CENTRAL GROUND WATER BOARD
DEPARTMENT OF WR, RD & GR
MINISTRY OF JAL SHAKTI
GOVERNMENT OF INDIA

BHUJAL SAMVAD

JULY TO DEC, 2023, VOL.22-23

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MESSAGE

It gives me immense pleasure to introduce this new volume of Bhujal Samvad, a special issue on "Jal Shakti Abhiyan 2023" with a Theme "Source Sustainability for Drinking water" launched by Hon'ble President of India during March 2023.

The Officers of Central Ground Water Board participated in the JSA campaign whole heartedly and visited the allotted districts twice during the year for providing technical inputs to the district administration for development and augmentation of the existing water sources in order to ensure potable drinking water to the people of 150 water stressed districts of the country.

Its a matter of pride for entire CGWB Family that RGNGWTRI, Raipur is accredited as अति उत्तम under the Capacity Building Commission's National Standards as assessed by the National Accreditation Board of Education and Training on eight pillars of capacity building. We have covered this in our In Focus section.

A special Report on "Adaptation of Ancient Wisdom for Artificial Recharge of Ground Water through Pond: A Case Study" is also a part of this Issue. Research publications of CGWB officers in reputed International journals are listed with abstracts in 'Shodh' section.

Bhujal Samvad is constantly evolving ! In this issue of Bhujal Samvad, in addition to regular sections, we have added a new section "Bhujal Samvad Talk Series", wherein a brief overview of the insightful talks delivered will be produced in every issue.

Thoughts and feedback of the avid readers are most welcome to make the Bhujal Samvad a success. Please email us or post your feedbacks on our social media pages.

For more information or to contribute to the Bhujal Samvad's success, the contact email provided is **mediacell-cgwb@nic.in**. This publication aims to raise awareness and promote sustainable groundwater management practices in India.

We are eager to hear from You !

भूजल संवाद

The Quarterly Magazine of
Central Ground Water Board
Dept. of Water Resources,
River Development and
Ganga Rejuvenation,
Ministry of Jal Shakti,
Government of India

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CONTENTS

IN FOCUS

National Compilation on Dynamic Ground Water Resources of India 2023, released by Sh. Gajendra Singh Shekhawat Ji, Hon'ble Minister of Jal Shakti.

RGNGWTRI, Raipur is accredited as **अति उत्तम** under the Capacity Building Commission's National Standards as assessed by the National Accreditation Board of Education and Training on eight pillars of capacity building.

संसदीय राजभाषा समिति की दूसरी उप-समिति द्वारा केंद्रीय भूमि जल बोर्ड, राज्य एकक कार्यालय, बेलगावी का निरीक्षण माननीय प्रो. रीता बहुगुणा जोशी जी की अध्यक्षता में सफलतापूर्वक संपन्न हुई।

CGWB signed MoU with Brahmkumari Ishwariya Vishwavidyalaya for groundwater conservation.

Meeting of the Central Level Expert Group (CLEG) for re-assessment of the Ground Water Resources of India for 2023 was held under the Chairmanship of Shri Satish Kumar, Chairman, Central Ground Water Board on 27.09.2023. The Members of CLEG approved the Ground Water Resource Assessment -2023 of India.

Dr. S. K. Ambast assumed charge of Chairman, Central Ground Water Board on 25.10.2023.

CGWB, Bhubaneswar organised a PIP on Ground Water Conservation under the banner Lifestyle for Environment at Chhancha village, Mayurbhanj district, Odisha. Sh. Bishweswar Tudu, Hon'ble MoS, Jal Shakti and Tribal Affairs, has graced the occasion as chief guest

Midterm review workshop on NAQUIM 2.0 studies pertaining to water quality / Mining / Industrial / Coastal studies organized at CGWB, SWR, Bangalore.

CGWB, SUO Delhi on behalf of DoWR, RD & GR participated in "9th Vibrant India 2023" exhibition, organized at Dilli Haat, Pitampura. Dr. S K Ambast, Chairman, CGWB, visited stall.

MoU signed between CGWB and CWC on Water Quality Analysis at Ministry of Jal Shakti.

COVER STORY

Background

During 2019, Department of Drinking Water and Sanitation, Ministry of Jal Shakti launched Jal Shakti Abhiyan (JSA), covering 1592 blocks in 256 water stressed districts of the country, in two phases, as a time bound campaign intended to improve water availability in these blocks.

After its successful implementation of Jal Shakti Abhiyan in 2019, the Ministry of Jal Shakti planned to take up the Jal Shakti Abhiyan-II , covering all blocks of all districts of the country but could not be taken up due to Covid 19 pandemic restrictions. However, to keep its continuity, a campaign, "Catch the Rain" with the tagline "Catch the Rain – where it falls when it falls" was started by National Water Mission in March 2020. It primarily focused on government/private institutions.

Jal Shakti Abhiyan 2023

On account of the success of Jal Shakti Abhiyans of 2019, 2021 and 2022 in generating awareness on Water Conservation amongst the citizens of the country, it was proposed to take up "Jal Shakti Abhiyan: Catch the Rain"- 2023 (JSA:CTR 2023) campaign in the country with the main theme **"Source Sustainability for Drinking Water".** The campaign was launched by Hon'ble President of India during March 2023. The JSA : CTR 2023 programme focuses on sustainability of the source of water, particularly in **150 selected Water Stressed Districts** (WSDs) of the country, identified by Jal Jeevan Mission.

The "Jal Shakti Abhiyan: Catch The Rain" (JSA:CTR), 2021 campaign with the theme "Catch the Rain, where it falls, when it falls" was launched by Hon"ble Prime Minister on 22 March, 2021. It was taken up in all 729 districts (7213 rural blocks and all urban areas) of the country during the pre-monsoon and monsoon period, to create and maintain appropriate Rain Water Harvesting Structures (RWHS), suitable to the soil strata & climatic conditions of the area, using convergence of all relevant funds, with people's participation.

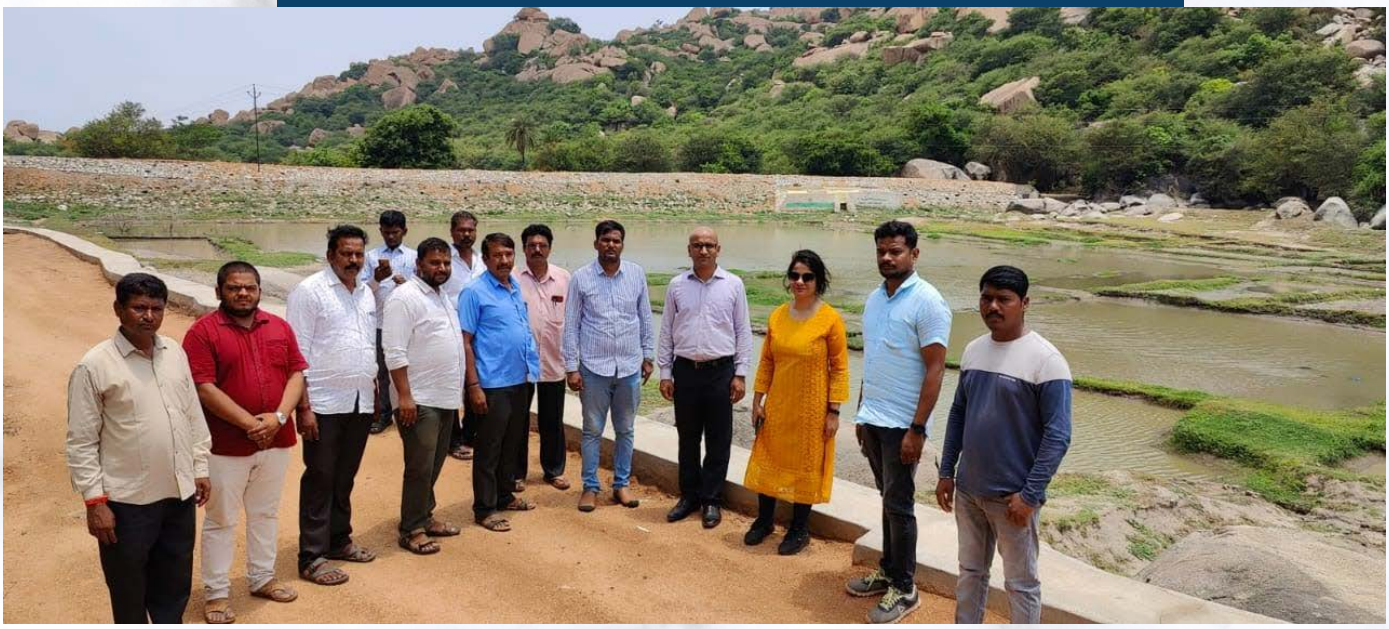
The JSA:CTR campaign implemented by National Water Mission (NWM), had the following 5 focused interventions

- Rainwater harvesting & water conservation
- Enumerating, geo-tagging & making inventory of all water bodies; preparation of scientific plans for water conservation
- Setting up Jal Shakti Kendras in all districts
- Intensive afforestation and
- Awareness generation

On account of success of Jal Shakti Abhiyans of 2019 and 2021 in generating awareness amongst the citizens of the country, it is proposed that "**Jal Shakti Abhiyan: Catch the Rain" 2022** campaign was launched by Hon"ble President of India on March 2022 .

JSA: CTR-2022 has been taken up in all districts (rural as well as urban areas) of the country with the main theme "Catch the Rain, where it falls, when it falls". Under this campaign the targeted activities were being undertaken under the following interventions:

- Water Conservation and Rain water Harvesting
- Renovation of Traditional and other Water Bodies/ Tanks/ Step-wells/ Baolis.
- Reuse and recharge structures.
- Watershed Development
- Revival of wetlands and protection of flood-banks.
- Protection of water catchment area
- Spring-Shed development
- Enumerating, geo-tagging & making inventory of all water bodies
- Development of Scientific District Water Conservation Plan.
- Rejuvenation of River/ Rivulets.
- Setting up of the Jal Shakti Kendra in all districts.
- Intensive Afforestation and
- Awareness generation



Creation/ Rejuvenation of 75 Water Bodies in every district to commemorate Azadi ka Amrit Mahotsav (AKAM)

As our Country is celebrating Azadi ka Amrit Mahotsav, marking 75 years of Independence, it has been decided that in order to commemorate this momentous occasion, 75 water bodies will be created or rejuvenated in every district, known as Amrit Sarovars. The creation/rejuvenation of the Amrit Sarovars was a special effort under JSA:CTR-2022.

Jal Shakti Abhiyan: Catch the Rain – 2023

The "Jal Shakti Abhiyan: Catch The Rain 2023 was launched by the Hon"ble President of India during March 2023 with the theme **"Source Sustainability for Drinking Water"**, with special focus on strengthening the water sources of **150 Water Stressed districts**.

The focused interventions includes

- water conservation and rainwater harvesting;
- enumerating, geo-tagging & making inventory of all water bodies and preparation of scientific plans for water conservation
- setting up of Jal Shakti Kendras in all districts
- intensive afforestation and
- awareness generation.

This year, "Source Sustainability for Drinking Water" being the theme of JSA:CTR, it is proposed that geo-tagging of all water sources of drinking water supply schemes to be undertaken and at least one recharge structure to be identified for implementation in each groundwater drinking supply source and geo-tagging of such recharge structures to be done. Sanitation survey & source protection works to be undertaken in villages where piped water supply is based on groundwater or spring sources.
Community mobilization to be ensured for water conservation so that "jalandolan" may truly become a "janandolan".

The Officers of Central Ground Water Board have put in there efforts in the JSA campaign whole heartedly and visited the allotted districts twice during the year for providing technical inputs to the district administration for development and augmentation of the existing water sources in order to ensure potable drinking water to the people of 150 water stressed districts of the country.

REPORT

ADAPTATION OF ANCIENT WISDOM FOR ARTIFICIAL RECHARGE OF GROUND WATER THROUGH POND

Gyanendra Rai, CGWB, SUO, New Delhi

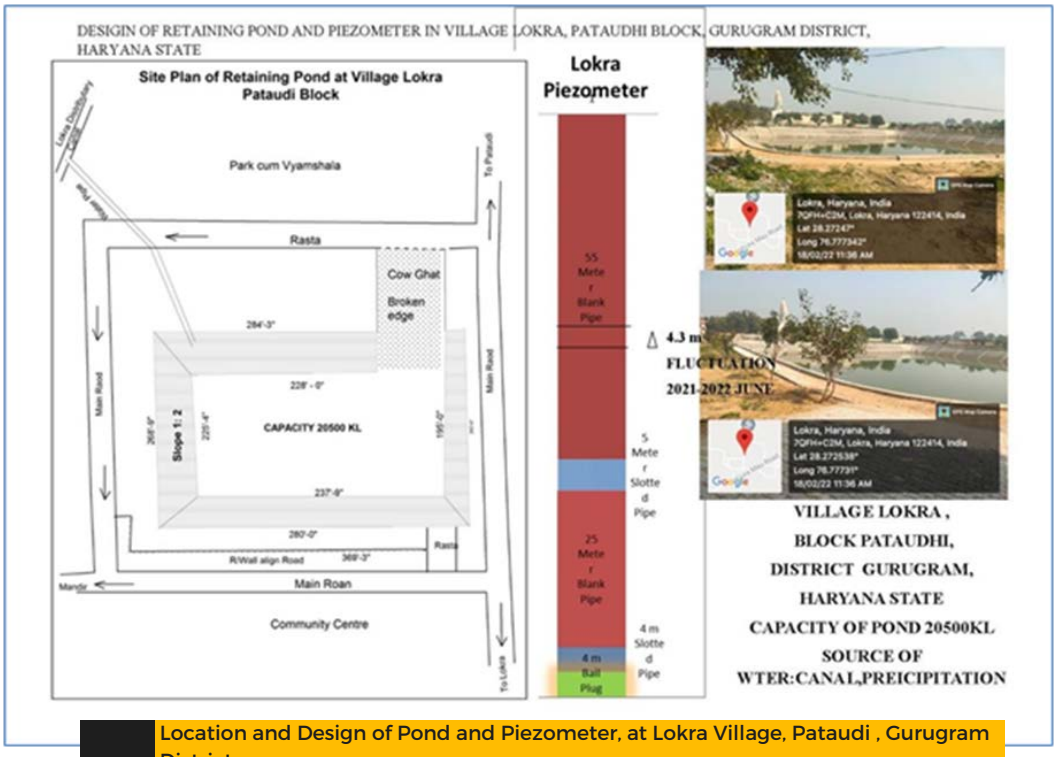
INTRODUCTION

India consumes the largest amount of groundwater in the world and also is home to the largest number of tubewells. Most of the water is used for irrigation by farmers in dry and arid regions. Indian farmers had long enjoyed the benevolence of a bountiful rainfall in absence of irrigation through canals or rivers. However, erratic rainfall and weather patterns have led to the dependence of farmers on groundwater for irrigation needs. Groundwater has become a major source for irrigation, domestic and industrial use. The overdependence and overexploitation, without proper regulation and management of groundwater resources, has led to the rapid depletionand lowering of groundwater levelsin the country, particularly in the rain-deficient northern and western regions. The depletion and the deterioration in the water quality is causingproblem of water supply in the urban area. The rapid urbanization, and waste filling and encroachment of the naturalwater bodies has drastically reducedthe recharge of the groundwater. Our ancient practices and wisdom of water conservation through the ponds is still relevant as illustrated by the pond renovated at Village Lokra.A renovated pond at Village Lokra has augmented water conservation as well as has impacted the ground water level in the surrounding area through artificialrecharge.

Study Area: Lokra village is located in Pataudi block, Gurugram district, Haryana State where a pond is located to south-western side of the village, near Baba Mailk Temple onLokra-Pataudi road and having latitude 28°16'22.13"N and longitude 76°46'41.10"E which is in very deplorable condition without maintenance and its catchment area had reduced. A large quantity of rainwater, wastefully did not reach pond andcollection of rainwater in the pond was almost negligible.

Under the Jal Shatkti Abhiyan 2020, Block Development and Panchayat office (BDPO),Pataudi, had taken up renovation of this pond. The renovated pond has the dimension of 85*82*3.5 m(L*B*D), has a capacity of 20500 m3. The pond was converted into retaining wall pond from all the four-side, walls are slopy inward toward pond and cemented,the base of the pond is kept un-cemented for infiltration.

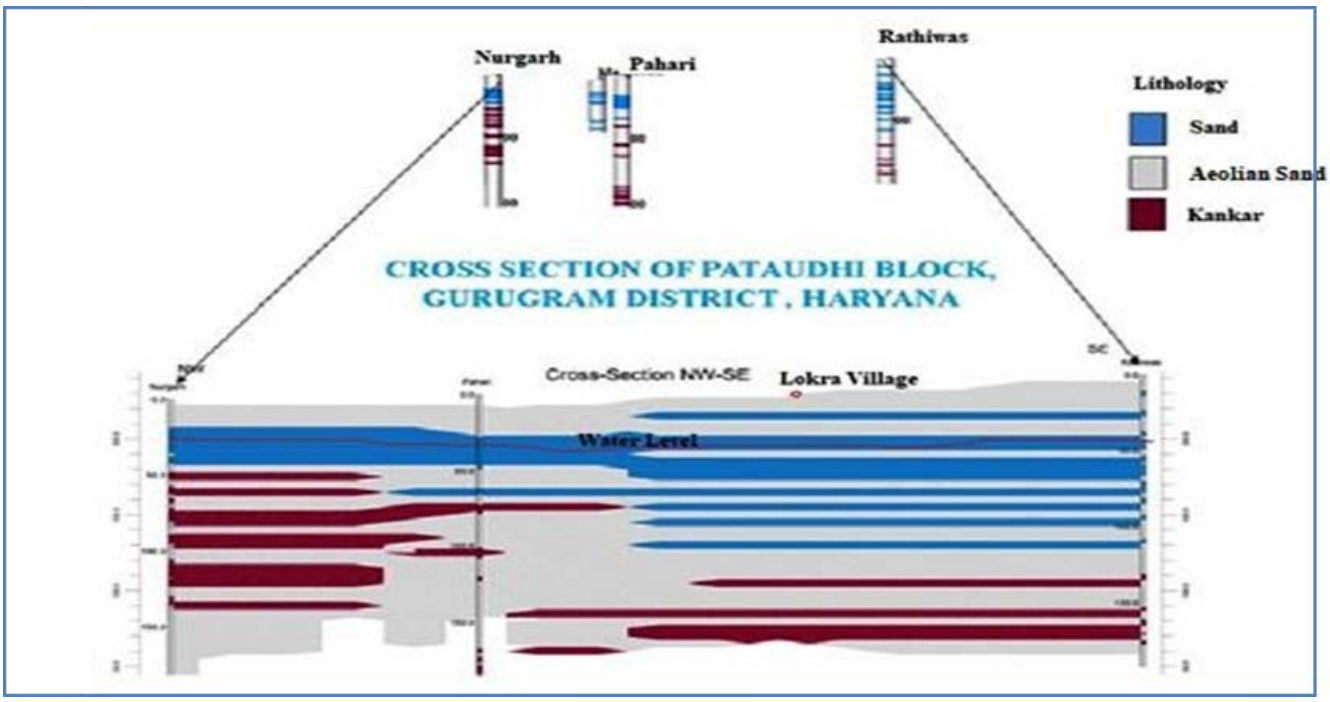
Catchment area of pond was modified and altered to prevent erosion and small channels were constructed to divert monsoon water from the surrounding area to the Pond. To augment the drinking and domestic water supply to the village, this pond was connected to Lokra distributary canal located inside the village. As reported, Lokra distributary provide water to the pond for filling it after every 10-15 days in monsoon season and for 20-25 days during non- monsoon season.As per information, it takes seven days to fill the pond by Lokra distributary supplied water.



Location and Design of Pond and Piezometer, at Lokra Village, Pataudi , Gurugram District

Apart for water supply from the canal, the rainwater also accumulates in the village pond from catchment area during rainy days. As the pond area has increased and the retention time for storage water in the pond has enhanced,the collected water is getting recharged underground. Presently the pond is serving the purpose of storage as well as percolation since after some time all the stored water is recharged to the ground water.

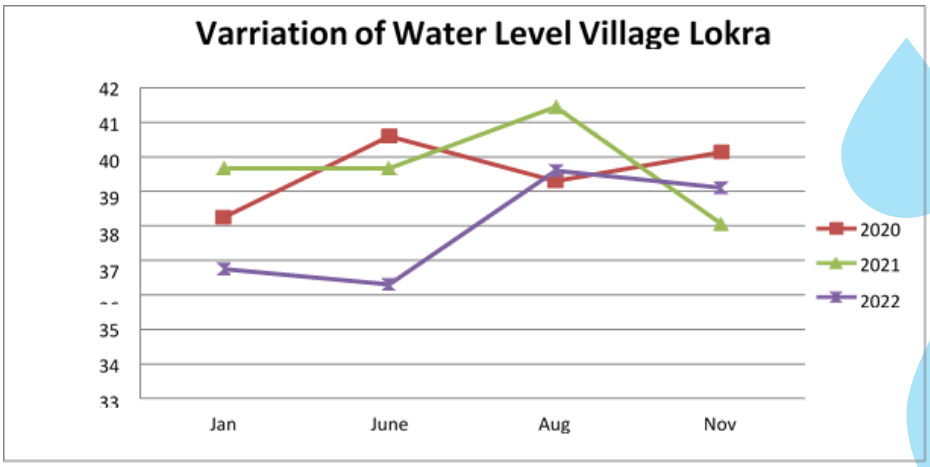
Hydrogeology: Alluvial sand deposit is the potential aquifer for tubewell construction in the area. Cross section drawn along the Nurgarh, Pahari and Rathiwasexploratory wells: IndicatesAeolian sand at the top underlain by alluvial sand as shown in Fig., Potential aquifer ranges from 3 to 150 m depth. The upper zone of saturation consists of intercalation of fine sand withsilt varying from place toplace. The thickness of sandy layer is very limited. The drawdown is generally high Indicating absence of highly potential ground water earing aquifer.



cross sectionalong Nurgarh PahariRathiwas section

Ground Water Level Analysis

A piezometer with a depth of 92 m and zone tapped at the depth of 55-60(5m) and 85- 89(4m) is present in temple premises. The renovation of the pond was taken up in 2020 and completed in 2021. At the time of renovation of pond, the water level observed were 40.6 mbgl (June 2020) and 39.6 mbgl(June 2021) respectively. Impact of Artificial Recharge was manifested in piezometer. The observed ground water levels were 38.5 and 36.75 mbgl during November 2021 and January 2022, respectively, while in June 2022, it was observedto be 36.30 mbgl. It can be interpreted that after renovation the rise in waterlevel has been observed in piezometer which is attributed to the storage and percolation of artificial recharge from the pond. The absolute impact of artificial recharge can be compared by observing the difference in water level from the month of January 2020 to 2022, which shows a rise of 1.49 m, similarly comparing the water level during month of June 2020 to 2022 and November 2020 to 2022 shows a rise 4.3 m and 1.04 m respectively.



Variation of WaterLevel Village Lokra in Year 2020, 2021, 2022

Hydrograph Analysis

Water level trend of the piezometer is declining from 2016 to 2022 as shown in the Hydrograph (Fig 6 A) with declining rate of -0.0321m/year. After renovation of Pond, considering the hydrograph for the year between 2020 to 2022, is showing risingwater level trend at rate of 0.26m/year (Fig 6B).

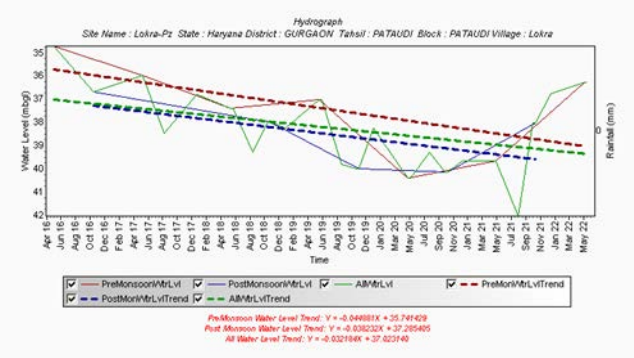


Fig6 A Hydrograph-1(2016 Aug- 2022 May)

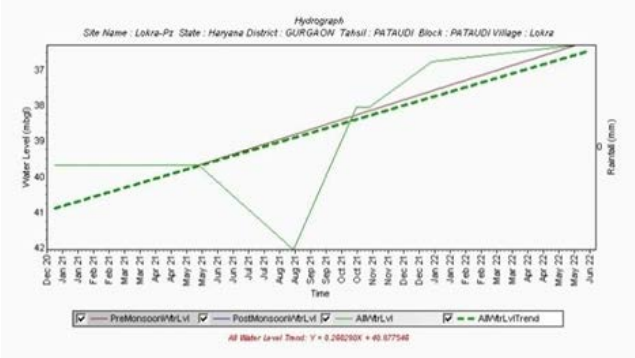


Fig6 B Hydrograph-2(Dec 2020 to June 2022)

Conclusion and Recommendation

As we know the soil of the Pataudi area and Lokra village are silty and sandy in nature and their organic content is relatively low. Rainfall intensity of that area is relatively high and infiltration is relatively slow. Soil is loose in nature and during the rainfall, the wall of the pond slumped which was caused by low filtration. However de-silting and construction of the retaining wall of the lokra village pond have enabled to store a sufficient amount of water. Removal of silt has increased soil infiltration rate by 40%. Subsurface Aeolian sand (Silt, sand) limited granular zone zone available in a range of 3-150 m and connectivity available in the aquifer represents direct recharge. The impact has been observed in Lokra Piezometer which was tapped at depth of 55-60m and 85-89m which shows positive response on water level fluctuation. Catched water can significantly contribute to groundwater and solve declining water problem in Lokra village. If more of these kinds of ponds are constructed it will solve the water problem in Patuadi block. De- siltation has its own important role hence it should be practiced every two-year. Water samples from the collection point showed an EC of 1100 us/cm, categorizing it as freshwater suitable for drinking, domestic use, and agriculture. In 2022, the EC measurement of 712 us/cm improved post the canal water augmentation. Replicating this pond type could address Pataudi Block's groundwater issue

HYDROMETEOROLOGY

Dr. Gajanan Ramteke, Scientist C, CHQ, Faridabad

Introduction

Hydrometeorology is an interdisciplinary field of study that combines principles of meteorology, hydrology, and climatology to better understand the interactions between the atmosphere, the land surface, and water resources. Hydrometeorology consists study of complex relationship between precipitation, evapotranspiration, and the movement of water across the Earth's surface, as well as how these processes are influenced by atmospheric conditions such as temperature, humidity, and wind.

Hydrometeorology plays an important role in many fields, including agriculture, water resources management, environmental planning, and disaster risk reduction. It plays a crucial role in understanding and managing a wide range of environmental, social, and economic issues. By providing a better understanding of the complex interactions between the atmosphere and water resources, hydrometeorologists can help society to manage and sustainably use this critical resource.

Hydrometeorological measurements are an essential part of understanding the complex processes involved in the hydrological/water cycle and its interactions with the atmosphere. Some common hydrometeorological measurements include:

Precipitation: Precipitation measurements are used to determine the amount and type of precipitation that falls over a specific area, including rain, snow, sleet, and hail. Precipitation is usually measured using rain gauges or snow gauges, which are often automated to provide continuous data.

Evapotranspiration: Evapotranspiration measurements are used to determine the amount of water that is evaporated from the Earth's surface and transpired by plants. This is typically measured using specialized instruments, such as lysimeters, eddy covariance towers, or scintillometers.

Streamflow: Streamflow measurements are used to determine the amount and velocity of water that is flowing through a river or stream. This is typically measured using stream gauges or acoustic Doppler current profilers.

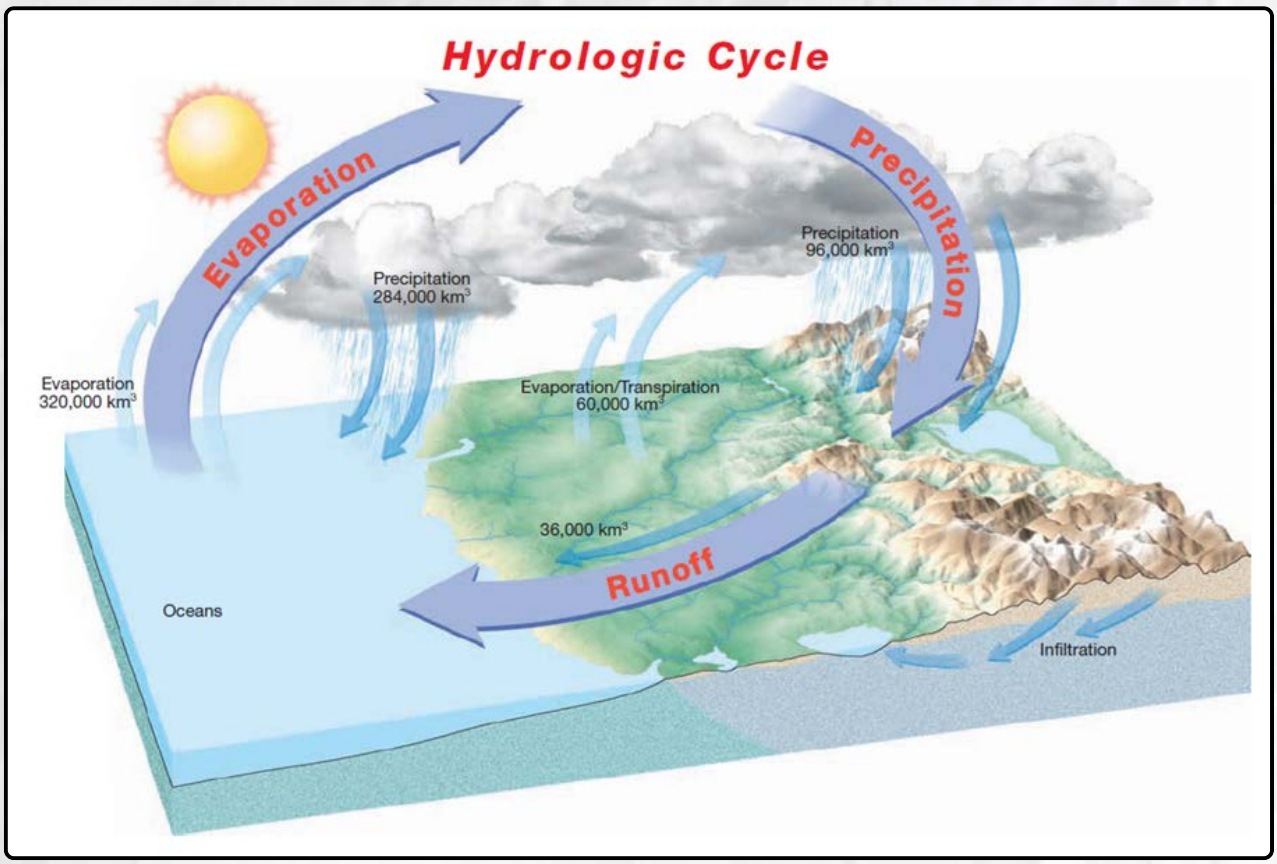
Groundwater: Groundwater measurements are used to determine the amount and quality of water that is stored beneath the Earth's surface. This is typically measured using well gauges, which are used to monitor the depth of the water table and the amount of water in the well.

Atmospheric humidity: Atmospheric humidity measurements are used to determine the amount of water vapor in the atmosphere. This is typically measured using instruments such as hygrometers, which can measure both relative humidity and dew point.

Wind speed and direction: Wind speed and direction measurements are used to determine the movement of air masses, which can affect the distribution and transport of water across the Earth's surface. This is typically measured using anemometers and wind vanes.

Soil moisture: The water content in the soil is measured using sensors like neutron probes, capacitance sensors or time domain reflectometry.

Solar radiation: The amount of solar radiation reaching the Earth's surface is measured using pyranometers, which are used to determine the amount of incoming solar radiation.



These measurements are often integrated into hydrological and meteorological models to understand the complex interactions between the atmosphere, land surface and water resources. By combining these measurements with models, hydrometeorologists can make predictions about the behavior of the water cycle, weather patterns and climate change, as well as develop strategies for managing water resources and mitigating the impacts of natural disasters. Hydrometeorology is used in a wide range of applications that impact our daily lives. It plays a crucial role in various aspects of our lives, from daily weather forecasts to long-term water resource planning and environmental conservation.

BHUJAL SAMVAD TALK SERIES

W-E-F NEXUS & CLIMATE RESILIENT STRATEGIES FOR GROUND WATER MANAGEMENT IN INDIAN PERSPECTIVE

Dr. S.K. Ambast, Chairman, CGWB

Bhujal talk Series was initiated at CHQ, Faridabad inviting both internal and external experts to deliver presentations. In the inaugural session, Dr. S. K. Ambast, Chairman, CGWB addressed the topic of "**W-E-F Nexus & Climate Resilient Strategies for Ground Water Management in Indian Perspective**". A brief overview of his insightful talk is outlined below.

The concept of the Water-Energy-Food (WEF) Nexus highlights interdependencies between water, energy, and food systems. India, a nation fighting with significant challenges related to water scarcity, energy requirements, and agricultural necessities, adopting the WEF Nexus approach is pivotal for fostering sustainable development. It aligns with Sustainable Development Goals like SDG 2: Zero hunger, SDG 6: Clean Water and Sanitation and SDG 7: Affordable and Clean Energy which is integrated across several SDGs due to crucial role these resources play in sustainable development

In agricultural practices, irrigation stands as the second most energy-intensive input after tillage. While precision irrigation methods contribute to improved water efficiency, they often demand higher energy inputs. This increased reliance on energy for irrigation poses significant challenges. Furthermore, declining groundwater levels and insufficient wastewater treatment contribute to heightened energy requirements. However, improving efficiency and employing demand management strategies can significantly reduce energy consumption in these domains

As we approach 2050, several challenges related to water, energy, and food security are anticipated due to various factors including population growth, climate change, urbanization, and resource constraints which can be mitigated by Best Management Practices & Policy Interventions. Initiatives like KUSUM (Kisan Urja Suraksha Evam Utthaan Mahabhiyan) Yojana which solarised 30 million agricultural pumps, reducing burden of subsidy on agricultural consumption of electricity. This shift towards solar energy not only diminishes reliance on traditional electricity but also creates an extra revenue stream for farmers.

Moving forward, national budgeting concerning the Water-Energy-Food (W-E-F) nexus requires a comprehensive approach integrating various strategies. One key aspect involves exploring options to manage the W-E-F nexus through predictive modelling, aiding in better resource allocation and planning. Balancing increased water productivity in agriculture for enhanced food security while considering the associated energy requirements poses a significant tradeoff. Additionally, considering the W-E-F nexus as a trading commodity offers a potential avenue for negotiating regional conflicts over resources. Fine-tuning farming systems to optimize land and water allocation to maximize farm profitability and resource efficiency is important. Moreover, the evaluation of land shaping techniques as a mitigation measure against sea-level rise in coastal areas holds significance, requiring thorough assessment and adaptation strategies for sustainable coastal development in the face of changing environmental conditions. Integrating these considerations into national budgets and policy frameworks is essential to address challenges and promote sustainable management of the W-E-F nexus.

Shodh

Research Publications by CGWB Officers in Reputed International Journals

Title: Transformative impact of various groundwater recharge and water conservation measures on different aquifer systems in India

Current Science

Satapathy S.; Kumar M.S.; Ray R.K.; Nayak R.; Kumar S.

Abstract : Groundwater contributes to 9% of India's GDP; 64% of irrigation, 85% of rural water supply and over 50% of urban water demand. Over the last decade, 54% of India's shallow wells became defunct due to declining groundwater levels and thus deep wells have been constructed. This shift to deeper wells has led to more groundwater withdrawal than natural recharge resulting in over-extraction. Most of States and Central Government agencies focus on groundwater recharge and conservation to address sustainability through schemes like Jal Shakti Abhiyan and MGNREGA. These interventions between 2017 and 2020 led to a notable 12.46 bcm increase in groundwater resources in hard-rock aquifers. This study's findings would assist policymakers and administrators in evaluating the effectiveness of schemes for different aquifer, and drawing their attention to suggests design changes for more effective recharge of groundwater. © (2023), (Indian Academy of Sciences).

Title: Satellite gravity observation and hydrological modelling-based integrated groundwater storage change in Northwestern India

Journal of Hydroinformatics, 25, Issue 1, Page No. 226-242

Pranjal P., Chatterjee R.S., Kumar D., Dwivedi S., Jally S.K., Kumar B.

Abstract : This paper presents a novel approach for an improved estimate of regional groundwater storage (GWS) change in Northwestern India by integrating satellite-based Gravity Recovery and Climate Exchange (GRACE) gravity observation and hydrological modelling of satellite/in situ hydrometeorological data. Initially, GRACE observation-based terrestrial water storage (TWS) change and hydrological model-based TWS change products were integrated using weight coefficients derived from multi-linear regression analysis of TWS change vs governing hydrological components. Later, the monthly average soil moisture change was subtracted from the monthly average individual and integrated TWS change products to obtain GWS change products. By spatial correlation analysis, three GWS change products were then compared with groundwater level (GWL) fluctuation-based in situ GWS change. Hydrological model, spaceborne GRACE observation, and integrated GWS change products show a positive correlation in â^1/459, â^1/469, and â^1/473% of the area with in situ GWS change. While a hydrological model-based estimate considers geology, terrain, and hydrometeorological conditions, GRACE gravity observation includes groundwater withdrawal from aquifers. All the factors are included in the integrated product. The approach overcomes the limitations of GRACE observation (spatial resolution, geology, terrain, and hydrometeorological factors), hydrological modelling (groundwater withdrawal conditions), and conventional GWL fluctuation-based method (inadequate spatial continuity and cumbersome, labour-intensive exercise). Â© 2023 The Authors.

Title: Impact of Leachate Percolation on Groundwater Quality near the Bandhwari Landfill Site Gurugram, India

Journal of the Geological Society of India

Srivastava S.K.; Mohiddin S.K.; Prakash D.; Bhartariya S.G.; Singh T.; Nagar A.; Lale K.; Radhapyari K.

Abstract: Non-engineered landfill sites pose substantial environmental threats, especially on air, biodiversity, soil fertility, human health. In addition, they have significant threats to groundwater resources. As a result, areas lying close to these landfills have a higher chance of groundwater contamination because of the leachate originating from these sites. Therefore, physico-chemical, heavy metal and organic pollutants were examined to study the effects of leachate seepage on groundwater quality collected in and around the Bandhwari sanitary landfill site. The study results revealed that parameters such as TDS, total hardness, COD, cations, anions, and heavy metals (Cd and Pb) exceeded the BIS limits and WHO limits. It depicts that contaminant from the landfill site have made their way into the groundwater, adversely affecting the quality of groundwater of the vicinal area, despite the existing quartzite geological setup and deep aquifers. The concentration of COD in groundwater samples around landfill ranged between 08–152 mg/L, and COD in leachate samples ranged between 14000–14800 mg/L. The concentration of BOD in groundwater samples ranged between 1.0–30 mg/L, and BOD for leachate samples ranged between 6771–7617 mg/L. The samples analysed for organochlorine, carbanates and organo-phosphorus pesticides shows that pesticides concentration is within the acceptable limit of 0.001 µg/L. © 2023, Geological Society of India, Bengaluru, India.

Title: Sustainable aquifer management plan for basaltic aquifer system of Jalna district, Maharashtra, India

Journal of Earth System Science

Anirudh singh; Varade A.M.; Verma J.R.; Anu V.; Venkatesam V.

Abstract: Groundwater depletion in South Asian Himalayan, transboundary Indus-Ganges-Brahmaputra-Meghna (IGBM) rivers basin is among the highest globally. Given the high irrigation demand and population, groundwater sustainability requires an improved understanding of groundwater systems for the accurate prediction of groundwater levels (GWLs). However, the prediction of groundwater system behaviors is a significant challenge since it is dominated by spatiotemporal and subsurface depth-dependent drivers. Earlier studies that address the challenges are mainly based on the short spatial and temporal extent and/or do not separate the renewable (i.e., shallow) vs nonrenewable (i.e., deeper) groundwater signals. Here, we first identified the variable importance of spatial and depth-dependent drivers on GWL in the IGBM basin. Our results indicate a greater influence of anthropogenic factors (i.e., widespread pumping and increased population) in most parts of the IGBM basin, except in the precipitation-dominated basin of the Brahmaputra. Our next purpose was to delineate a multifactorial approach for GWL prediction using the two most used machine learning models (i.e., support vector machine and feed-forward neural network) in the literature. In general, the machine learning model outputs show a good match in comparison to the GWL from the observation wells (n = 2303 distributed across India and Bangladesh) with some limitations in areas with increased groundwater irrigation. We separately compared the results from shallow (<35 m) and deep (>35 m) observation wells, emphasizing the significance of deep groundwater pumping. Our approach highlights the importance of spatiotemporal to multidepth factors in GWL prediction and can be adopted in other parts of the globe to predict GWLs. Â© 2022 American Chemical Society.

SOCIAL MEDIA HIGHLIGHTS

Central Ground Water Board
@CGWB_CHQ

Sh. A. K. Agrawal took charge of Chairman, Central Ground Water Board on 01.07.2023.

Central Ground Water Board
@CGWB_CHQ

Sh. Satish Kumar took charge of Chairman, Central Ground Water Board on 01.09.2023.
@MoJSDoWRRDGR

Central Ground Water Board
@CGWB_CHQ

CGWB, SUO Delhi on behalf of DoWR, RD & GR participated i
Vibrant India 2023" exhibition, organized from 3rd to 5th No
Dilli Haat, Pitampura. CGWB has been awarded 1st Prize for S
Development and Management of Ground Water Resources.
@MoJSDoWRRDGR

Central Ground Water Board
@CGWB_CHQ

Second Quarterly Dialogue was organized by CGWB, WR, Jaipur in association with CWC, Jaipur for interactions with State Govt.
@MoJSDoWRRDGR

Central Ground Water Board
@CGWB_CHQ

Workshop on Mid Term Review of NAQUIM 2.0 (Urban Aggl
held at CGWB, CHQ, Faridabad.
@MoJSDoWRRDGR

:05 PM · Sep 25, 2023 · **186** Views

Central Ground Water Board
@CGWB_CHQ

A three-day training programme on "Sustainability of Ground \
Sources" was successfully conducted at APWD Lecture Hall, P
Union Territory of Andaman and Nicobar Islands under the ove
supervision of the Regional Director, CGWB, Eastern Region, K

2:45 PM · Jul 4, 2023 · **198** Views

Central Ground Water Board
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MoU signed between CGWB and CWC on Water Quality Anal
Ministry of Jal Shakti.
@MoJSDoWRRDGR

6:14 PM · Aug 30, 2023 · **352** Views

SOCIAL MEDIA HIGHLIGHTS

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1. Special Field study of CGWB, NCR, Bhopal in collaboration with Geological Survey of India for Geogenic source of Fluoride Contamination and Uranium concentration in Jhabua District as per signed MOU.
2. Construction of Exploratory Borewell at Ettimanickampatty Village in Salem District under NAQUIM 2.0 in flouride affected area. Depth of the well-constructed is 287 m and Discharge from the recorded to be 2.5 lps.
3. CGWB, Kerala conducted PIP on "Aquifer Mapping and Ground Water Management" in Kannur district, Kerala.
4. The Vigilance Awareness Week with the theme "Say no to corruption; commit to the Nation" was inaugurated at CHQ, and Regional offices of CGWB.
5. Scientist of CGWB, NER presented NAQUIM report of Cachar district, Assam before DC, Cachar. Officers of various state departments were also present in the meeting.
6. Step Drawdown Test (SDT) followed by Aquifer performance Test (APT) was conducted in the Exploratory Well at Napara High School, Puncha block, Purulia district, West Bengal.
7. Ground Water Resources 2022 report of India and Karnataka shared with Shri B. G. Ramachandraiah, Director, Ground Water Department, Govt. of Karnataka by Shri N. Jyothi Kumar, Regional Director, CGWB, SWR, Bangalore.

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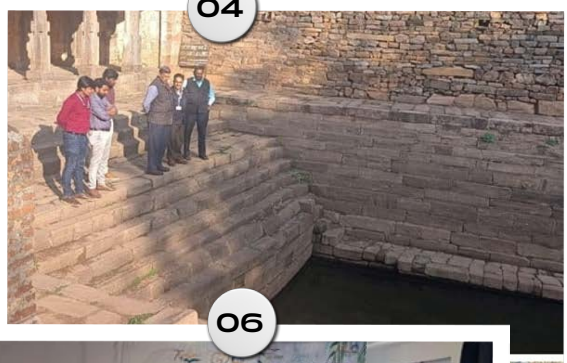
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1. Sh. Subodh Yadav, Joint Secretary, (Admin, IC & GW) MoJS interacting with the Regional Directors of CGWB during his visit to CGWB, CHQ, Faridabad.
2. CGWB, CHQ organized cleaning activity in the adjoining areas of Bhujal Bhawan Faridabad and K V No. 3 Faridabad on 1st Oct. 2023.
3. Regional Director, ER, Kolkata shared the report of National Compilation on Dynamic Ground Water Resource of India, 2022 with Sh. V. B. Pathak (IAS, Chief Secretary, Sikkim).
4. Dr. S K Ambast, Chairman, CGWB along with Sh. N. Varadaraj, Regional Director, Nagpur, visited Heritage Rainwater Harvesting Structure at Ramtek, Nagpur District.
5. CGWB, NCCR, Raipur shared NAQUIM Report of Janjgir Champa district, Chhattisgarh state with Ms. Richa Prakash Choudhury, Collector, Janjgir Champa.
6. Honorable Minister of State for Tourism, Ports, Shipping and Waterways Govt. of India Shri. Shripad Naik presented trophy to CGWB for participation in Vision Goa 2023.
7. Midterm review workshop 2.0 of Spring shed and autoflow areas has been organised in Dehradun by CGWB UR Dehradun.

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1. Dr. S K Ambast, Chairman, CGWB delivered a talk in a Seminar on Water Resources in Kerala held at Trivandrum which was inaugurated by Honble Minister for Water Resources, GoK, Shri RoshyAgustine.
2. Dr. S K Ambast, Chairman, CGWB, delivered a talk on the topic "Water-Energy-Food Security Nexus in Indian Perspective" as part of the BhujalSamvad Talk Series. This session was attended by officers from CHQ and regional offices.
3. Officer of CGWB WCR Ahmedabad carried out Preliminary Yield Test of Piezometer drilled at Nikava village, Kalavad Taluka, Jamnagar District.
4. Public Interaction Program (PIP) conducted by CGWB, AP, Visakhapatnam at Damaracherla Anjaneyulu Government Polytechnic College, Ongole, Prakasam District (JSA District), AP.
5. CGWB NER Guwahati organised a Public Interaction Program under Mission Lifestyle for Environment (LiFe) in Dhubri district of Assam.
6. CGWB, CHQ organized a Regional Director's meeting led by Chairman, CGWB, Sh. A. K. Agrawal.
7. Regional Director, CGWB SECR Chennai signed MoU with Dr.Velraj, Vice Chancellor of Anna University for taking up various collaborative studies including sharing of all facilities and labs.

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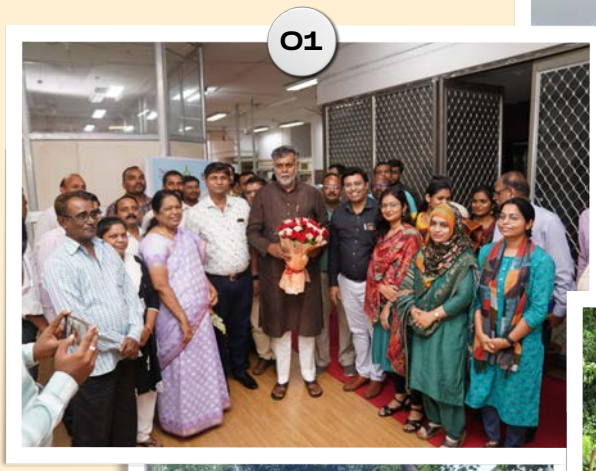

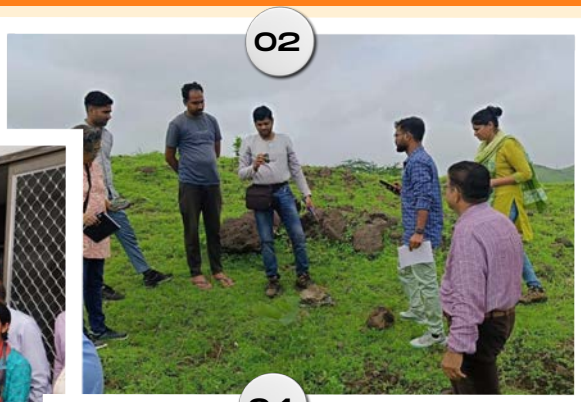

1. Honorable Minister, MoJS, Govt of India Sh Prahlad Singh Patel visited CGWB, NCR, Bhopal office to review the activities.
2. Special Field study of CGWB, NCR, Bhopal in collaboration with Geological Survey of India for Geogenic source of Fluoride Contamination and Uranium concentration in Jhabua District as per signed MOU.
3. Scientist from CGWB, SUO, Jodhpur conducted Preliminary Yield Test (PYT) and prepared litholog at Palshipgram (RIICO WSS), Jodhpur. Discharge obtained is 48 lpm.
4. Three days training Programme on Source Sustainability at the JJM Office, Itanagar, Arunachal Pradesh.
5. Scientists from CGWB, Kolkata conducted Step Drawdown Test in the Observation Well at Kunchia High School, Bandwan block, Purulia district, West Bengal.
6. Exploratory well at Maharana Pratap Nagar, Bhopal inspected using bore hole camera for total depth, casing depth, fracture zone, observation of variation in lithology etc.
7. Swachhta Abhiyan : CGWB, SUO Agartala conducted cleaning of Pond and the adjacent Park, MBB College, Agartala.

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1. Meeting with Scientists of IFPRI, IWMI regarding Energy, Food &Water nexus and gains for Awareness in the chamber of Chairman, CGWB at Jamnagar House, New Delhi.
2. Two days Workshop for mid-term review of NAQUIM 2.0 studies held in Bengaluru on 12th October 2023.
3. Ice-Breaking session on NHP Advance Phase oragnized in Lucknow on 11-12 October 2023. During this session, officers from CGWB provided an overview of the planned activities under the NHP Advance Phase.
4. CGWB is honoured for Best participation prize for the stall by event organiser on the behalf of the honourable Chief Minister of Goa Sh Pramod Sawant ji.
5. Scientist from CGWB, SUO, Belagavi conducted Preliminary Yield Test (PYT) for the Exploratory Well drilled at Govt. Highschool, Padesur Village, Navalgund Taluk, Dharwad District. Total Drawdown observed was 15.52 m with maximum Discharge of 4.4 lps
6. National Aquifer Mapping and Management Report of Sehore District, Rajasthan has been shared with CEO, Zila panchayat Shri Ashish Tiwari.
7. संसदीय राजभाषा समिति ने आज धर्मशाला (हिमाचल प्रदेश) में केंद्रीय भूमि जल बोर्ड प्रभाग 17, धर्मशाला कार्यालय के साथ निरीक्षण बैठक की। इस दौरान समिति ने मंत्रालय एवं विभाग के वरिष्ठ अधिकारियों की उपस्थिति में हो रहे राजभाषा हिंदी के कार्यों का अवलोकन किया ।