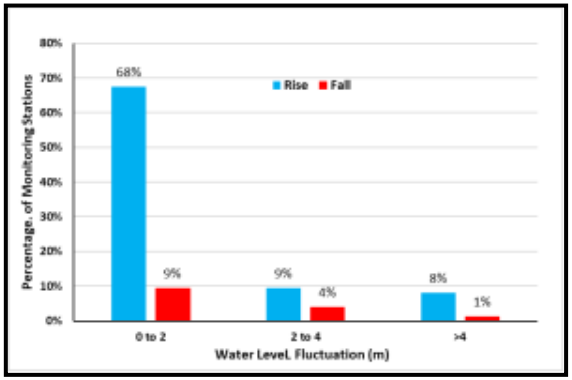

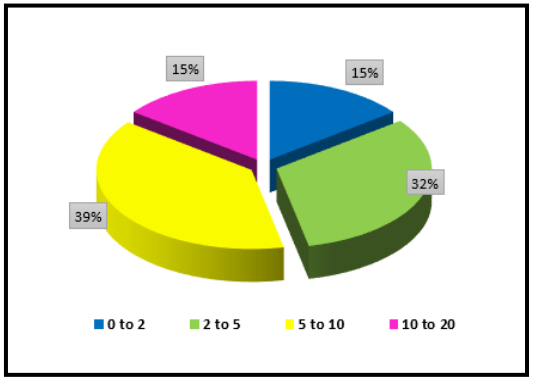

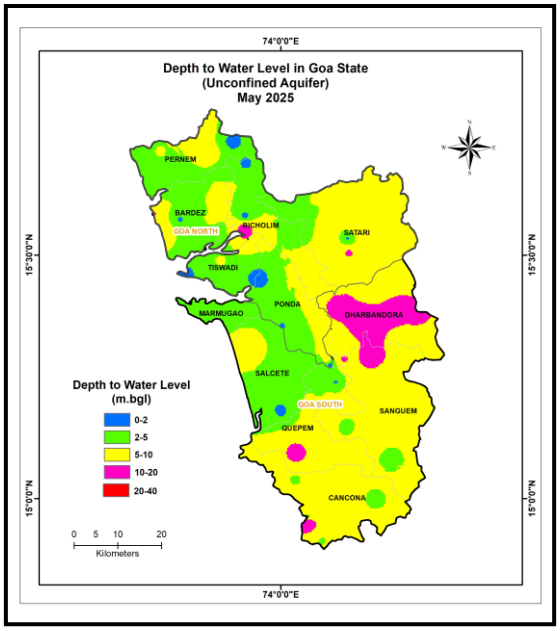

GROUND WATER LEVEL BULLETIN
MAY 2025 - GOA STATE

ABSTRACT

This report presents the groundwater level scenario for the state of Goa during the pre-monsoon period of May 2025. The analysis is based on data collected from a network of 123 monitoring wells, comprising 75 dug wells and 48 piezometers, spread across North and South Goa districts. The depth to water level in the unconfined aquifer predominantly ranges from 2 to 10 meters below ground level (mbgl), accounting for 70% of the monitored wells.

Major part of the Goa state (85% of wells) shows a rise in water level when compared to the May 2024 & May 2025. Similarly, a comparison with the decadal mean water level (2015-2024) indicates rise in 69% of the wells, suggesting a positive trend in groundwater storage in recent years. The report also provides recommendations for sustainable groundwater management, including rainwater harvesting, and promoting water conservation practices to address localized areas of water level decline and ensure long-term water security.

Central Ground Water Board,
South Western Region, Bangalore

GROUND WATER LEVEL BULLETIN MAY 2025 - GOA STATE

CONTENTS

Maps & Tables list:

1. INTRODUCTION:

The groundwater bulletin is a periodical publication by the Central Ground Water Board (CGWB) that depicts the changing groundwater regime of the Goa State across different seasons. It is an effort to obtain critical information on groundwater levels through a network of representative monitoring wells. The groundwater regime is influenced by natural climatic parameters like rainfall and evapotranspiration, as well as anthropogenic factors such as groundwater extraction for various uses, recharge from irrigation systems, and water conservation practices. The CGWB has been monitoring groundwater levels since 1970. Measurements are taken four times a year: January, May (Pre-Monsoon), August, and November (Post-Monsoon). As on March 2025, the National Hydrograph Network Stations (NHNS) in Goa consists of 135 observation wells, which are monitored to assess the state's groundwater regime.

2. STUDY AREA

Goa, with a total geographical area of 3,702 sq. km, is administratively divided into two districts (North Goa and South Goa) and 12 taluks. In recent years, groundwater has become a vital resource to meet the increasing water demands of the state's tourism, domestic, and industrial sectors.

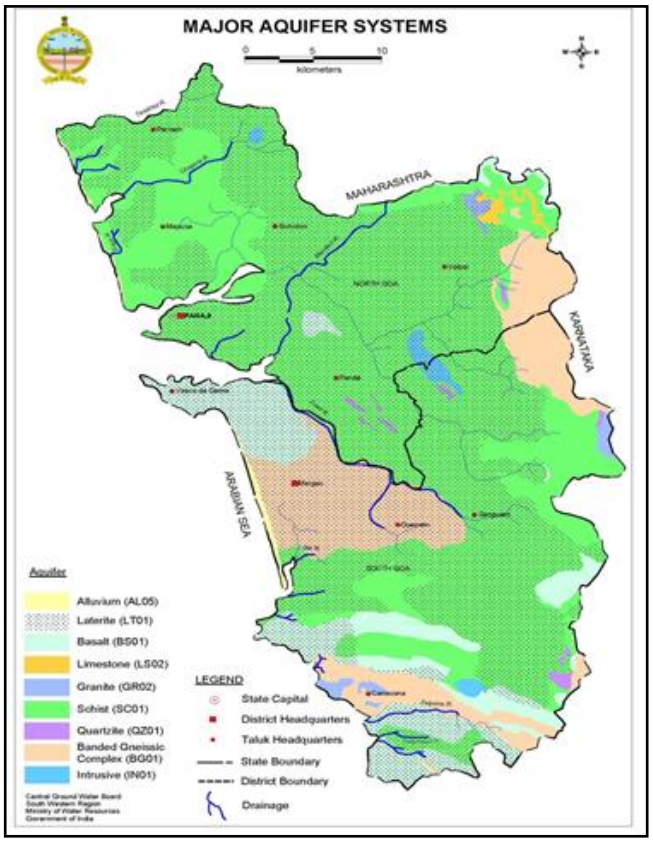

Figure 1: Map showing major aquifers and administrative divisions of the state/study area

Goa state is dominantly covered by the formations of the Goa group belonging to Dharwad Super Group of Archaean to Proterozoic age, except for a narrow strip along the north eastern corner occupied by Deccan Trap of Upper Cretaceous to Lower Eocene age. The Goa

group is consisting of green schist facies of the metamorphic rocks and is divided in to Barcem, Sanvordem, Bicholim and Vageri formations in the ascending order of super position. The Goa groups of rocks have been intruded by granite gneiss, feldspathic gneiss, hornblende gneiss and porphyritic granite, followed by basic intrusive. During The Sub-Recent and Recent times the rocks have been subjected to lateritisation of varying thickness. Coastal alluvium occurring along the coastal planes consists of fine to coarse sands with intercalations of sandy loam, silt and clay.Ground water bearing formations in Goa state are alluvium, laterite, granite and granite gneiss, meta-volcanics and sedimentaries.

3. GROUND WATER LEVEL MONITORING

The Central Ground Water Board, South Western Region, continuously monitors the groundwater regime in Goa on a quarterly basis. The established network comprises 135 monitoring stations (81 dug wells (DW) and 54 piezometers(PZ)) located in diverse hydrogeological units.

For the pre-monsoon period of May 2025, groundwater levels were monitored in 123 of these stations. The monitored network included 75 dug wells and 48 piezometers. The remaining stations were not monitored due to being inaccessible or having gone dry. The district-wise breakup of the water level monitoring stations is given in Table-1.

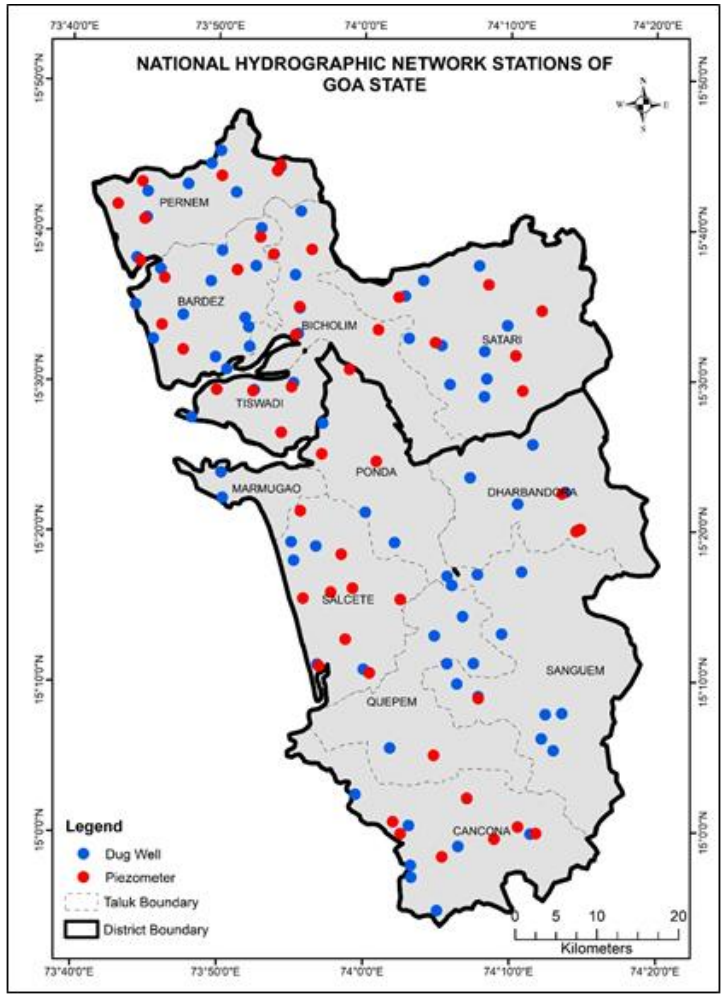

Figure. 2 Map showing locations of monitoring wells (NHNS) in the state/study area

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

	Monitoring Stations			Stations monitored May 2025		
District	DW	PZ	Total	DW	PZ	Total
North Goa	40	32	72	38	23	61
South Goa	41	22	63	37	25	62
Total	**81**	**54**	**135**	**75**	**48**	**123**

4. RAINFALL AND CLIMATE

The state has a tropical-maritime monsoonal type climate with distinct aerographic influence. Due to proximity to the Arabian Sea humidity throughout the year is more than 60% and it ranges from 80 to 90% during monsoon period. Rain occurs during the South West monsoon period from June to September (almost 90% of annual rainfall). As a result of orographic influence rainfall increases towards the Western Ghats from the coast. The normal annual rainfall for entire Goa State is 3367.86 mm.

5. GROUND WATER LEVEL SCENARIO

5.1. Unconfined Aquifer

5.1.1 Depth to Water Level Scenario in Goa State during May 25.

An analysis of the water level data from 75 monitored wells reveals the following salient features for May 2025:

- The depth to water level ranged from a minimum of **0.94 meters below ground level (mbgl)** in Karanjhalen village, Tiswadi taluk, to a maximum of **15.15 mbgl** in Daptamol Lolien, Canacona taluk.
- The depth to water level over major part of the State lies within 10 m bgl i.e. **85%** of wells analysed, while **15%** of wells show depth to water level in the 10-20 m bgl range.
- Depth to water level of less than 2 m bgl has been recorded in **15%** of wells analysed and noted in Bardez, Bicholim, Pernem, Ponda, Quepem, Salcete, and Tiswad taluks.
- Depth to water level in the range of 2 to 5 m bgl has been recorded in 32% of wells analyzed, and in the range of 5 to 10 m bgl in 39% of wells and with both categories being noted in all taluks.

- Depth to water level in the range of 10 to 20 m bgl has been observed in **15%** of wells analysed and noted in Bicholim, Bardez, Canacona, Satari and Sangeum taluks.

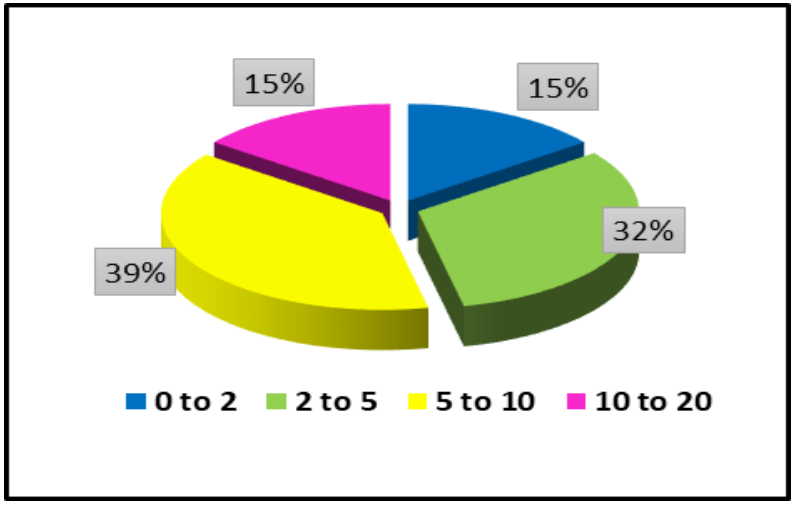

Figure 3: Percentage of wells in different water level ranges in an unconfined aquifer.

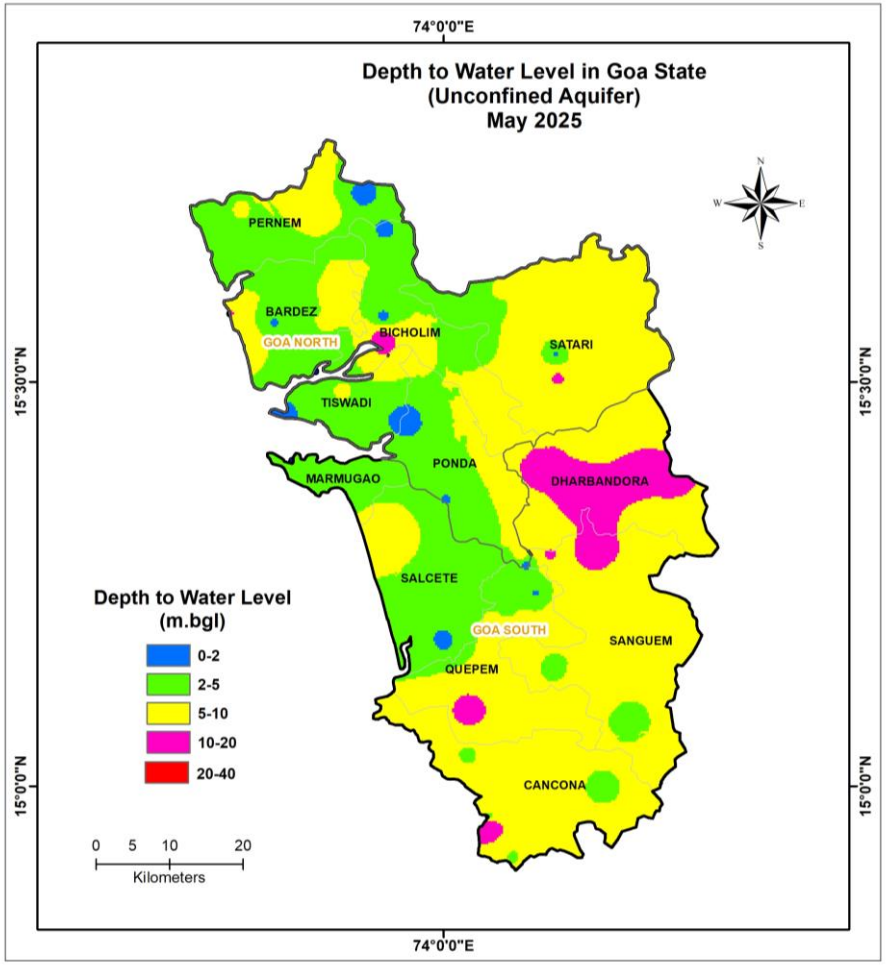

Figure 4: Depth to water level of unconfined aquifer during Pre-monsoon 2025

5.1.2 Annual Fluctuation in Water level

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

A comparison of water levels between Pre-monsoon 2024 and Pre-monsoon 2025 shows a rise in 85% of analyzed wells and a fall in the remaining 15%. This percentage-based distribution is presented graphically in Figure 5. The corresponding annual fluctuation in the shallow aquifer's water level is spatially plotted in Figure 6.

- Rise in the water level in the range of 0-2 m has been observed in **68%** of wells analysed and observed in all the taluks. Rise in the water level in the range of 2-4 m has been observed in **9%** of wells analysed in Berdez, Canacona, Pernem, Ponda, Salcete, and Sanguem taluks. Rise in the water level in the range of >4 m has been observed in **8%** of wells analysed and observed in Bardez, Canacona, Pernem, Ponda, Salcete, and Sanguem taluks.
- Fall in the water level in the range of 0-2 m has been observed in 9% of wells analysed and observed in Bardez, Canacona, Dharbondora, Pernem, and Sattari taluks. Fall in the water level in the range of 2-4 m has been observed in **4%** of wells analysed and observed Dharbondora and Ponda taluks.

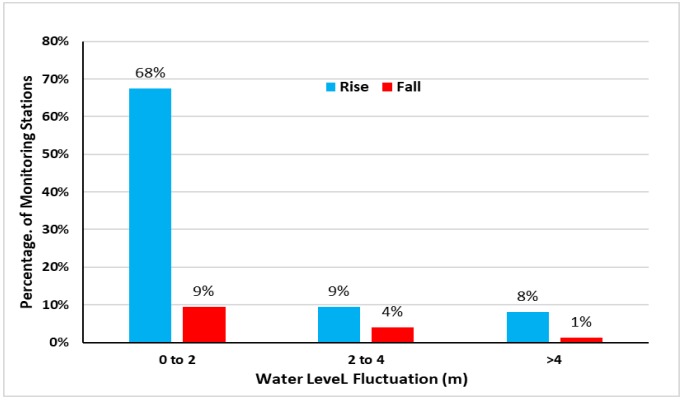

Figure 5: Percentage of wells showing rise and fall in WL in an unconfined aquifer. (Pre-monsoon 2024 to Pre-monsoon 2025)

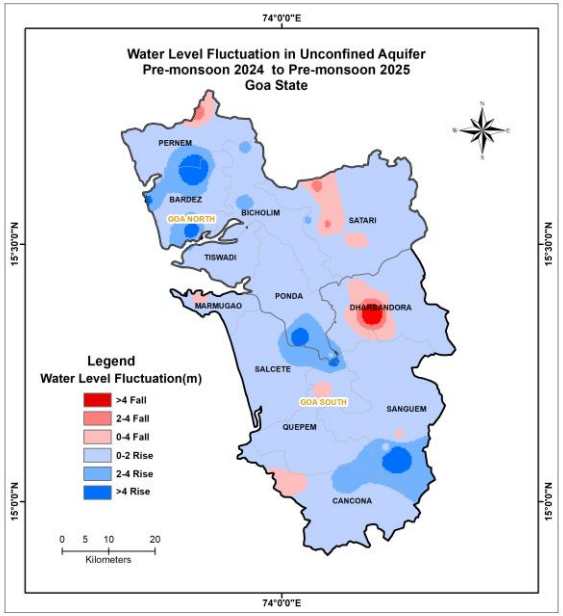

Figure 6: Annual water level fluctuation in unconfined aquifer (Pre-monsoon 2024 to Pre-monsoon 2025)

5.2.2 Annual Fluctuation of Water Level in Unconfined Aquifer (Pre-monsoon 2023 to Pre-monsoon 2025)

A comparison of water level between Pre-monsoon 2023 and Pre-monsoon 2025 shows that a rise in the water level is recorded in **86%** of wells analyzed & fall of water level recorded in **14%** of wells analysed. This percentage-based distribution is presented graphically in Figure 7. The corresponding annual fluctuation in the shallow aquifer's water level is spatially plotted in Figure 8.

- Rise in the water level in the range of 0-2 m has been observed in 68% of wells analysed and observed in all the taluks. Rise in the water level in the range of 2-4 m has been observed in 11% of wells in Bardez, Bicholim, Pernem, Ponda, Salcete, and Sanguem taluks. Rise in the water level in the range of >4 m has been observed in 7% of wells in Bardez, Canacona, Ponda, Pernem, Salcete, and Sanguem taluks.
- Fall in the water level in the range of 0-2 m has been observed in 7% of wells analysed and observed in Bardez, Canacona, Dharbondora, Pernem, Salcete, Sattari, and Tiswadi taluks. Fall in the water level in the range of 2-4 m has been observed in 4% of wells in Bardez, Dharbondora, Pernem, and Sattari taluks. Fall >4 m has been observed in 3% of wells analysed and observed in Dharbondora taluks.

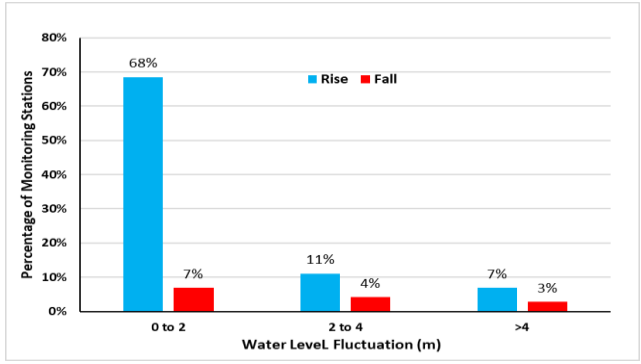

Figure 7: Percentage of wells showing rise and fall in WL in an unconfined aquifer. (Pre-monsoon 2023 to Pre-monsoon 2025)

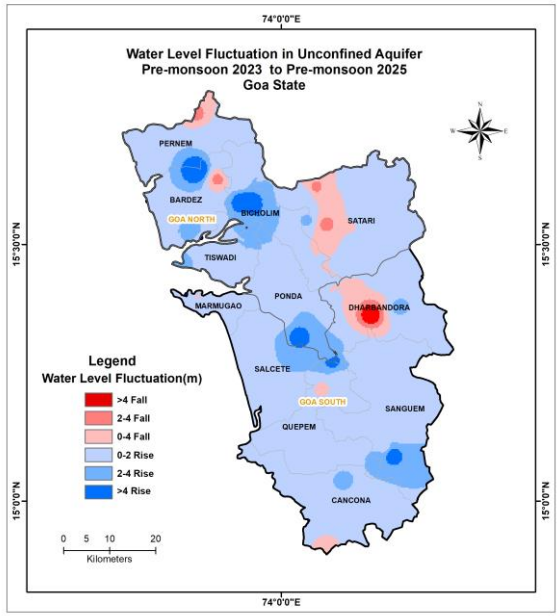

Figure 8: Annual water level fluctuation in unconfined aquifer (Pre-monsoon 2023 to Pre-monsoon 2025)

5.1.3 Decadal Fluctuation in Water Level

Decadal Fluctuation of Water Level in Unconfined Aquifer (Decadal Mean Pre-monsoon (2015-2024) to Pre-monsoon 2025)

A comparison of May 2025 water levels with the decadal average (2015-2024) shows that a rise in the water level is recorded in **69%** of wells analysed & fall of water level recorded in **31%** of wells analyzed. This percentage-based distribution is presented graphically in Figure 9. The corresponding annual fluctuation in the shallow aquifer's water level is spatially plotted in Figure 10.

- Rise in the water level in the range of 0-2 m has been observed in 56% of wells in all the taluks. Rise in the water level in the range of 2-4 m has been observed in 7% of wells in Bardez, Pernem, Canacona, Salcete and Quepem talukBardez, Canacona, Pernem, Quepem, and Salcete taluks. Rise in the water level in the range of >4 m has been observed in 7% of wells in Bardez, Canacona, Pernem, and Sanguem taluks.
- Fall in the water level in the range of 0-2 m has been observed in 24% of wells in Bardez, Canacona, Dharbandora, Pernem, Salcete, Sattari, and Tiswadi taluks. Fall in the water level in the range of 2-4 m has been observed in 3% of wells in Dharbondora, Pernem, and Sattari taluks. Fall >4 m has been observed in 4% of wells analysed and observed in Dharbondora and Sattari taluks.

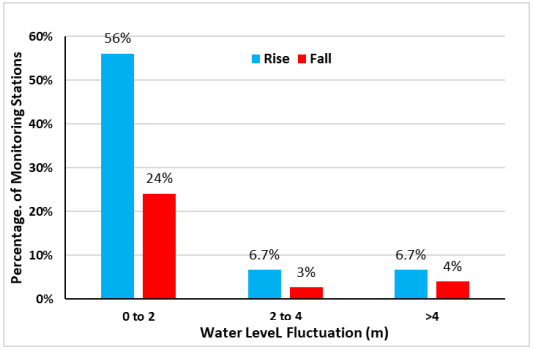

Figure 9: Percentage of wells showing rise and fall in WL in unconfined Aquifer (Decadal Mean Pre-monsoon (2015-2024) to Pre-monsoon 2025)

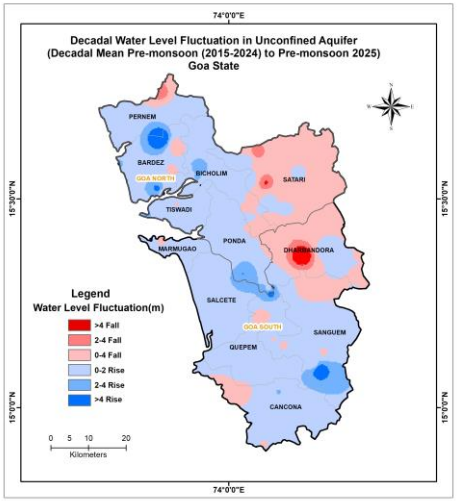

Figure 10: Decadal water level fluctuation in unconfined Aquifer (Decadal Mean Pre-monsoon (2015-2024) to Pre-monsoon 2025)

6. SUMMARY

Depth to Water Level in Unconfined Aquifer: The water level in the unconfined aquifer is largely within 10 meters of the surface, with 70% of wells falling in the 2-10 m bgl range. Deeper water levels (>10 m bgl) are localized in specific taluks like Bicholim, Canacona, and Satari.

Annual Fluctuation in Unconfined Aquifer: Compared to the previous year (May 2024), majority of wells (85%) show a rise in water levels, indicating good recharge during the preceding year. A similar trend (86% rise) is observed when comparing with May 2023.

Decadal Fluctuation in Unconfined Aquifer: Water level of May 2025 when compared to the decadal pre-monsoon average (2015-2024), 69% of the wells show a rise in water levels. This suggests that over the last decade, groundwater recharge has generally outpaced extraction. However, about 31% of wells show a falling trend, concentrated in parts of Sattari, Dharbandora, Pernem, and Bardez, highlighting areas that required focused management interventions.

7. RECOMMENDATIONS

In order to enhance the groundwater scenario of Goa state utmost effort should be made to harvest the rainwater received during monsoon days and use it for artificial recharge. Periodic maintenance of the structures is also recommended to maintain the efficiency of the structure. Abandoned bore wells/dug well / Mine pits can be used to recharge the aquifer utilizing the surplus surface runoff available during rainy days. Master plan for artificial recharge of Goa as well as NAQUIM reports of CGWB help in selecting sites for artificial recharge structures.

- Spring-shed development should be taken up for developing the springs.
- Point recharge structures are recommended to recharge deeper aquifers
- Efficient micro irrigation practices can save up-to 40% of water
- Sea water ingression should be arrested.
- Use of Grey water after treatment, opting for water efficient fixtures and low flow plumbing fixtures reduce the stress on groundwater. Low flow technology is normally used in faucets, aerator, shower heads and toilets.