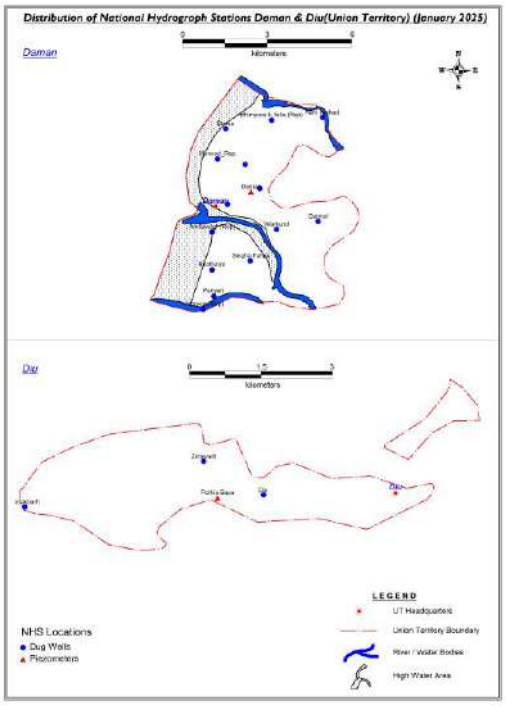
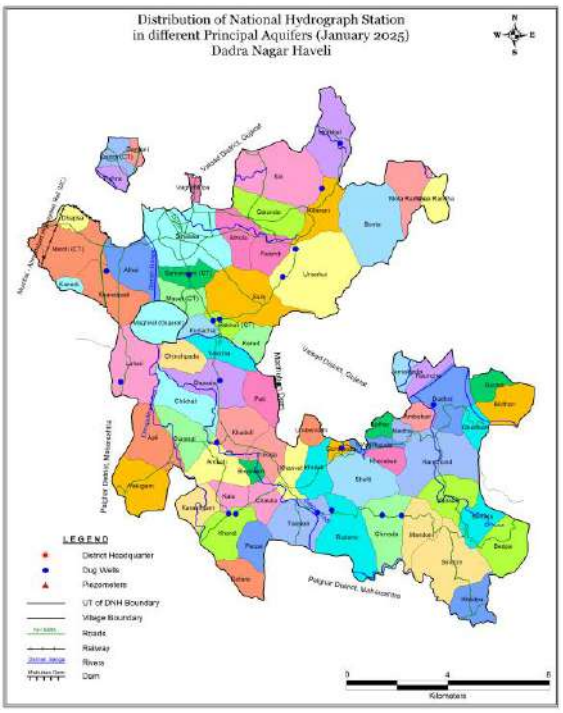
GROUND WATER LEVEL BULLETIN

JANUARY 2025

UT OF DAMAN, DIU AND DNH





ABSTRACT

Ground water level Scenario during January 2025 highlighting
The findings, status of ground water level in different aquifers
And its annual and decadal comparison.

CGWB, WEST CENTRAL REGION,

UT OF DAMAN, DIU AND DNH

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1. INTRODUCTION

Groundwater bulletin is prepared by CGWB, WCR, Ahmedabad depicting changes in groundwater regime of the country through different seasons. It is an effort to obtain information on groundwater levels through representative monitoring wells. The important attributes of groundwater regime monitoring are groundwater level. The natural conditions affecting the groundwater regime involve climatic parameters like rainfall, evapotranspiration etc., whereas anthropogenic influences include pumping from the aquifer, recharge due to irrigation systems and other practices like waste disposal etc.

Groundwater levels are being measured by Central Ground Water Board four times a year during January, May, August and November. Initially, the monitoring commenced in the year 1969 with the establishment of 2 observation wells spread uniformly over the entire state, and since then, the number of stations were added regularly so as to get proper hydrological information of different hydrogeological and geo-morphological units. A network of 43 observation wells called National Hydrograph Network Stations (NHNS), located all over the state is being monitored. Index map showing in fig.1 and Administrative map shown in Fig.-2.

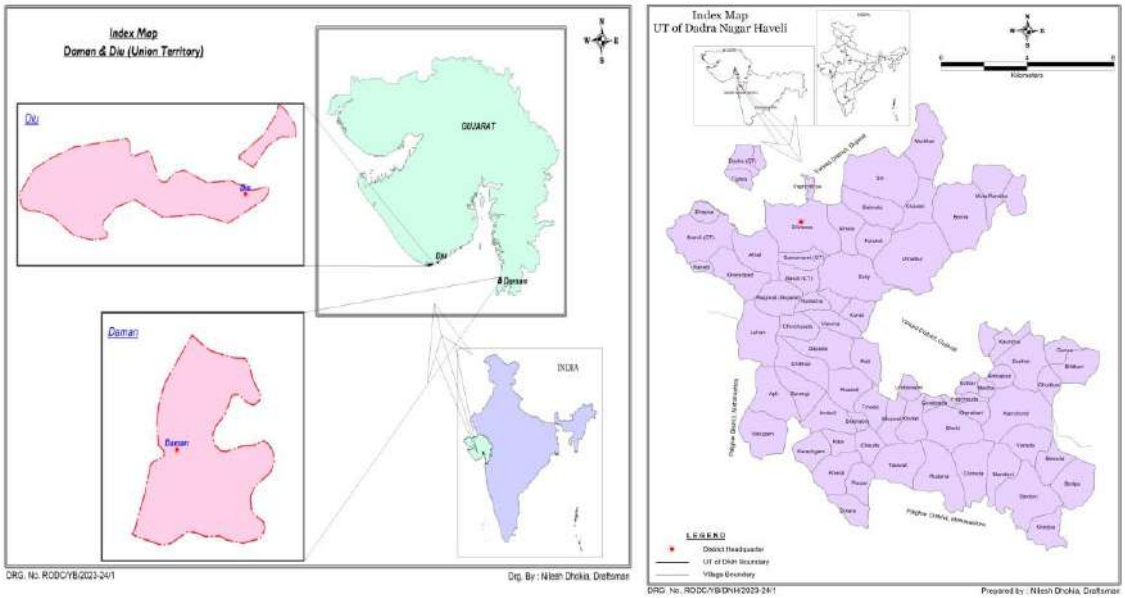

Figure 1: Index Maps of UT of Daman, Diu & and Dadra and Nagar Haveli

2. STUDY AREA

The West Central Region of Central Ground Water Board has jurisdiction over the Union Territory of Daman & Diu and Dadra and Nagar Haveli (UT of DDD). Daman & Diu covering an area of 112 sq km. Diu is an Island just south of Saurashtra coast and Daman is situated west of Vapi in the south and Dadra Nagar Haveli covering an area 491 sq km. (Fig 2)

Daman is situated between north latitudes 20°22' & 20°29'58" and east longitudes 72°49'42" & 72°54'43"and falls in Survey of India toposheet No. 46 D/15. It covers an area of 72 sq. km. Its length measures 11 km from extreme north to south and the width measures 8 km. from east to west.

The UT is bounded on the north, east and south by Valsad district of Gujarat state and west by Arabian Sea.

Diu district of UT of DDD is situated in southern part of Saurashtra region of Gujarat State, in western India. The Diu district is situated between north latitudes 20°44'39" & 20°42'00" and east longitudes 70°52'26"& 71°00'24" and falls in Survey of India toposheet No. 41 L/14. Its east west extent is nearly 19.2 km and north south width is varying from 1 to 2.5 km. Out of the total area of 43.8 Sq Km, 26.84 Sq. Km is rural area and 17.76 Sq.km is urban area.

The Union Territory of Dadra and Nagar Haveli is situated on the western coast of India between states of Gujarat and Maharashtra. It lies between north latitudes 20° 02' and 20° 22' and east longitudes 72° 54' and 73° 14' and falls in Survey of India Topo sheet no. 46 D/15, 16, 46H/3 and H/4. The Territory is surrounded on the west, north and east by Valsad district of Gujarat State and in the south and southeast by Thane and Nashik districts of Maharashtra State.

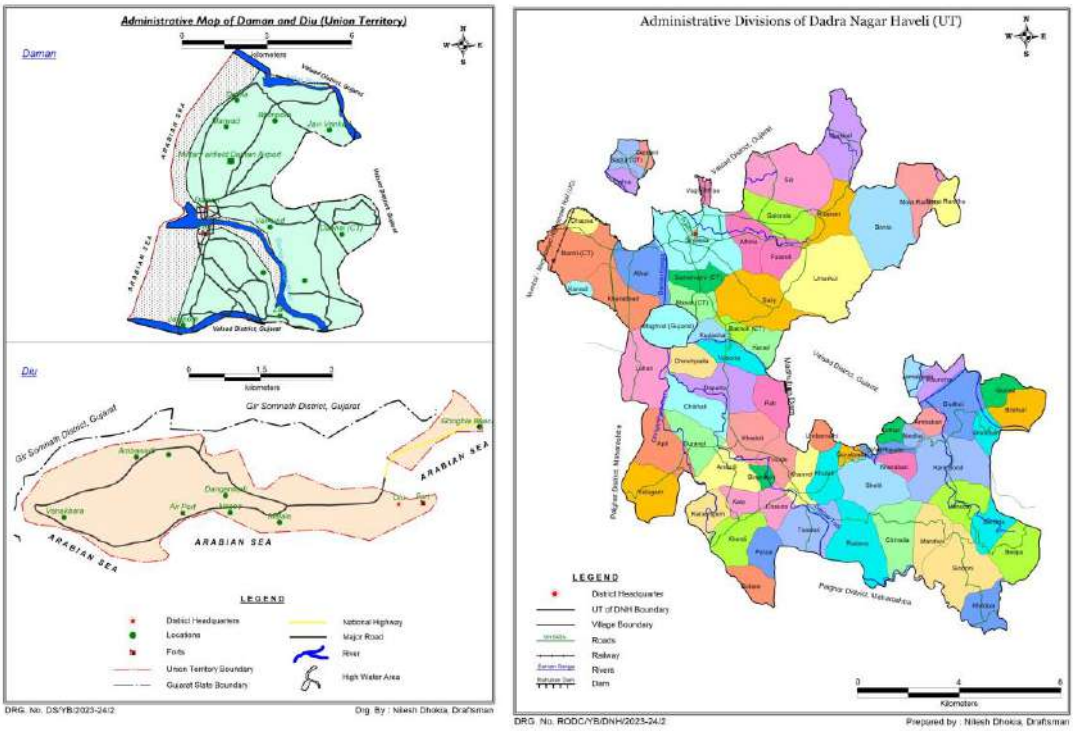

Figure 2: Map showing major aquifers and administrative divisions of Daman & Diu and Dadra and Nagar Haveli (UT of DDD).

3. GROUND WATER LEVEL MONITORING

Central Ground Water Board, as a part of its national program, has established a network of observation wells in the UT of Daman, Diu and DNH for periodic monitoring of groundwater levels and to study its quality variation in time and space. WCR, has set up a network of observation wells known as the Ground Water Monitoring Wells (GWMW's) located all over UT of Daman, Diu and DNH which comprises 44 GWMWs. Map showing hydrograph stations monitored during the year and their distribution is presented as Fig. 3.

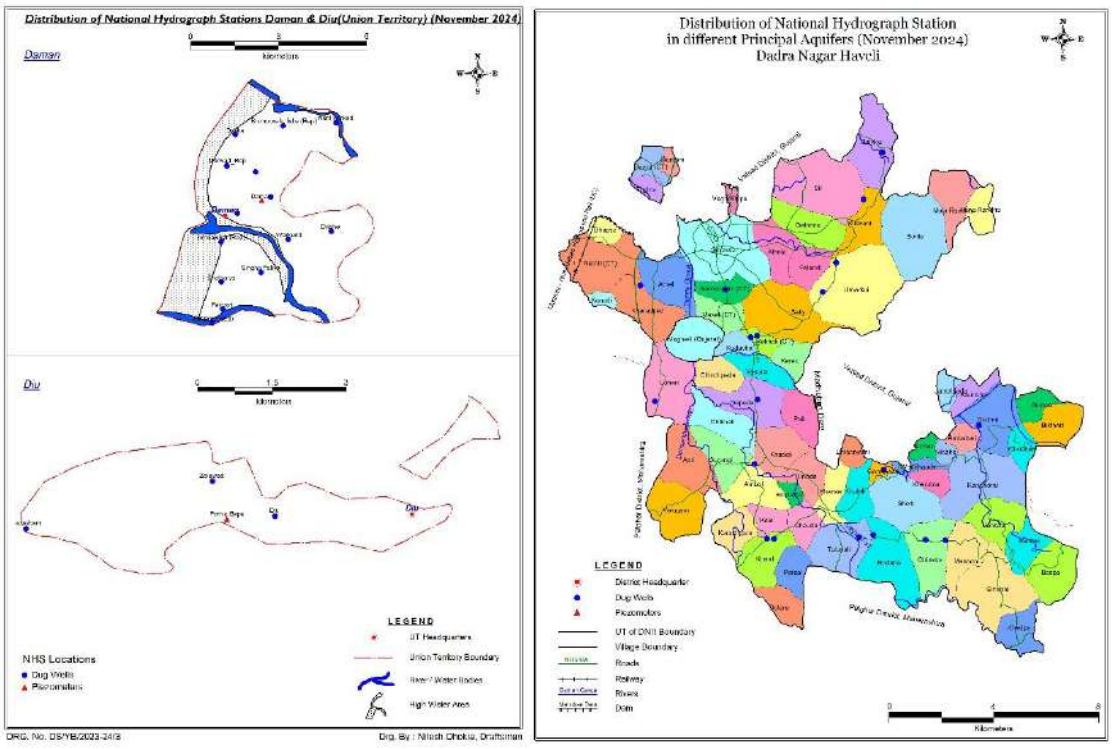

Figure 3: Distribution of NH Stations in UT of Daman, Diu & Dadra and Nagar Haveli

4. Rainfall

In the UT, rainfall is the primary source of groundwater recharge. Although the seasons differ from one location to another, a year is classified into four seasons for climatological purposes, particularly with regard to rainfall: winter (January and February), premonsoon (March to May), southwest monsoon (June to September), and postmonsoon (October to December). Rainfall occurs primarily during the SW Monsoon season throughout the majority of the region. The rainfall has direct impact on ground water regime. Groundwater table is usually deeper during pre-monsoon and before the onset of the monsoon and it becomes shallow during monsoon and shortly before the cessation of monsoons. The rainfall shows an erratic rainfall pattern during 2024 which shows rainfall 3359 mm in Dadra and Nagar Haveli to 860 mm in Diu and 2282.2 mm in Daman.

5. GROUND WATER LEVEL SCENARIO

5.1 Depth to Water Level

Depth to Water Level in Unconfined Aquifer (January 2025) – UT of DAMAN, DIU & DADRA AND NAGAR HAVELI

During January 2025 the depth to water level of unconfined aquifer range from 2 to 5 m bgl. The perusal of the depth to water level reveals that 7 % of the monitoring stations falls in the ranges of 0 to 2 mbgl, 2 to 5 mbgl water level are observed in 66%, 57% and 40% and 5 to 10 mbgl water level are observed in 26.67 %, 42.86% and 60.00% of the well in UT of Dadra and Nagar Haveli , Daman and Diu respectively. Map and graph of Depth to Water Level in Unconfined Aquifer (January 2025) shown in Fig.4 and Fig.5 respectively

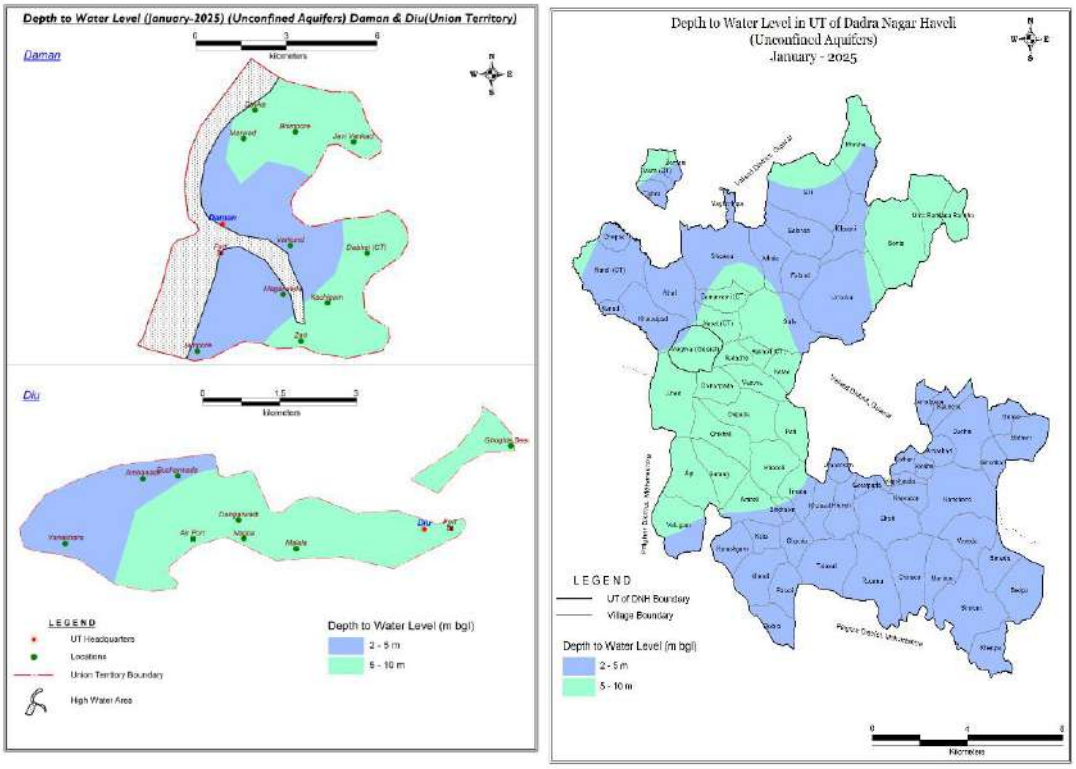

Figure 4 : Depth to Water Level in Unconfined Aquifer (Decadal average of January (2015 to 2024) to January 2025) of UT of DAMAN, DIU & DADRA AND NAGAR HAVELI

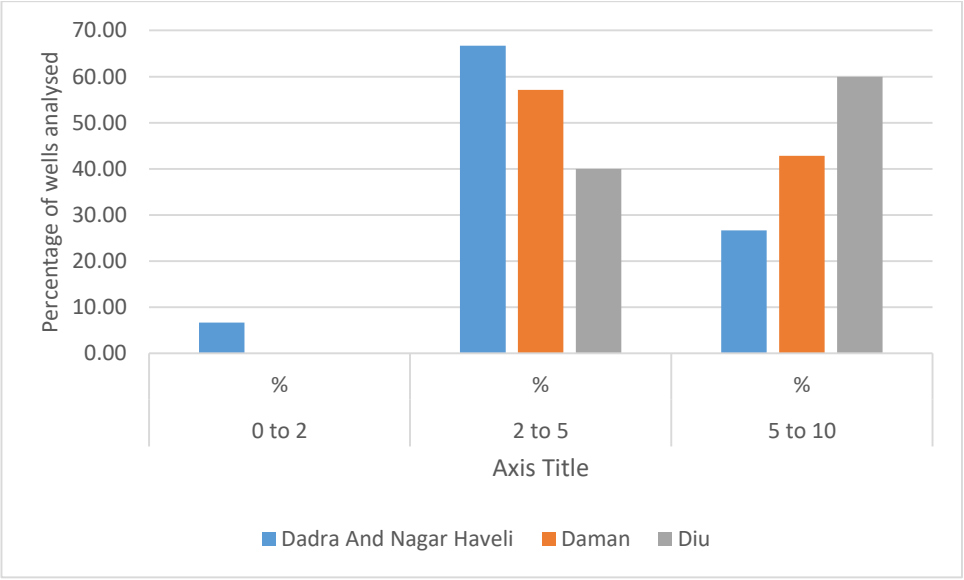

Figure 5: Graph of Depth to Water Level in UT of DAMAN, DIU & DADRA AND NAGAR HAVELI - Unconfined

5.2 2 Seasonal Water Level Fluctuation

Seasonal Water Level Fluctuation (May 2024 to January 2025) – Unconfined aquifer, Ut of Daman, Diu & Dadra and Nagar Haveli

Out of the total well analysed 97.1% of the total wells in UT of Daman and Diu & Dadra and Nagar Havel shows a rise in water level. Rise in water level are observed in the range of 0 to 2 m in 11.4% of wells, 2 to 4 m in 37.1% of well and more than 4m in 48.6% of wells monitored in the Union Territory of Daman and Diu and Dadra and Nagar Haveli. The maximum rise of 11.75m is recorded in Dadra and Nagar Haveli whereas the minimum rise of 1.12 m is recorded in Diu. In UT of Daman only rise in water level is observed in January 2025 as compared to May 2024. Map and graph of Seasonal Water Level Fluctuation (May 2024 to January 2025) - Unconfined Aquifer, UT of Daman, Diu & Dadra and Nagar Haveli shown in Fig.6 and Fig.7 respectively.

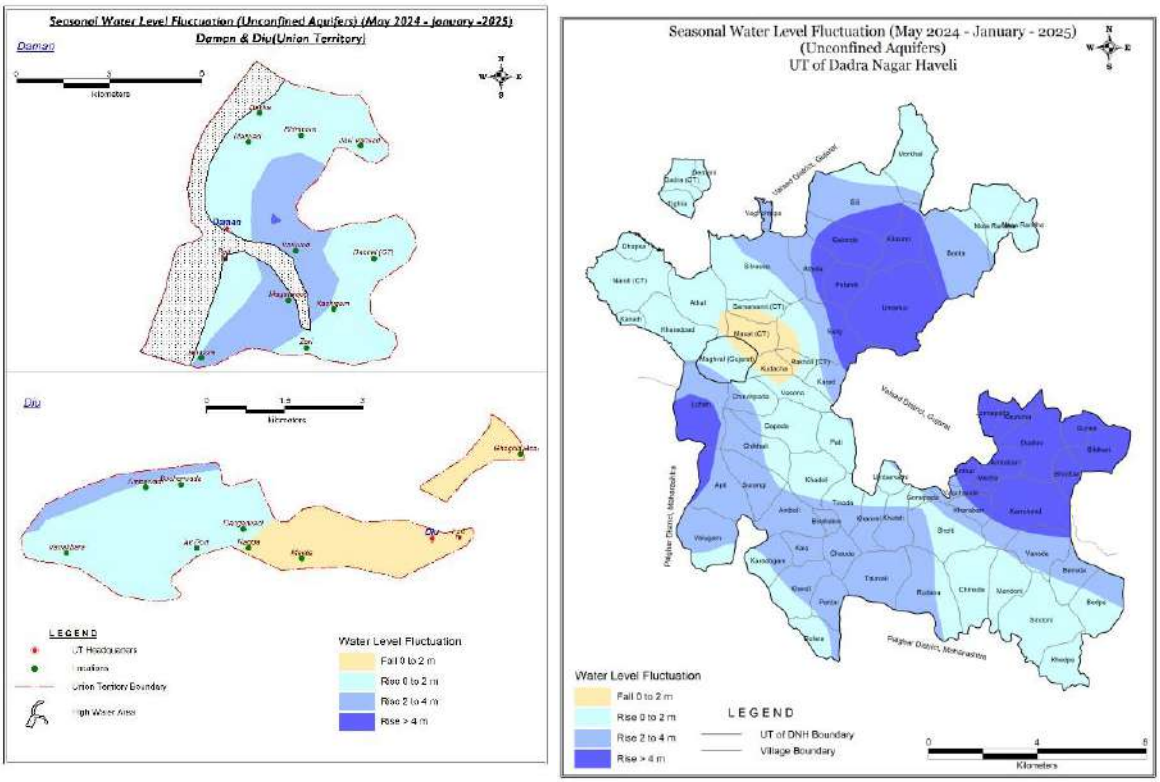

Figure 6: Seasonal Water Level Fluctuation (May 2024 to January 2025)- Unconfined Aquifer, UT of Daman, Diu & Dadra And Nagar Haveli

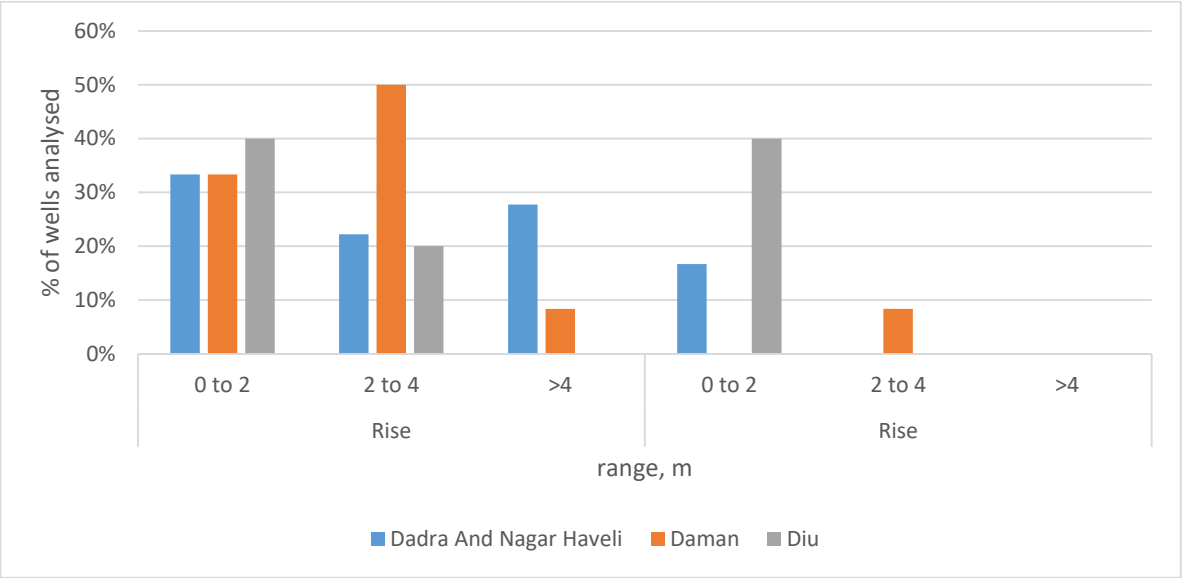

Figure 7: Graph of Seasonal Water Level Fluctuation (May 2024 to January 2025)- Unconfined Aquifer, UT of Daman, Diu & DNH

Seasonal Water Level Fluctuation (August 2024 to January 2025) – Unconfined aquifer, Ut of Daman, Diu & Dadra and Nagar Haveli

Out of the total well analysed 94.1% of the total wells in UT of Daman and Diu & Dadra and Nagar Havel shows a rise in water level. Rise in water level are observed in the range of 0 to 2 m in 32.4% of wells, 2 to 4 m in 41.2% of well and more than 4m in 20.6% of wells monitored in the Union Territory of Daman and Diu and Dadra and Nagar Haveli. The maximum rise of 7.31m is recorded in Dadra and Nagar Haveli and the minimum decline of 4.14 m is recorded in Dadra and Nagar Haveli. In UT of Daman and Diu only rise in water level is observed in January 2025 as compared to August 2024. Map and graph of Seasonal Water Level Fluctuation (August 2024 to January 2025) - Unconfined Aquifer, UT of Daman, Diu & Dadra and Nagar Haveli shown in Fig.8 and Fig.9 respectively

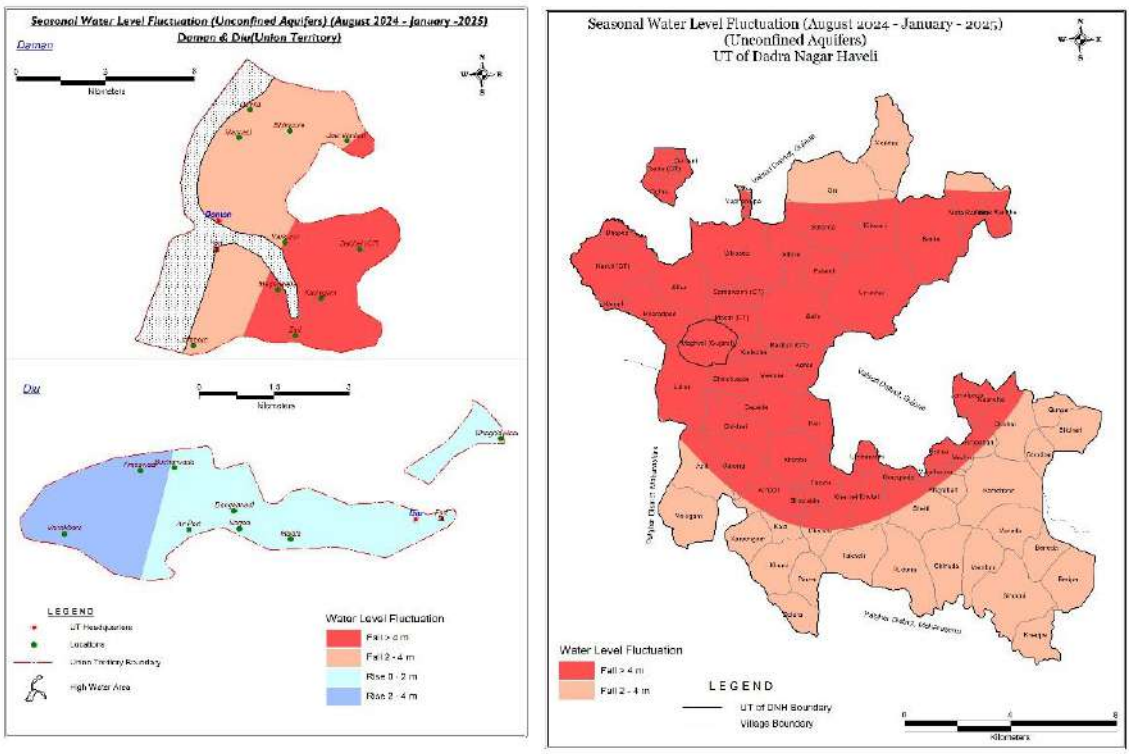

Figure 8 Seasonal Water Level Fluctuation (August 2024 to January 2025) – Unconfined aquifer, UT of DAMAN, DIU & DADRA AND NAGAR HAVELI

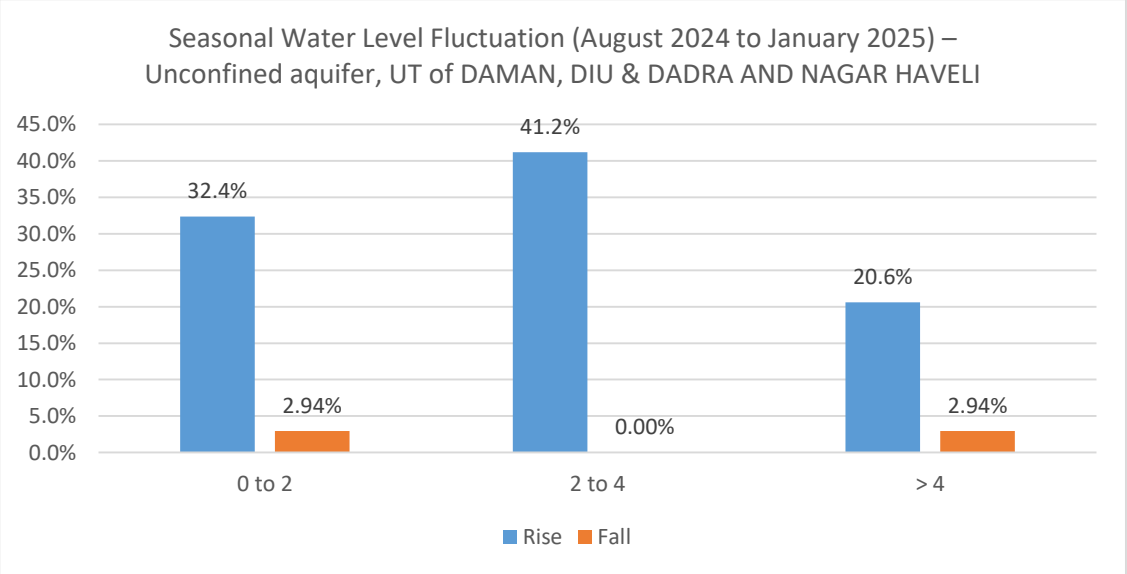

Figure 9 Graph of Seasonal Water Level Fluctuation (August 2024 to January 2025) – Unconfined aquifer, UT of DAMAN, DIU & DADRA AND NAGAR HAVELI

Seasonal Water Level Fluctuation (November 2024 to January 2025) – Unconfined aquifer, UT of Daman, Diu & Dadra and Nagar Haveli

Out of the total well analysed 94.1% of the total wells in UT of Daman and Diu & Dadra and Nagar Havel shows a rise in water level. Rise in water level are observed in the range of 0 to 2 m in 47.1% of wells, 2 to 4 m in 23.5% of well and more than 4m in 23.5% of wells monitored in the Union Territory of Daman and Diu and Dadra and Nagar Haveli. The maximum rise of 6.6 m is recorded in Dadra and Nagar Haveli whereas the minimum rise of 0.27 m is recorded in Diu. In UT of Daman and Diu only rise in water level is observed in January 2025 as compared to November 2024. Map and graph of Seasonal Water Level Fluctuation (November 2024 to January 2025) - Unconfined Aquifer, UT of Daman, Diu & Dadra and Nagar Haveli shown in Fig.10 and Fig.11 respectively

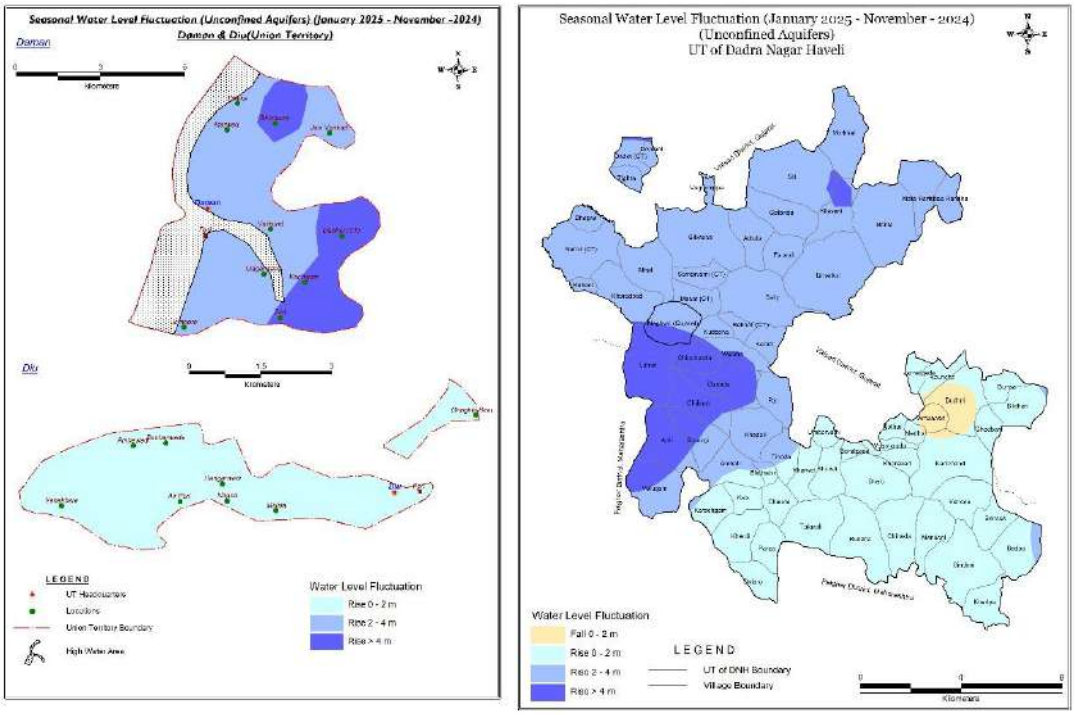

Figure 10 Graph of Seasonal Water Level Fluctuation (November 2024 to January 2025) – Unconfined aquifer, UT of DAMAN, DIU & DADRA AND NAGAR HAVELI

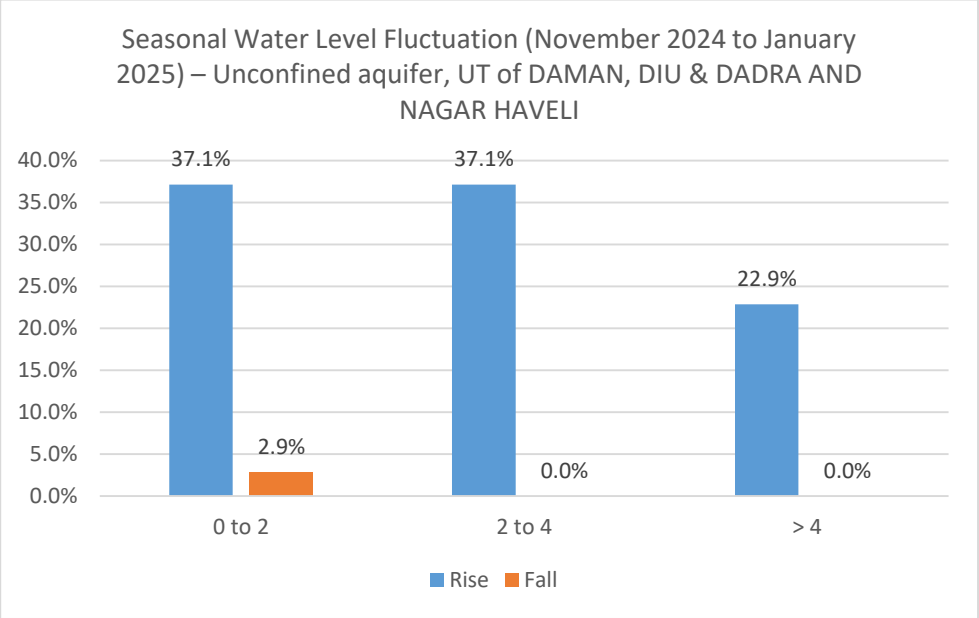

Figure 11 Graph of Seasonal Water Level Fluctuation (November 2024 to January 2025) – Unconfined aquifer, UT of DAMAN, DIU & DADRA AND NAGAR HAVELI

5.1.3 Annual Water Level Fluctuation

Annual Water Level Fluctuation (January 2024 to January 2025) – Unconfined- UT of UT of Daman, Diu & Dadra and Nagar Haveli

Annual Water Level Fluctuation reveals that 71 % of total monitoring well in the UT of DNH shows a rise in water level and fall observed in 29 %. Rise in water level within range of 0 – 2 m is observed in about 70.59 % of wells, Fall in the range of 0 – 2 m experienced by 29.41% of wells. 93 % of total monitoring well in the UT of Daman shows a rise in water level and fall observed in 7 %. Rise in water level within range of 0 – 2 m is observed in about 70.59 % of wells, 2 to 4 m in 17.2% wells and 3.4% of wells showing rise greater than 4 m. Fall in the range of 0 – 2 m experienced by 20.7% of wells. 50 % of total monitoring well in the UT of Daman shows a rise in water level and fall observed in 50 %. Rise in water level within range of 0 – 2 m is observed in about 70.59 % of wells, 2 to 4 m in 17.2% wells and 3.4% of wells showing rise greater than 4 m. Fall in the range of 0 – 2 m experienced by 20.7% of wells.

In the UT, rise in water level range from 0.00 to 1.59 m in DNH; 0.16 to 4.91 in Daman whereas in Diu 0.05 to 0.34 m. Fall in water level range from 0.14 to 0.28 m in Diu and 0.02 to 1.74 m in DNH.

Map and graph of Annual Water Level Fluctuation (January 2024 to January 2025)- Unconfined of UT of Daman, Diu & Dadra And Nagar Haveli shown in Fig.12 and Fig.13 respectively.

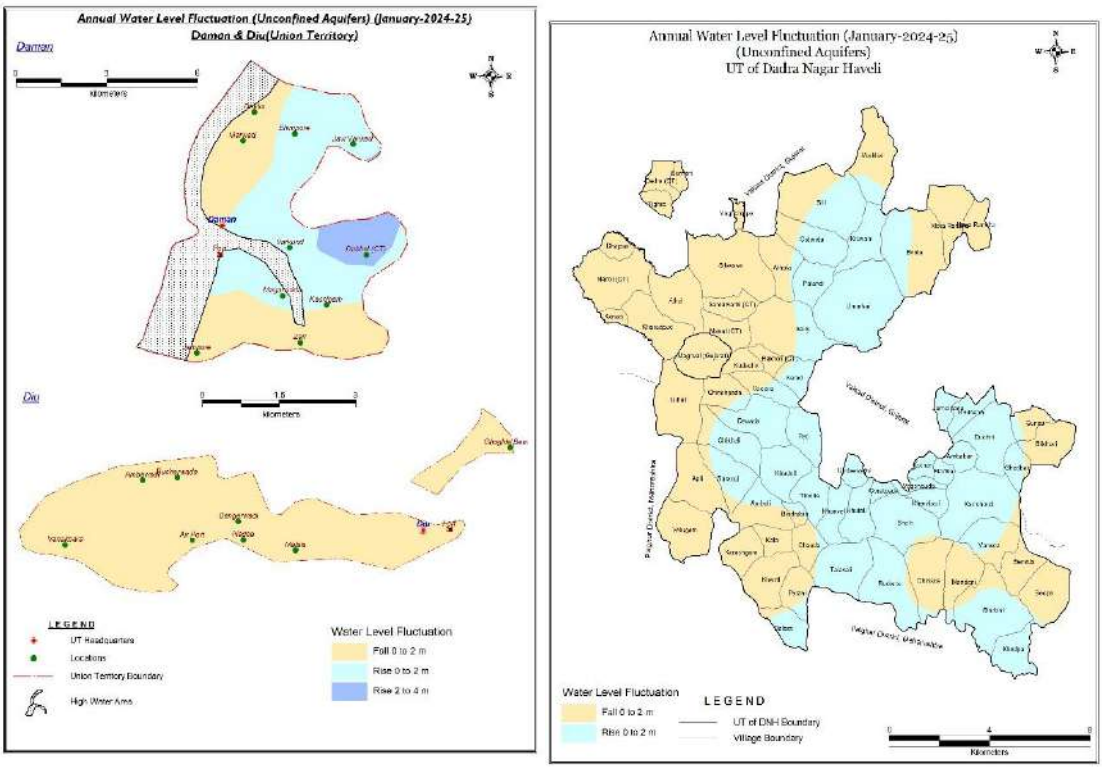

Figure 12: Annual Water Level Fluctuation (January 2024 to January 2025)- Unconfined of UT of Daman, Diu & Dadra And Nagar Haveli

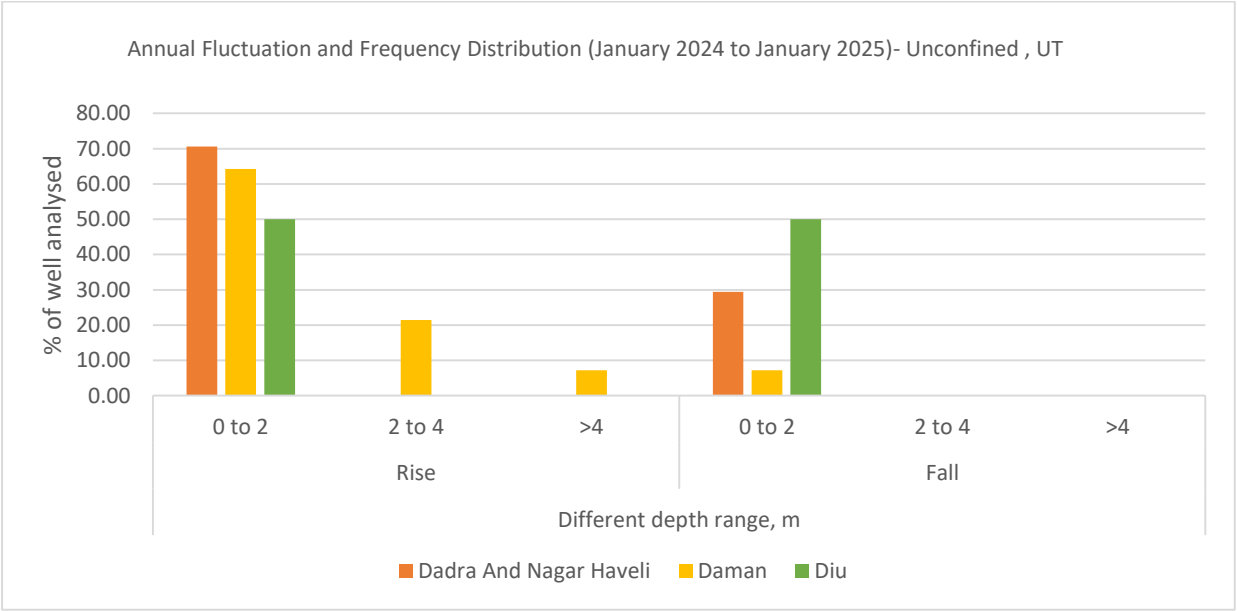

Figure 13: Graph of Annual Water Level Fluctuation (January 2024 to January 2025)- Unconfined Aquifer of UT of Daman, Diu & Dadra And Nagar Haveli

Annual Water Level Fluctuation (January 2023 to January 2025) – Unconfined- UT of UT of Daman, Diu & Dadra and Nagar Haveli

Annual Water Level Fluctuation reveals that 59.3 % of total monitoring well in the UT of DNH shows a rise in water level and fall observed in 40.7 %. Rise in water level within range of 0 – 2 m is observed in about 51.9 % of wells, fall in the range of 0 – 2 m experienced by 40.7% of wells. 60 % of total monitoring well in the UT of Daman shows a rise in water level and fall observed in 40 %. Rise and fall in water level is mostly in the range range of 0 – 2 m. 66.7 % of total monitoring well in the UT of Diu shows a rise in water level and fall observed in 33.3 %. 57.1 % of total monitoring well in the UT of DNH shows a rise in water level and fall observed in 42.9 %.

In the UT, rise in water level range from 0.07 to 3.66 m in DNH; 0.03 to 2.72 in Daman whereas in Diu 0.08 to 0.61 m. Fall in water level range from 0.15 to 1.7 m in Daman and 0.21 to 1.43 m in DNH.

Map and graph of Annual Water Level Fluctuation (January 2023 to January 2025)- Unconfined of UT of Daman, Diu & Dadra and Nagar Haveli shown in Fig.14 and Fig.15 respectively.

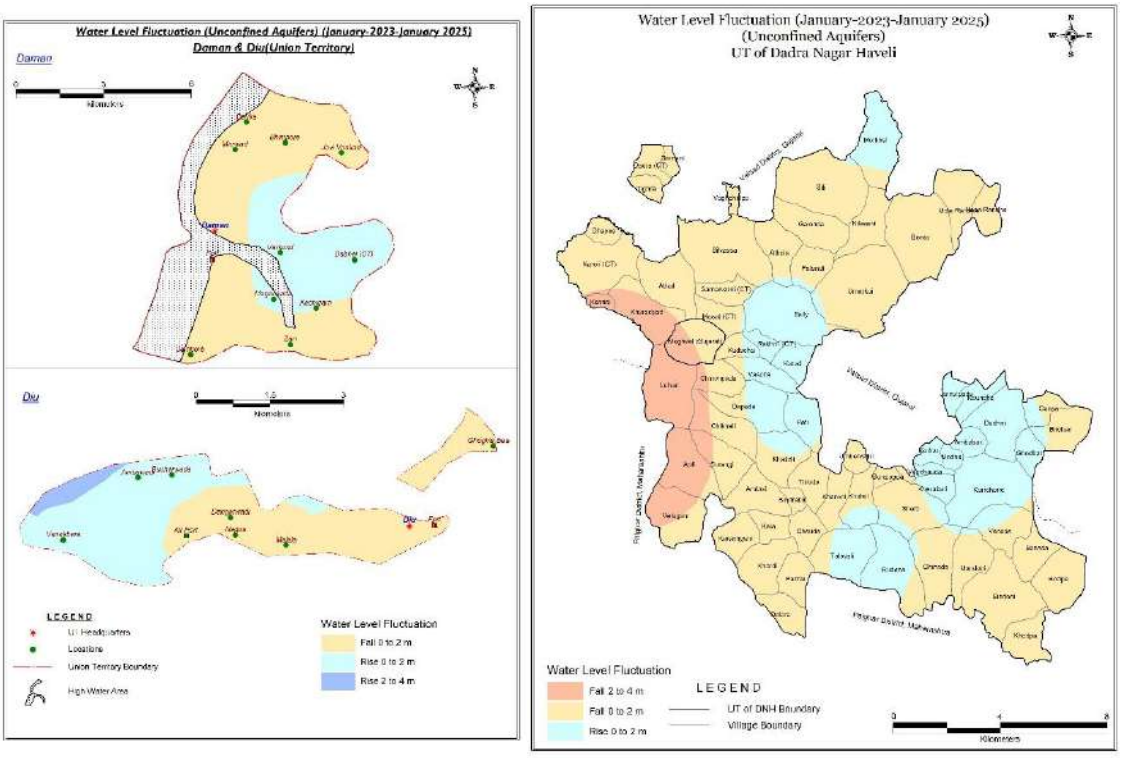

Figure 14: Annual Water Level Fluctuation (January 2023 to January 2025)- Unconfined of UT of Daman, Diu & Dadra And Nagar Haveli

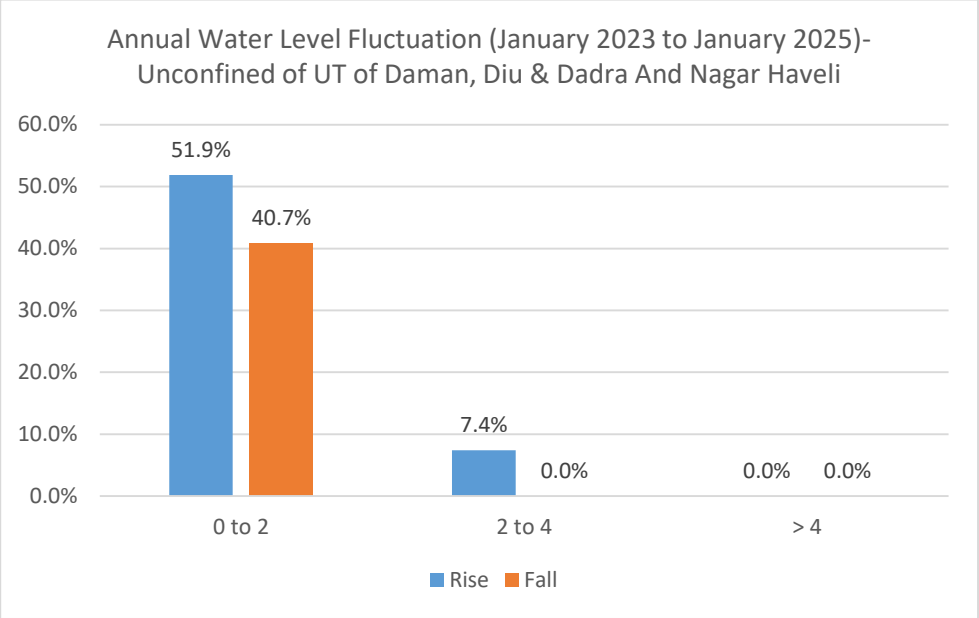

Figure 15: Graph of Annual Water Level Fluctuation (January 2024 to January 2025)- Unconfined Aquifer of UT of Daman, Diu & Dadra And Nagar Haveli

5.2.4 Decadal Fluctuation in Water Level

Decadal Fluctuation in Unconfined Aquifer (Decadal average of January (2015-24) to January 2025) - UT of UT of Daman, Diu & Dadra and Nagar Haveli

A comparison of the water level of the January 2025 with the average water level of the January for last one decade (2015-24) reveals that there is a rise in (45% of well analysed) and fall in 54% of well analysed. Rise of 42.4% of well show in the range of 0 – 2 m and 3% shows in range of 2- 4 m. Fall is 51.5% in the range of 0 to 2 m. The maximum rise of 2.19 m is recorded in Dadra and Nagar Haveli whereas the maximum decline of 2.06 m is recorded in Daman.

Map and graph of Decadal Fluctuation in Unconfined Aquifer (Decadal average of January (2015-24) to January 2025) of UT of Daman, Diu & Dadra and Nagar Haveli shown in Fig.16 and Fig.17 respectively.

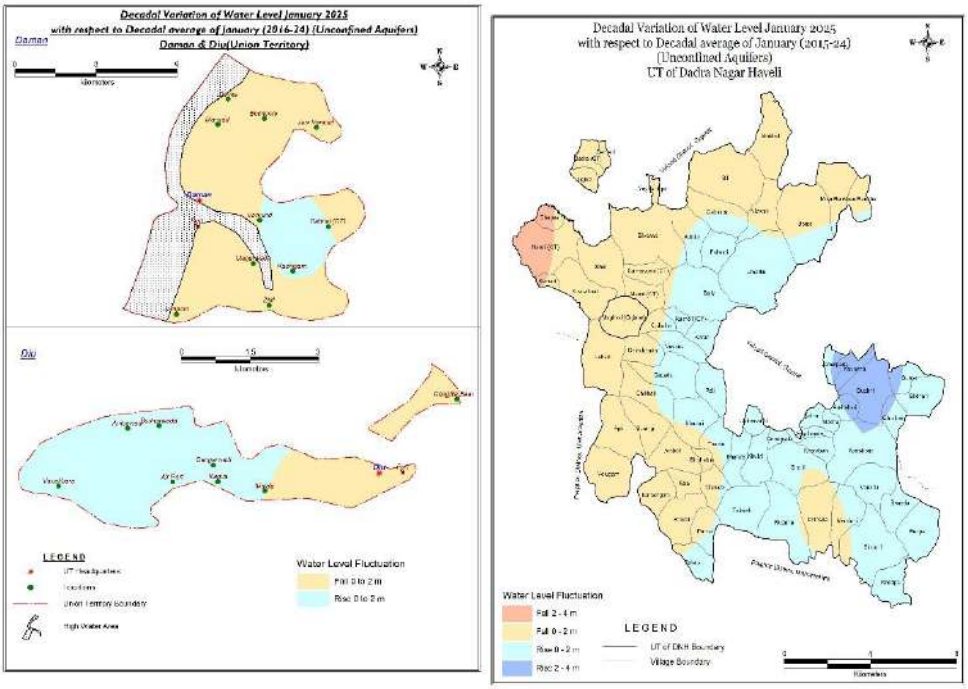

Figure 16: Decadal Fluctuation in Unconfined Aquifer (Decadal average of January (2015 to 2024) to January 2025) of UT of DAMAN, DIU & DNH

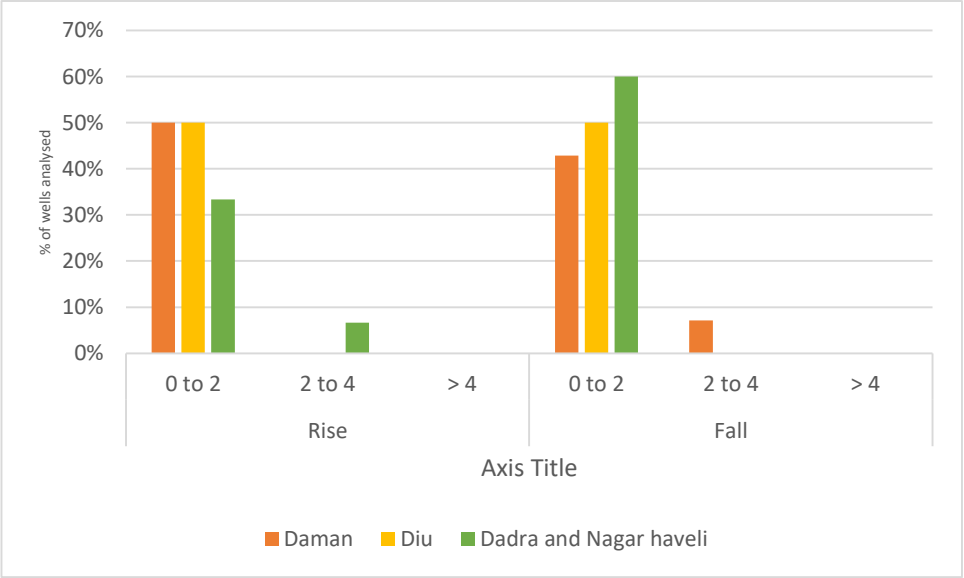

Figure 17: Graph showing Decadal Fluctuation in Unconfined Aquifer (Decadal average of January (2015 to 2024) to January 2025) of UT of Daman, Diu & DNH

Summary

In January 2025, In unconfined aquifer, Water level of ranges from ranges of 0 to 2 mbgl, 2 to 5 mbgl water level are observed in 66%, 57% and 40% and 5 to 10 mbgl water level are observed in 26.67 %, 42.86% and 60.00% of the well in UT of Dadra and Nagar Haveli , Daman and Diu respectively. The water level in the UT of Daman barely increased in January 2025 compared to May 2024. Dadra and Nagar Haveli has the highest recorded climb of 7.31 meters and the lowest recorded decrease of 4.14 meters. Dadra and Nagar Haveli has the highest recorded climb of 7.31 meters and the lowest recorded decrease of 4.14 meters. Only a rise in water level was noted in the UT of Daman and Diu between January 2025 and August 2024. Dadra and Nagar Haveli record the highest elevation of 6.6 meters, while Diu has the lowest rise of 0.27 meters. Only in January 2025, as opposed to November 2024, is there an increase in the water level in the UT of Daman and Diu. Water levels in the UT have risen from January 2024 by 0.00 to 1.59 meters in DNH, 0.16 to 4.91 meters in Daman, and 0.05 to 0.34 meters in Diu. Water level drops in Diu and DNH vary from 0.14 to 0.28 meters and 0.02 to 1.74 meters, respectively. Decadal variation Dadra and Nagar Haveli have the highest climb of 2.19 meters, while Daman records the highest decrease of 2.06 meters.

Recommendation:

Decline in groundwater levels warrants immediate attention for taking-up of recharge schemes to arrest further declines and augment the groundwater resources. Pointed attention of the administrators and policy makers is drawn towards adoption of artificial recharge, public awareness and other appropriate measures for ensuring adequate groundwater availability and sustainability.