36	0.10	0.62	36.83
11	Jharkhand	4.91	0.43	0.47	0.35	6.15	0.51	5.64	0.93	0.20	0.51	1.64	0.52	4.02	29.13
12	Karnataka	7.47	4.68	2.23	3.77	18.16	1.76	16.40	9.60	0.00	1.03	10.63	1.16	7.08	64.85
13	Kerala	4.20	0.13	0.46	0.86	5.65	0.53	5.12	1.16	0.01	1.47	2.65	2.25	2.13	51.68
14	Madhya	27.75	1.60	0.12	6.69	36.16	2.78	33.38	17.33	0.03	1.61	18.97	1.84	15.25	56.82
15	Maharashtra	20.66	2.38	0.53	8.45	32.01	1.76	30.25	15.29	0.003	1.34	16.63	1.34	14.20	54.99
16	Manipur	0.40	0.001	0.11	0.002	0.51	0.05	0.46	0.003	0.0002	0.02	0.02	0.02	0.44	5.12
17	Meghalaya	1.66	0.01	0.36	0.01	2.04	0.22	1.82	0.03	0.0003	0.05	0.08	0.06	1.73	4.22
18	Mizoram	0.19	0.00	0.03	0.00	0.22	0.02	0.20	0.00	0.00	0.01	0.01	0.01	0.19	3.81
19	Nagaland	1.08	0.76	0.27	0.06	2.17	0.22	1.95	0.002	0.00003	0.02	0.02	0.02	1.93	1.04
20	Odisha	10.26	2.71	1.51	2.60	17.08	1.37	15.71	5.50	0.15	1.21	6.86	1.46	8.74	43.65
21	Punjab	5.01	10.42	0.95	6.41	22.80	2.20	20.59	32.80	0.00	1.05	33.85	1.08	1.61	164.42
22	Rajasthan	8.80	0.58	0.29	2.57	12.24	1.17	11.07	14.37	0.13	2.14	16.63	2.17	0.99	150.22
23	Sikkim	0.96	0.00	0.00	0.00	0.96	0.10	0.86	0.00	0.002	0.01	0.01	0.01	0.85	0.86
24	Tamil Nadu	6.83	9.04	1.26	2.45	19.59	1.90	17.69	13.52	0.17	0.99	14.67	1.52	5.65	82.93
25	Telangana	7.50	3.29	1.10	4.75	16.63	1.60	15.03	7.13	0.14	0.73	8.01	0.74	7.14	53.32
26	Tripura	0.85	0.06	0.34	0.22	1.47	0.22	1.24	0.02	0.0002	0.08	0.10	0.09	1.14	7.94

STATE-WISE GROUND WATER RESOURCES OF INDIA, 2020

(inbcm)

S. No.	States / Union Territories	Ground Water Recharge				Total Annual Ground Water	Total Natural Discharges	Annual Extractable Ground Water Resource	Current Annual Ground Water Extraction				Annual GW Allocation for for Domestic Use as on	Net Ground Water Availability for future use	Stage of Ground Water Extraction (%)
		Monsoon Season		Non-monsoon Season					Irrigation	Industrial	Domestic	Total			
		Recharge from	Recharge from other	Recharge from	Recharge from other										
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
27	Uttar Pradesh	37.75	13.16	1.30	19.99	72.20	5.32	66.88	41.29	0.00	4.74	46.03	5.38	21.53	68.83
28	Uttarakhand	1.29	0.31	0.10	0.32	2.02	0.17	1.85	0.63	0.09	0.15	0.87	0.16	0.98	46.80
29	West Bengal*	18.71	1.51	5.26	3.85	29.33	2.77	26.56	10.84	0.27	0.73	11.84	1.53	14.19	44.60
30	Andaman and Nicobar Islands	0.32	0.0002	0.00	0.0001	0.32	0.03	0.28	0.0001	0.001	0.01	0.01	0.01	0.28	2.60
31	Chandigarh	0.01	0.02	0.005	0.03	0.06	0.01	0.06	0.01	0.002	0.03	0.05	0.03	0.01	80.60
32	Dadra & Nagar Haveli	0.04	0.01	0.003	0.02	0.07	0.005	0.07	0.01	0.01	0.02	0.03	0.02	0.03	45.99
	Daman & Diu	0.03	0.0005	0.00	0.001	0.03	0.001	0.03	0.003	0.03	0.00	0.03	0.02	0.0002	113.38
33	Jammu and Kashmir	0.80	2.04	0.95	0.88	4.68	0.46	4.22	0.20	0.13	0.56	0.89	0.57	3.32	21.03
34	Ladakh	0.01	0.05	0.02	0.04	0.12	0.01	0.11	0.001	0.0002	0.02	0.02	0.02	0.09	17.90
35	Lakshadweep	0.011	0.00	0.002	0.00	0.01	0.01	0.005	0.00	0.00	0.003	0.003	0.005	0.002	58.47
36	Puducherry	0.06	0.10	0.01	0.05	0.22	0.02	0.20	0.10	0.01	0.05	0.15	0.05	0.05	74.27
	Grand Total	249.65	73.54	30.41	82.54	436.15	38.51	397.62	217.61	2.94	24.37	244.92	28.90	184.56	61.60

NOTE-Data on Ground Water Extraction for Industries is not available for Karnataka, Punjab & Uttar Pradesh and is available only for 2 districts of Maharashtra.

*NOTE- The Ground Water resources assessment as on 2013 has been considered for the state of West Bengal.

CATEGORIZATION OF BLOCKS/ MANDALS/ TALUKAS IN INDIA (2020)												
S.No.	State/Union Territories	Total No. of Assessed	Safe		Semi-Critical		Critical		Over-Exploited		Saline	
			Nos.	%	Nos.	%	Nos.	%	Nos.	%	Nos.	%
1	Andhra Pradesh	667	551	82.61	40	6.00	15	2.25	23	3.45	38	5.70
2	Arunachal Pradesh	11	11	100.00								
3	Assam	28	28	100.00								
4	Bihar	534	471	88.20	51	9.55	5	0.94	7	1.31		
5	Chhattisgarh	146	110	75.34	27	18.49	9	6.16				
6	Delhi	34	3	8.82	7	20.59	7	20.59	17	50.00		
7	Goa	12	12	100.00								
8	Gujarat	248	182	73.39	24	9.68	4	1.61	25	10.08	13	5.24
9	Haryana	141	30	21.28	14	9.93	12	8.51	85	60.28		
10	Himachal Pradesh	10	10	100.00								
11	Jharkhand	259	244	94.21	10	3.86	2	0.77	3	1.16		
12	Karnataka	227	130	57.27	35	15.42	10	4.41	52	22.91		
13	Kerala	152	120	78.95	29	19.08	3	1.97				
14	Madhya Pradesh	317	233	73.50	50	15.77	8	2.52	26	8.21		
15	Maharashtra	353	271	76.77	63	17.85	8	2.27	10	2.83	1	0.28
16	Manipur	9	9	100.00								
17	Meghalaya	12	12	100.00								
18	Mizoram	26	26	100.00								
19	Nagaland	11	11	100.00								
20	Odisha	314	302	96.18	6	1.91					6	1.91
21	Punjab	150	17	11.33	10	6.67	6	4.00	117	78.00		
22	Rajasthan	295	37	12.54	29	9.83	23	7.80	203	68.81	3	1.02
23	Sikkim	4	4	100.00								
24	Tamil Nadu	1166	409	35.08	225	19.30	63	5.40	435	37.31	34	2.92
25	Telangana	589	321	54.50	180	30.56	44	7.47	44	7.47		
26	Tripura	59	59	100.00								
27	Uttar Pradesh	830	541	65.18	174	20.96	49	5.90	66	7.95		
28	Uttarakhand	18	14	77.78	4	22.22						
29	West Bengal*	268	191	71.27	76	28.36	1	0.37				

Annexure-XIX

30	Andaman and Nicobar	36	35	97.22							1	2.78
31	Chandigarh	1			1	100.00						
32	Dadra & Nagar Haveli	1	1	100.00								
	Daman & Diu	2	1	50.00					1	50.00		
33	Jammu and Kashmir	20	20	100.00								
34	Ladakh	2	2	100.00								
35	Lakshadweep	9	7	77.78	2	22.22						
36	Puducherry	4	2	50.00			1	25.00			1	25.00
	Grand Total	6965	4427	63.56	1057	15.18	270	3.88	1114	15.99	97	1.39

Note

Blocks- Bihar, Chhatisgarh, Haryana, Jharkhand, Kerala, Madhya Pradesh, Manipur, Mizoram, Odisha, Punjab, Rajasthan , Tripura, Uttar Pradesh, Uttarakhand, West Bengal

Taluks- Goa, Gujarat, Karnataka, Maharashtra

Mandals- Andhra Pradesh, Telangana

District- Arunachal Pradesh, Assam, Meghalaya, Nagaland, Sikkim, Dadra & Nagar Haveli, Daman & Diu, Jammu & Kashmir, Ladakh

Valley- Himachal Pradesh,

Islands- Andaman & Nicobar, Lakshadweep

Firka- Tamil Nadu

Region- Puducherry

UT- Chandigarh

Tehsil- Delhi

*West Bengal- The Ground Water Resource Assessment as on 2013 has been considered for state of West Bengal.