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

# Bhujal Samvad

JAN TO JUNE, 2023, VOL.20-21

## Cover Story

Source Sustainability Interventions

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# भूजल संवाद

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**Editorial office**

Media Cell,
Central Ground Water Board (CGWB),
Bhujal Bhawan, Faridabad,
Haryana 121001.
Email: mediacell-cgwb@gov.in
Phone: 01292477109

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# MESSAGE

It gives me great pleasure to present before you the latest release of Bhujal Samvad volume 20-21 which includes major accomplishments of Central Ground Water Board during Jan-June, 2023. Central Ground Water Board takes a pilot project under the Jal Jeevan Mission focusing on source sustainability to preserve and protect groundwater sources in four states of India. One of the Source sustainability interventions under Jal Jeevan Mission in Chikballapur district, Karnataka is discussed under the 'Cover story' section.

We are honored to share that the esteemed President of India, Smt. Draupadi Murmu Ji, released the Standard Operating Procedures (SoP) for the "Sustainability of Groundwater Sources" during the launch of Jal Shakti Abhiyan Catch of Rain 2023, which is covered under Infocus Section.

The section 'NAQUIM Success Story' showcases the successful implementation of aquifer mapping in Banaskantha district, Gujarat, where the identification of common recharge zones in unconfined and confined aquifers has proven instrumental in managing water resource effectively.

Our 'Report' section features the spring inventory in Jampui hills, North Tripura district, offering valuable insights into this region's groundwater potential and the importance of preserving natural springs for water supply. The 'Pathshala' segment focus on sharing knowledge related to hydrogeology, and in this volume, it covers the "Application of Stable Isotopes," which are likely used as tracers to study water movement and groundwater recharge.

The Shodh section features research papers from officers of Central Groundwater Board, published in reputed journals. This indicates the dedication to scientific research and advancements in groundwater management.

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.

# IN FOCUS

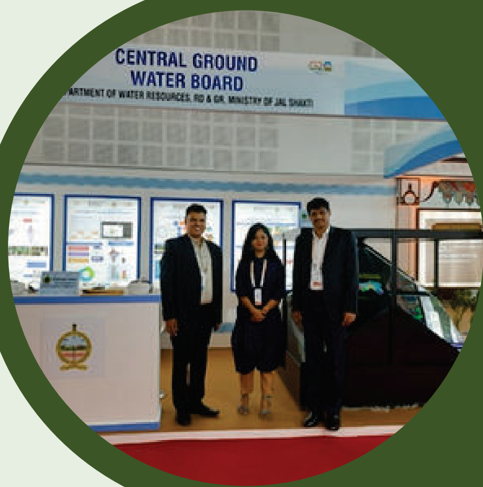
Hon'ble President of India, Smt. Droupadi Murmu Ji released the SoP for "Sustainability of Groundwater Sources" in the august presence of Union Minister of Jal Shakti, Sh. Gajendra Singh Shekhawat Ji during the launch of Jal Shakti Abhiyan: Catch the rain 2023

Inaugration of e-Sparrow by Sh. Sushil Gupta, Former Chairman, CGWB and Member, Punjab Water Regulations & Development Authority at Central Ground Water Board, Faridabad.

माननीय संसदीय राजभाषा समिति द्वारा केंद्रीय भूमि जल बोर्ड, प्रभागीय कार्यालय जोधपुर का राजभाषायी निरीक्षण किया गया। माननीय समिति द्वारा जोधपुर कार्यालय में राजभाषा हिंदी के प्रचार एवं उत्कृष्ट कार्यान्वयन पर प्रसन्नता जताई गई तथा इस दिशा में किए जा रहे प्रयासों को जारी रखने के दिशानिर्देश दिए गए।

केंद्रीय भूजल बोर्ड, उत्तर पश्चिमी क्षेत्र, जल संसाधन विभाग, नदी विकास और गंगा संरक्षण, जल शक्ति मंत्रालय, भारत सरकार ने चंडीगढ़ में "नेशनल एक्विफर मैपिंग एंड मैनेजमेंट (NAQUIM) प्रोग्राम" पर एक दिवसीय क्षेत्रीय कार्यशाला का आयोजन किया।

Exhibition of Central Ground Water Board at 2nd Environment and Climate Sustainability Working Group Meeting at Gandhinagar, Gujarat. Ministry of Jal Shakti, Department of Water Resources, RD & GR



CGWB, CR, Nagpur, participated and presented an Exhibition stall during inauguration of 108th Indian Science Congress at RTM University, Nagpur on the theme - ‘Science and Technology for Sustainable Development with Women Empowerment’.

Offiers of CGWB WR Jaipur participated in Mega Exhibition Alluring Rajasthan Udaipur and received Best stall award in Field of "water resource and conservation " by Member of Parliament Udaipur Shri Arjun lal Meena ji.

Tenth National Level Expert Committee meeting held on 1st February 2023 at CGWB, CHQ, Faridabad.

Officers from Central Ground Water Board carried out Geophysical survey at ITBP post, Shiplila, Kinnaur district, Himachal Pradesh (elevation: 12000 ft AMSL).


Central Ground Water Board, NCR, Bhopal participated in the Mining and Engineering Expo and Conference held at Satna. The Expo is organised by the Indian Mining and Engineering Journal in association with AKS University, Satna, Madhya Pradesh

# Cover Story

## Source Sustainability Interventions under Jal Jeevan Mission in Chikballapur District, Karnataka

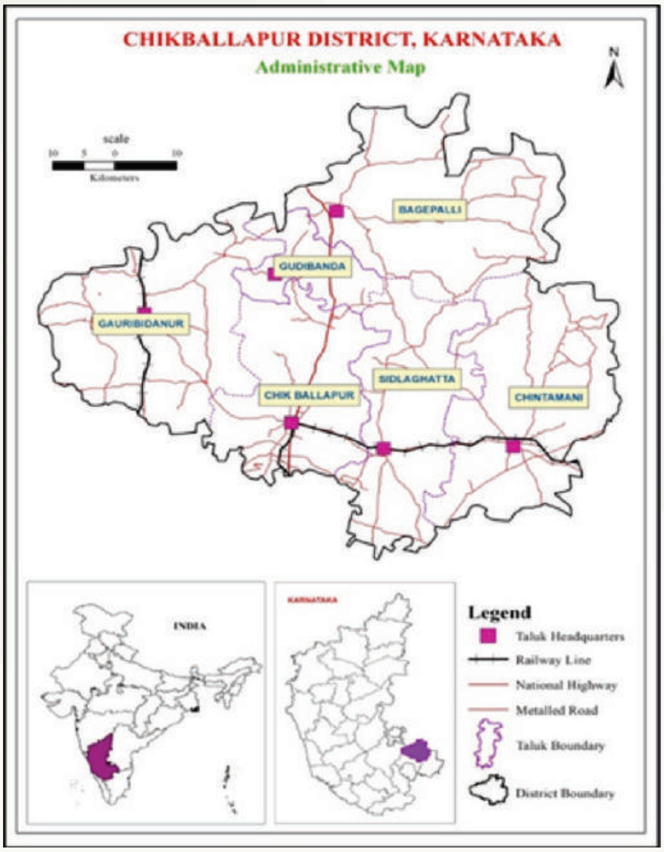
### ABOUT KARNATAKA

In Karnataka, the way the landforms, the climatic conditions and major area being occupied by hard rock aquifers makes it difficult for groundwater to be stored and replenished naturally beyond a certain point. Many farmers in Karnataka rely on groundwater to grow their crops, and about 60% of the irrigation and majority of rural water supply is dependent on ground water. Unplanned withdrawal of groundwater without thinking about how it can be replenished naturally has led to a lot of wells and boreholes going dry or their yield being reduced over the time as the ground water is a common pool resource. In fact, as per ground water resource assessment 2022, 49 taluks of Karnataka are categorised as Over-Exploited that means groundwater withdrawal is more than recharge. On average, about 70% of the available groundwater is being used, which is very high and is a major problem, because it means we might not have sufficient water for the future generations. That's why we need to come up with better ways to manage our ground water resources. We need to make sure we're not using more ground water than can be naturally recharged, so that we can continue to use ground water for drinking, agriculture and other important activities in Karnataka.

### ABOUT CHIKBALLAPUR DISTRICT

The Chikballapur district in Karnataka was chosen for a pilot study under the Jal Jeevan Mission, by Central Ground Water Board, Ministry of Jal Shakti, Department of Water Resources, River Development, and Ganga Rejuvenation, and the Department of Drinking Water and Sanitation.

The district is bordered by Bangalore and Tumkur districts to the west and Anantapur district of Andhra Pradesh to the north. It is administratively divided into 6 taluks (Chikballapur, Chintamani, Gudibanda, Siddalghatta, Bagepally, Gauribidnur), 157 gram panchayats, and 1384 villages. The district has a population of 12.54 lakhs with a density of 298 per sq.km, covering an area of 4250sq.km. The district lacks perennial rivers and is drained by three river basins: Palar, Ponnaiyar, and Pennar, which have minor seasonal water flows. Forests cover 11% of the district, while 68% is cultivable land, and 28% remains uncultivated. The district falls under the Eastern dry agro-climatic zone, experiencing a semi-arid climate with hot summers and mild winters with an annual rainfall of 716mm.



Granites, gneisses, schists, laterites and alluvium underlie the district. The occurrence and movement of ground water is controlled by weathered zone, fractures and fissures that exist in hard rocks. In the district, ground water occurs in phreatic and semi-confined to confined conditions. The weathered thickness varies from 6 to 18 m in the majority of the area, except in parts of Sidlaghatta and Chikballapura taluks where it ranges from 40 to 60 m. Two aquifer systems were identified, such as Aquifer-I (<2-30m) and Aquifer-II (30-200m). Aquifer-I constitute the weathered zone at the top, followed by the Aquifer-II discrete anisotropic fractured/fissured zone at the bottom, generally extending down to 200 m depth.

The exploitation of groundwater has created desaturation of shallow aquifers and ground water levels has reached up to 143.5 mbgl in piezometers in some places which in turn disturb the natural ground water regime. This in turn resulted in the over exploitation of ground water resources in all the 6 mandals with a stage of development of 140%. Apart from that, ground water quality contamination due to high concentration of Flouride & Nitrate in drinking water is also a challenging issue.

Low rainfall and high dependence on groundwater led to a steady fall in water levels and desaturation of the weathered zone in some parts, raising questions on the sustainability of existing ground water structures, food and drinking water security.

## ABOUT JAL JEEVAN MISSION

The Government of India has set a goal under Jal Jeevan Mission to provide safe and sufficient drinking water to all rural households through individual tap connections by 2024 either through surface or ground water sources. The aim is to ensure a minimum supply of 55 liters per person per day. In Chikballapur district there is absence of perennial surface water source, thus there is major dependence on ground water to meet the rural water supply and objectives of JJM.

The pilot study under the Jal Jeevan Mission in Chikballapur district aims to improve the ground water situation by focusing on making ground water sources more sustainable. The main objective is to propose village-wise artificial recharge structures and assess the sustainability of each village based on field input and the presence of sustainable wells. This classification will help determine if a village is safe or at risk in terms of water availability. The study specifically targets ground water resources, which serve as the primary source of drinking water schemes under the Jal Jeevan Mission.

## METHODOLOGY ADOPTED

The village-wise bore well inventory has been conducted to assess the ground water availability and also to assess the present conditions of the bore wells in each village. Additionally, interactions and feedback sessions with various stakeholders, including farmers, women self-help groups, and PRI (Panchayati Raj Institutions) representatives were done. These interactions helped to gather insights and perspectives from the local community regarding their water needs, challenges, and suggestions for improvement. Furthermore, visits have been made to the existing artificial recharge (AR) structures within the villages. These on-site visits gave the better understanding of the site-specific hydrogeological conditions, types of AR structures feasible and assessing the potential impact of these structures in recharging ground water and improving water availability.

Based on the JJM mandate of providing 55 liters per capita per day (lpcd) of water, the village-wise demand and supply figures have been calculated. This calculation takes into account the population of the village and the water demand based on the mandated 55 lpcd. The availability of water in each village is determined by considering well census data, pumping hours, the number of active wells, and their yield.

# VILLAGE WISE RISK ASSESSMENT

By comparing the calculated demand with the available water supply, each village is categorized as safe, at risk, or high risk. In the safe category, the supply of water exceeds the demand, whereas villages classified as at risk have a relatively balanced demand-supply ratio or a slightly higher demand compared to supply, but not to an alarming extent. The high-risk category comprises villages with a significant gap between demand and supply, indicating low sustainability of groundwater sources. This categorization helps identify villages where interventions are needed to bridge the demand-supply gap and sustain water resources. It provides guidance for the implementation of artificial recharge structures and other measures to improve the water situation in at-risk and high-risk villages.

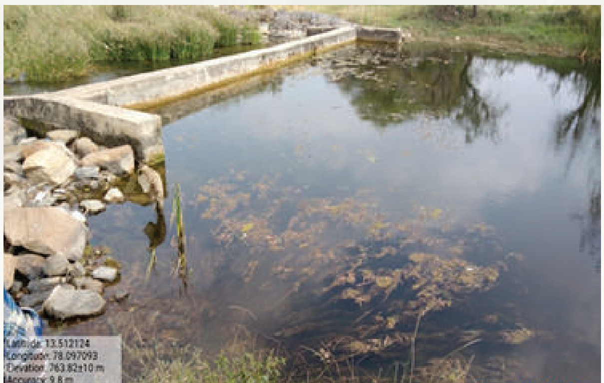
A comprehensive inventory of 11,124 ground water abstraction structures, primarily bore wells, spread across 1,384 villages, has been conducted in the field. This inventory followed standard operating procedures (SOP) to assess the sustainability of these structures. Based on the evaluation, the villages have been categorized into three categories: safe, at risk, and high risk. In Chikbalapur district, 127 high risk villages, 639 at risk villages and 761 safe villages are demarcated.


Interaction with Waterman, PDO and JJM officials at ,Jangamakote, Sidlaghatta Taluk

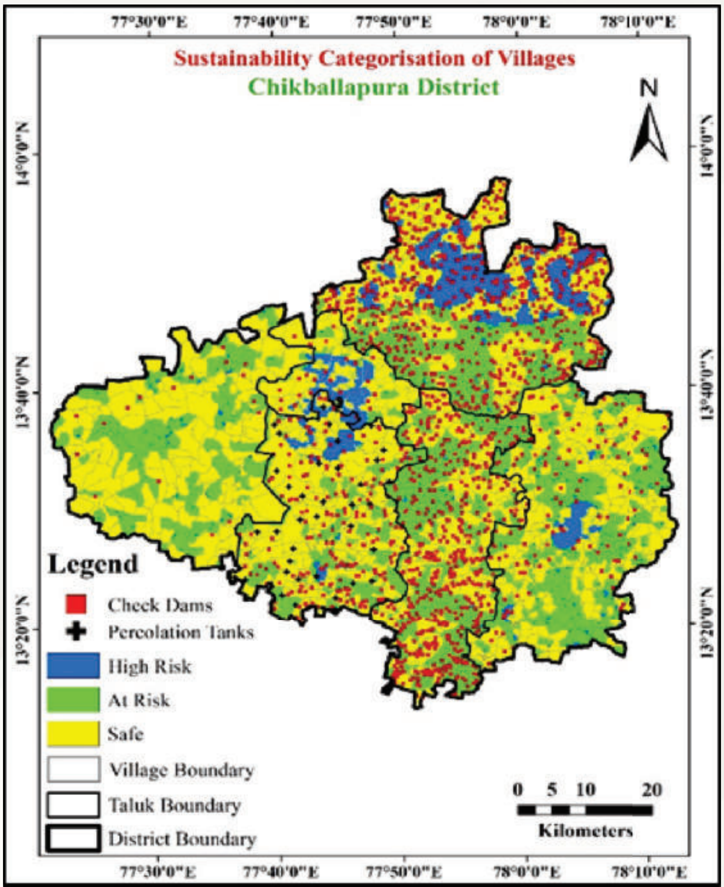
Failed BW near RO Plant, Jangamakote Village

Approximately 50% of the villages fall under the safe category, indicating favourable demand and supply side water availability along with positive hydrogeological characteristics. Around 42% of the villages are classified as at risk, suggesting a moderate level of concern regarding water availability and hydrogeological conditions. Only 8% of the villages are categorized as high risk, indicating significant challenges in terms of demand and supply side water availability and unfavourable hydrogeological characteristics.

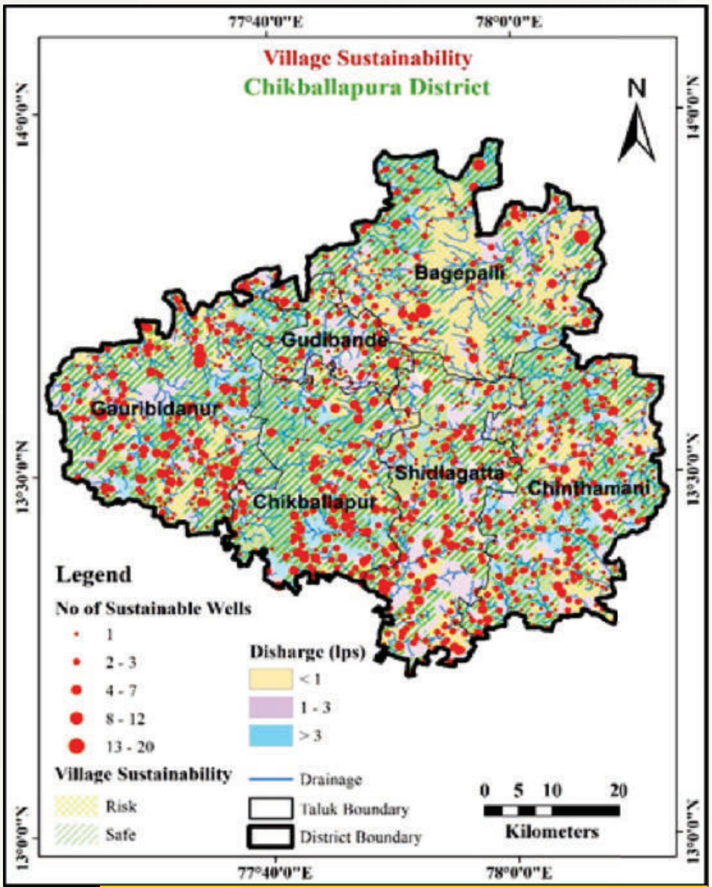
In Gauribidnur, Chikballapur, Sidlaghatta and Chintamani talukas occurring in the southern part of the district, the high risk villages are almost absent or less in numbers as compared to Gudibande and Bagepalli talukas occurring in northern parts of the district. The village wise number of sustainable wells has also been assessed during the detailed field work and it also shows similar results. This categorization provides valuable insights into the water situation in the villages and helps prioritize interventions and resource allocation to address water scarcity and ensure sustainable water management in the high-risk areas.



Damaged CD in Chintamani Taluk



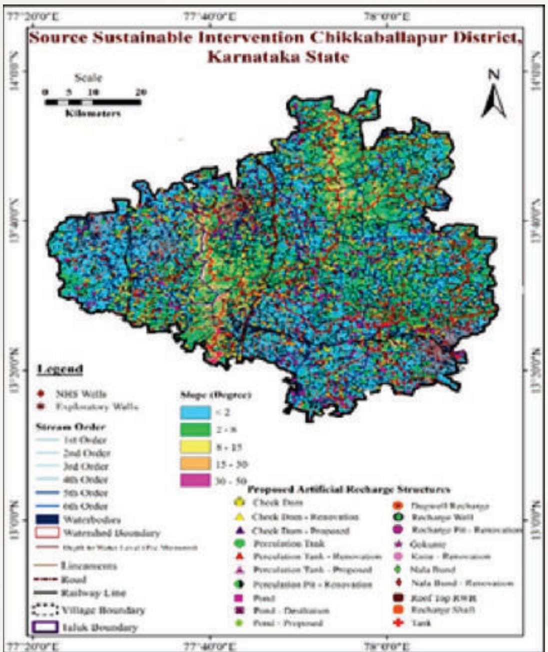

Sustainability categorisation



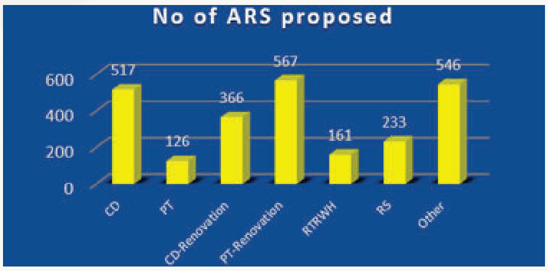

Village Sustainability

# SOURCE SUSTAINABILITY MEASURES SUGGESTED

After conducting detailed field studies and receiving feedback from villagers, state govt. officials, a range of additional and renovation of existing artificial recharge structures has been proposed for Chikballapur district (Fig.-8). These include 517 Check Dams, 128 Percolation Tanks, 366 Check Dam renovations, 567 Percolation Tank renovations, 161 Roof-top Rainwater Harvesting systems, 233 Recharge Shafts, and 546 other structures. These proposed interventions aim to improve water availability and recharge groundwater resources in the district, which in turn will improve the sustainability of both surface as well as ground water sources. Thus, it will help in achieving the objectives of JJM.




Source Sustainability Interventions, Chikballapur District




## WAY FORWARD

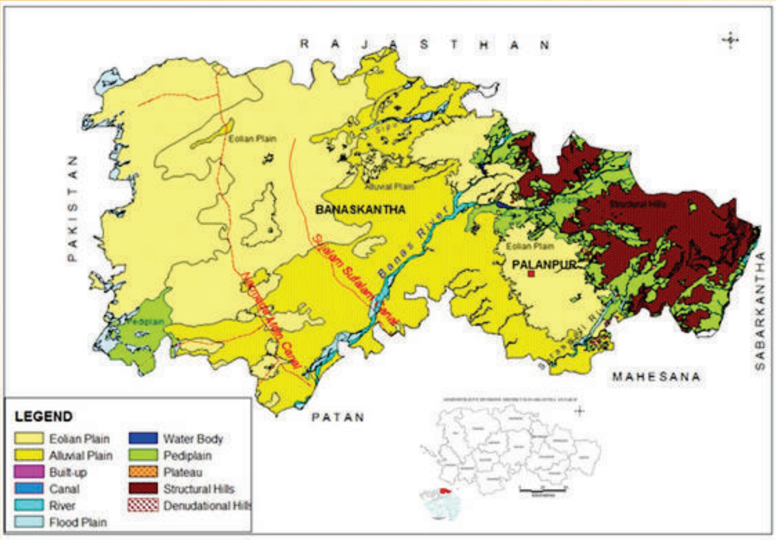
Such village wise demand vis-à-vis supply study provides comprehensive village wise risk assessment scenario and detailed source inventory provides sustainability capacities of the wells, thus giving a clear-cut picture on risk assessment and sustainability of the villages. Such studies will help in achieving the objectives of JJM wherever water supply is primarily based on ground water sources.

# NAQUIM

## SUCCESS STORY

### AQUIFER MAPPING HELPS IN IDENTIFICATION OF COMMON RECHARGE ZONE OF UNCONFINED AS WELL AS CONFINED AQUIFERS OCCURRING IN BANASKANTHA DISTRICT, GUJARAT

Banaskantha district has hilly- mountainous region having high relief and rugged topography covering parts of Dhanera, Palanpur, Vadgaon and entire Danta taluka in the east, the piedmont zone all along the periphery of hilly area, and west and southwest of River Banas the area is flat plain with occasional undulations given rise to by sand dunes and mounds in the west. The western extension of this plain merges into the marshy area of Rann of Kutch.




### PIEDMONT PLAIN WITH INSELBERGS:

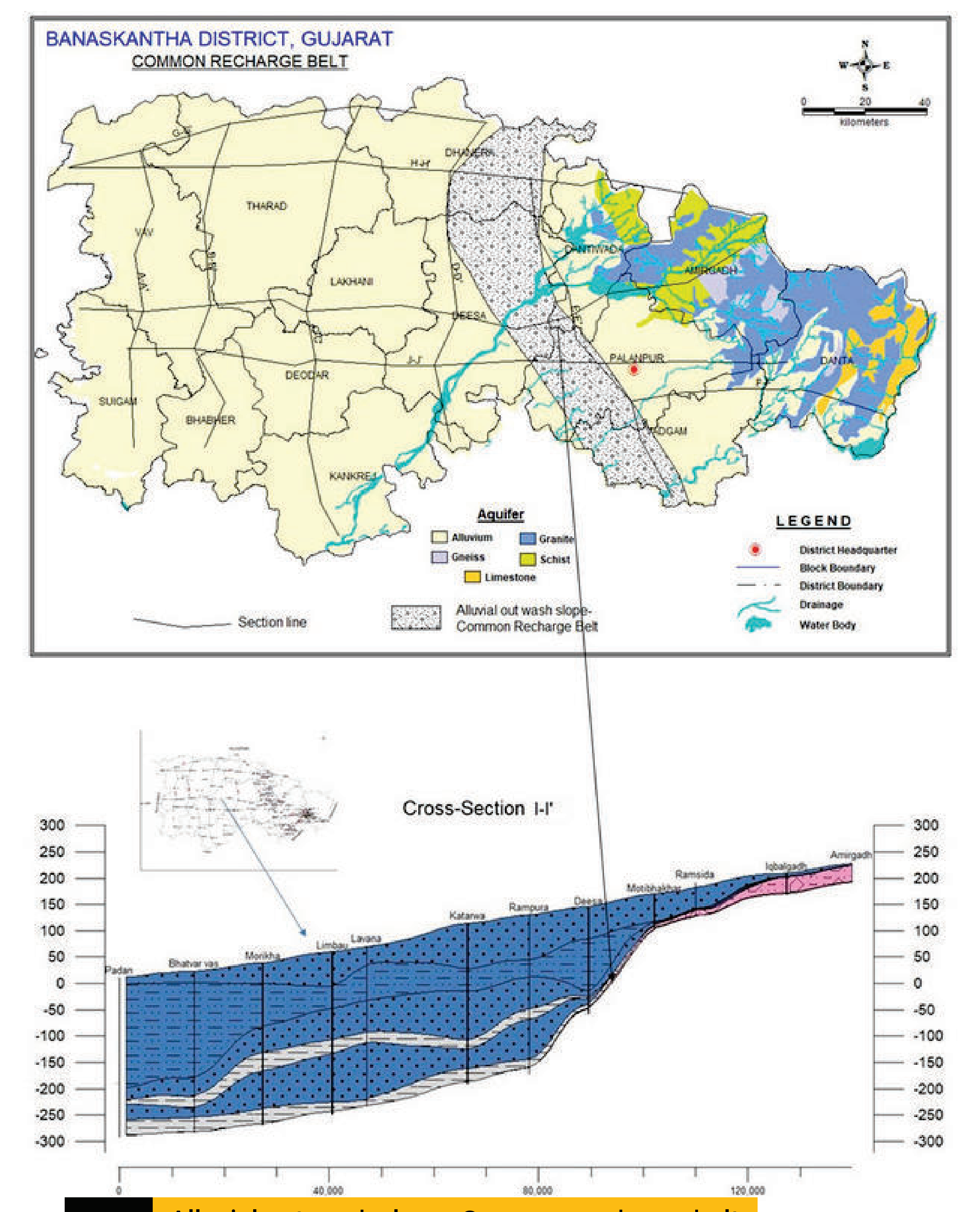
A belt of about 20-30 km width fringing the hilly terrain in the north and east approximately upto east longitude 72”15' constitutes piedmont plain. This belt is characterized by moderate to low relief, shallow alluvium (less than 40 m thick) and occasional inliers of older rocks. Isolated hillocks, tors, inselbergs and ridges of granites and older metamorphics, rise abruptly above the sandy plains breaking the monotony. The isolated hills in this belt attain elevations of 317 m amsl at Bhakhar and 364 m amsl near Chitrasni, However, the general elevation of this plain ranges from 180 to 240 m amsl.

A total of validated 162 lithologs of exploratory wells and piezometers constructed by CGWB and GWRDC, State Gujarat falling in Banaskantha district were utilised to decipher the subsurface geometry of the aquifer with the help of ROCKWORKS software. The different boundaries of aquifers are disseminated based upon the lithological and electrical logs of exploratory well drilled down to maximum depth of 310 mbgl.

North-south and East –West two sets of hydrogeological sections are drawn. Nine layers are disseminated in the depth representing Phreatic, First confined and second confined aquifer separated by semi pervious to impervious layers in the district. Unconsolidated formation underlain by semi-consolidated to consolidated hard formation delineated in the Easter side of the district.

Confined aquifers in the area have been broadly grouped into first confined (shallow) aquifer occurring in depth from 48 to 235 m bgl and the second confined aquifer (deep) in depth 122 to 276 m bgl. These aquifers extend from the foothill of the Aravallis in the northeast to the little Rann of Kachchh in the west.

## DELINEATION OF ALLUVIAL OUT WASH SLOPE- COMMON RECHARGE BELT:




Alluvial out wash slope -Common recharge belt

A longitudinal foot hill zone which is known as common recharge belt has been delineated based on lithological sections drawn in aquifer mapping area of district. This zone has an area of about 1183 sq. Km with dimensions of 88 Km long and 15 Km wide. One East –West lithological section is passing in central part of the area showing disposition of different aquifers in depth. This belt is very important in recharge point of view where all deeper aquifer are abated and merged and formed single aquifer. If any recharge activity takes place in the belt it will recharge both unconfined and confined aquifer simultaneously. In recommendation this demarcated area is proposed to concentrate any artificial groundwater recharge activity by various methods for effective use of recharge.

# REPORT

# SPRING INVENTORY IN JAMPUI HILLS, NORTH TRIPURA DISTRICT

Ritu K. Oraon, V Sophia, Rupam Chattaraj, Dr. R.R. Purohit
Central Ground Water Board, SUO, Agartala

## 1.INTRODUCTION

The spring study was carried out in Jampui Hill Range, North Tripura District, covering an area of 471.86 km² falling in the Survey of India Toposheet no. 83D/7, 83D/8, 84A/5. The study area includes Jampui hill block and parts of Dasda and Damcherra blocks. Study was carried out with an objective to inventory springs in the area, identifying the spring type, their occurrence and distribution, to access the geochemistry of spring water and worked out a management plan for sustainable development of the area. This is the first time spring studies has being carried out by CGWB in this area, in which a total of 40 different springs in the Jampui Hills were inventoried and summarised in this paper.

## 2.SPRING INVENTORY

Spring is concentrated discharge of ground water on the surface. Water from spring moves downhill through soil, cracks or from any depression present in rock and comes out of the ground by natural pressure. The amount or yield of available water form springs may vary with the time of year and rainfall. Springs are the major source of fresh water specially in the mountainous areas. These springs are the main source of water for a large population of communities living in the hilly area of Tripura.

During the pursuance of the field study, 40 numbers of springs were inventoried. However, owing to the inaccessible nature of the terrain, only 35 were monitored periodically covering Jampui hill block, parts of Dasda and Damcherra block.

Phuldungsei 1 spring (pre-monsoon). (Fracture spring)

Phuldungsei 1 spring (post-monsoon) with Turbid Water

Tanky para 1 (Depression spring)

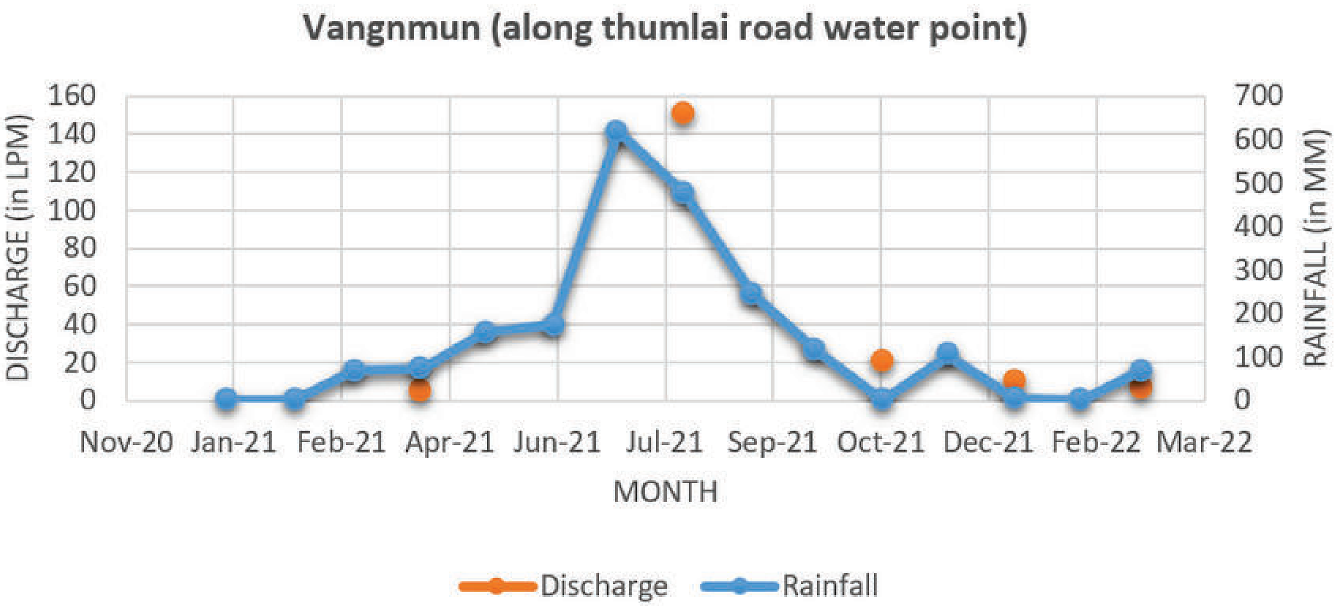
Tlangsang 3 spring (Fracture spring)

Tlangsang 2 Spring. (Contact spring)

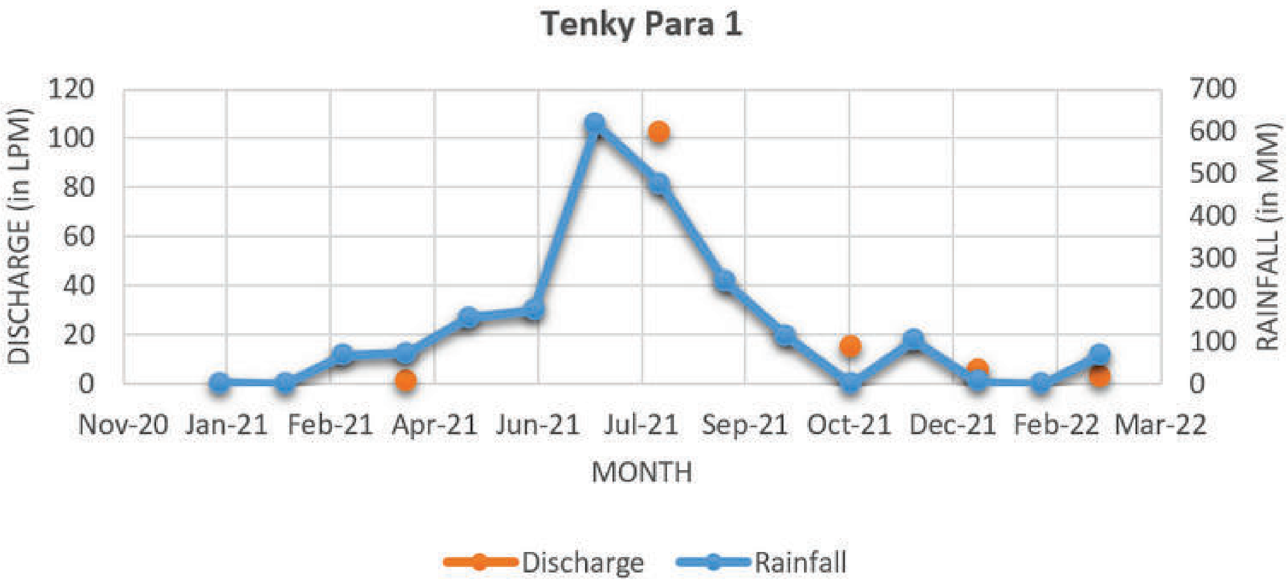
Tlangsang 5 Spring. (Depression spring)

### 2.1.Correlation of Rainfall Recharge with Discharge of the Springs:

Most springs show fluctuation in the rate of discharge. Fluctuations are in response to rainfall. The discharge measurement indicates the springs of Jampui hill are of seasonal nature. The discharge pattern is deeply correlatable with rainfall pattern, the discharge is highest in monsoon period and the discharge decreases gradually in post monsoon and become lowest in pre-monsoon where in some springs even go dry.




Discharge (lpm) of Vangnmum spring vs Rainfall (mm) Kanchanpur station for the year 2021




Discharge (lpm) of Tenky Para 1 spring vs Rainfall (mm) Kanchanpur station for the year 2021

## 2.2. Spring Classification

Spring is described as a concentrated discharge of ground water appearing on the surface as a current of flowing water (Todd & Mays, 2005, p-67-68). Springs have been classified into various types depending upon various criterion like rock structure, discharge, temperature, and variability. Spring are fed by aquifers system i.e. the types of rock present in that area, which stores and transmits water to those springs. Rocks of various type show different properties which are characteristics of their process of formation. All these properties influences behaviour of spring.

Bryan (Bryan, 1919) divided all springs into (1) those resulting from gravitational forces and (2) those resulting from non-gravitational forces. Meinzer (1923) proposed a classification based on the magnitude of the springs. Orders were assigned based on the mean discharge of the individual springs.

In the present study, all the springs observed were gravitational in nature (no artesian springs are found in Jampui hills area) and there was no temperature variability (no spring in excess of normal local ground water temperature).

Hence, for the present study, the classifications based on their lithological setting and mean discharge has been considered.

### 2.2.1 Classification based on Gravitational forces:

The springs in the study area have been classified under gravitational forces in to 3 types based on their lithological setting namely, Depression, Contact and Fracture springs (Table.no.2)

1. Depression Spring: Formed where the ground surface intersects the water table.
2. Contact Spring: Created by a permeable water bearing formation overlying a less permeable formation that intersects the ground surface.
3. Fracture (Tubular) Springs: Water releasing from fracture/joints/beddings of impermeable to semipermeable rocks or formations.

**Table no 1 : Different types of springs inventoried in the study area based on gravitational forces**

| Sl. No | Spring Types | Nos | Names | Lithology |
|---|---|---|---|---|
| 1. | Contact Spring | **6** | Khakchnagpara, Phuldungsei 4, Tlangsang 1, Vaisum 1, Behliangchip and Tlangsang 2 | Contact between unconsolidated soil and semi-consolidated sandstone. |
| 2. | Depression spring | **12** | Hmuanchang 2, Phuldungsei 3, Phuldungsei 5, Santipur, Paschim Bandarima, Tenky para1, Tlaksih 1, Tlangsang 5, Vahnmun 1, Vahnmun 2, Vaisum 4 , Zomuantlang 2 | Unconsolidated sediments |
| 3. | Fracture spring | **17** | Hmuanchang 1, Hmunpui 1, Hmunpui2, Khantlang1, Khantlang 2, Khantlang 3, Phuldungsei 1, Phuldungsei 2, Ruchukon, Sabual, Tenky para 2, Thumlai Road water pioint, Tlangsang 3, Tlangsang 4, Vaisum 2, Vaisum 3 Zomuantlang 1. | Bedded sandstone |
| **Total** | | **35** | | |

## 2.2.2. Classification based on Discharge of the springs:

On the basis of discharge, springs of Jampui Hills are classified as per Meinzer classification given in the Table no 3.

Table no 2 : Classification of Springs by Discharge (After Meinzer)

| Sl. No | Magnitude (Order) | Mean discharge | Numbers of Spring | Names |
|---|---|---|---|---|
| 1. | 4th | 10-100 l/s | **1** | Hmunpui 2 |
| 2. | 5th | 1-10 l/s | **6** | Hmuanchang 2, Hmunpui 1, Tlangsang 1, Vaisum 1, Vaisum 3,Zomuantlang 2 |
| 3. | 6th | 0.1-1 l/s | **18** | Behliangchip, Khakchnagpara,, Khantlang 1, Khantlang 2,Khantlang 3, Phuldungsei 2, Ruchukon, Sabual, Paschim Bandarima, Tenky para1, Thumlai Road water pioint, Tlaksih 1, Tlangsang 2, Tlangsang 4, Vahnmun 2, Vaisum 2, Vaisum 4,Zomuantlang 1 |
| 4. | 7th | 10-100 ml/s | **9** | Hmuanchang 1, Phuldungsei 1, Phuldungsei 4, Phuldungsei 5, Santipur, Tenky para2, Tlangsang 3, Tlangsang 5, Vahnmun 1 |
| 5. | 8th | <10 ml/s | **1** | Phuldungsei 3 |
| **Total** | | | **35** | |

## 2.3. Hydrochemistry of Spring Water

Assessment of spring water quality was carried out from various spring sources for basic, heavy metal, Iron and Arsenic and Uranium analysis during the month of November 2021 and March 2022 respectively.

The statistical summary of the Physico-chemical parameters of the spring water samples collected from various springs during the pre and post-monsoon from the study area is shown in the Table no 3. The concentration of all parameters is within the BIS permissible limit except the concentration of Fluoride at Santipur during post monsoon.

The low electrical conductivity, especially low Cl and SO4 shows that flow paths is short. It implies that the water did not travel long enough indicating that the recharge areas are not too far or the springshed is small.

The Piper plot shows that 44% of the spring water samples in the study area fall in the left quadrant which are calcium bicarbonate (Ca-HCO3) water, which is typical of shallow fresh groundwater, 48% fall in Sodium bicarbonate water and 4% each in sodium chloride and calcium sulfate water during pre monsoon.

Table no 3 : Summarized results of analysis of groundwater samples collected during November 2021 and March 2022

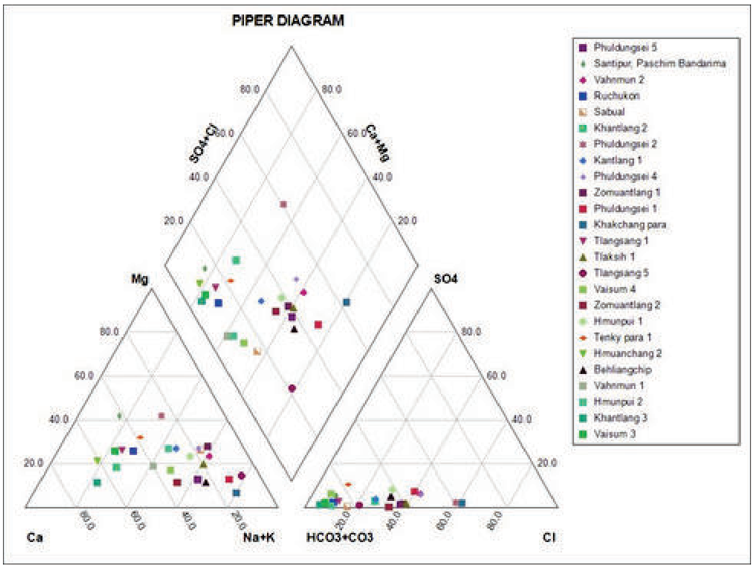
| Sl.No. | Chemical constituents (concentrations in mg/l) except pH and EC) | Water Samples from Springs | | | |
|---|---|---|---|---|---|
| | | Pre monsoon | | Post monsoon | |
| | | Min | Max | Min | Max |
| 1. | pH | 6.0 | 8.4 | 7.47 | 8.64 |
| 2. | EC (µS/cm) at 25˚C | 45.48 | 456.7 | 34.51 | 232.40 |
| 3. | Turbidity(NTU) | BDL | 0.22 | BDL | 1.00 |
| 4. | TDS | 30.02 | 301.42 | 19.66 | 136.60 |
| 5. | $CO_3$ | 0 | 9 | 0.00 | 9.00 |
| 6. | $HCO_3$ | 24.42 | 305.24 | 24.42 | 189.25 |
| 7. | TA (as $CaCO_3$) | 24.42 | 314.24 | 24.42 | 189.25 |
| 8. | Cl- | 7.09 | 35.45 | 7.09 | 49.63 |
| 9. | $SO_4$ | 0.07 | 8.42 | 0.10 | 18.99 |
| 10. | $NO_3$ | 0.06 | 16.56 | 0.00 | 13.66 |
| 11. | F- | 0.01 | 0.11 | 0.33 | 1.70 |
| 12. | Ca | 2.00 | 70.056 | 2.00 | 30.02 |
| 13. | Mg | 1.21 | 15.76 | 1.21 | 14.56 |
| 14. | TH (as $CaCO_3$) | 15 | 205 | 15.00 | 125.00 |
| 15. | Na | 4.32 | 29.91 | 1.19 | 34.39 |
| 16. | K | 0.04 | 29.16 | 0.11 | 10.40 |
| 17. | Fe | | | 0.13 | 1.43 |
| 18. | U (ppb) | BDL | 0.16 | BDL | 1.239 |
| 19. | As (ppb) | | | BDL | 0.359 |

### 2.3.1. Suitability of ground water for drinking and domestic use

The result of chemical analysis shows that ground water quality in the area is potable and range of all the chemical constituents are within the permissible limit set by BIS (2012). In general, the electrical conductivity (EC) varies from 34.51 to 232.40 µS/cm. The content of iron in ground water ranges from 0.13 to 1.43 mg/L. Turbidity varies from BDL to 1 NTU.

### 2.3.2. Suitability of ground water for irrigation & industrial use

In general, spring water in the area is suitable for irrigation and industrial purposes. Wilcox diagram shows that 100% of samples during post monsoon fall under low sodium and low salinity hazard.The spring water can be used for irrigation with most crops on most soils with little likelihood that soil salinity will develop. Low sodium water can be used for irrigation on almost all soils with little danger of the development of harmful levels of exchangeable sodium.




Piper diagram showing groundwater type for the Pre Monsoon Samples

## 3. CONCLUSIONS

Corelating rainfall with spring discharge shows that the spring discharge fluctuates in response to rainfall. The springs of Jampui hill are of seasonal nature. The discharge is highest in monsoon period and gradually decreases in post monsoon with its lowest discharge during the pre-monsoon. Classification based on the gravitational forces, three types of springs are identified in the area namely, contact, depression and fracture springs. Also, on the basis of discharge, springs have been classified based on Meinzer classification, which fall in between Fourth to Eight order. Hydrochemical study of the spring has shown that quality of the spring water is suitable for domestic and irrigation use.

Adequate management of the spring chamber is required by periodical cleaning, flushing, desiltation and chlorination of its surrounding, which will help for maintaining the hygiene and quality of water. Turbid water in some of the spring was observed during the rainy season which can be treated mechanically (through filtration) or chemically (through flocculation and settling of suspended material). The spring chamber and the storage facility must be constructed based on the availability and requirement of local population. Some springs are abandoned due to siltation and collection of debris in the spring chamber. These springs can be revived and restored.

There is a need to restore and preserve the spring as it is the source of fresh water to the local community. Rejuvenation plan for the spring involves identifying recharge area of the aquifers feeding the spring and then taking up artificial recharge works like digging trenches and ponds to catch the surface flow and enhance the infiltration, thereby supplementing the natural groundwater recharge. Some of the springs have a small catchment area and low thickness of feeding aquifers etc., hence are highly vulnerable to low discharge. It also involves the maintenance and protection of catchment of the spring and the spring head to ascertain that there is no danger of pollution to ensure safe water. It involves land use management and control from anthropogenic interference in the springshed. Recharge areas or springheads are required to be mapped to protect the springs. Participatory management approach is adequately required for the sustainability of the springs.

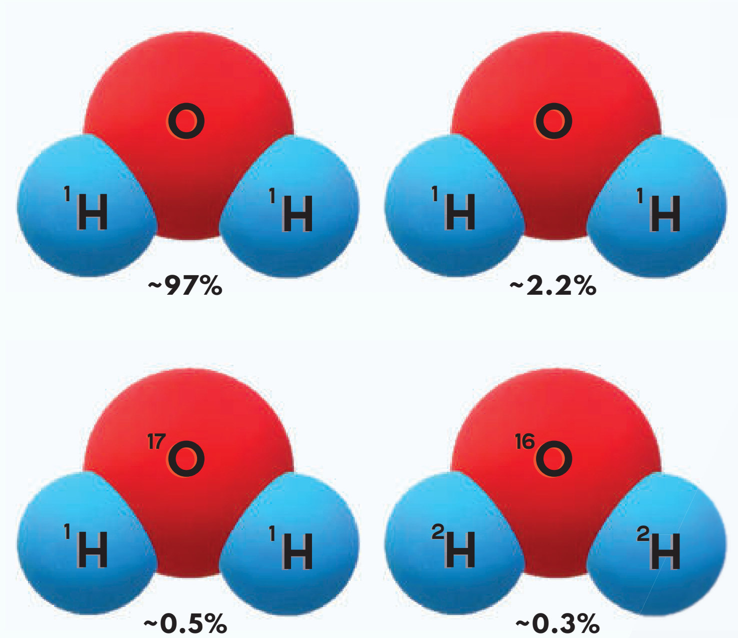
# Pathshala

## Application of Stable Isotopes in Hydrogeology

S. N. Dwivedi, Anoop Tiwari, CHQ, Faridabad

### Introduction

Isotopes are atoms of a particular element having the same atomic number but different atomic mass e.g., there are three isotopes of Oxygen (16O, 17O and 18O) and three isotopes of Hydrogen (1H, 2H and 3H). Stable isotopes are nuclei that do not decay to other isotopes and Radioactive isotopes are nuclei that spontaneously disintegrate over time to form other isotopes.




Water molecules are made up of hydrogen and oxygen atoms, therefore the isotopes of hydrogen and oxygen are of particular interest in groundwater studies as they act as natural tracers to trace the movement of water. Natural water contains mainly atoms of hydrogen of mass 1 (1H) and oxygen of mass 16 (16O). In addition, it also contains small amounts of deuterium (2H or D), tritium (3H) and isotopes of oxygen like 17O and 18O. The six isotopes of hydrogen and oxygen may combine to form 18 possible types of water molecule. These different molecules are known as isotopologues. However, out of 18 possible isotopologues of water, the most common ones are 1H216O accounting for ~ 97%; 1H218O for~ 2.2%; 1H217O for about 0.5% and 2H216O for about 0.3%.

### Expression of Stable Isotopes data

Stable isotopes are not reported as absolute numbers but their isotopic concentrations are expressed as the difference between measured ratio of sample [e.g. (2H/1H)] to the reference standard [e.g. (2H/1H) VSMOW where VSMOW is Vienna Standard Mean Ocean Water]. This is expressed as delta ($\delta$) notation. Since the value is very small so it is multiplied by 1000 to express in parts per thousand or per mil (‰).

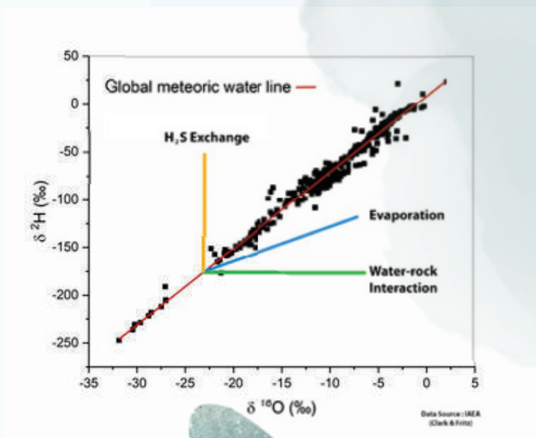
$$\delta_{sample} = (R_{sample} - R_{reference})/R_{reference} * 1000\ (‰)$$

### Global Meteoric water Line (GMWL) and deuterium excess (d-excess)

The Global Meteoric Water Line (GMWL) describes the global annual average relationship between $\delta$18O and $\delta$D in precipitation. It has been found that despite the complexities in various components of hydrological cycle, the $\delta$D and $\delta$18O in precipitation exhibit a predictable relationship on a global scale which is expressed by the following equation.

$$\delta D = 8\ \delta 18O + 10‰\ \text{(Craig, 1961)}$$

GMWL, thus serves as a reference for interpreting the processes that may lead to modification in the isotopic ratios.



In case of groundwater, if the measured values plot away from the line, the type of shifting provides important clues regarding the process leading to the observed shift (e.g., rock-water interaction, evaporation, mixing with seawater, etc.).

**Deuterium excess** is a derived parameter which is important in interpretation of the isotopic data. The parameter d-excess is defined by the relationship **$d = \delta D - 8\ \delta^{18}O$** (Dansgard, 1964). This parameter d-excess identifies the relative magnitude of kinetic fractionation in different water and provide information regarding various origins and conditions of formations of the vapour. On a global basis, d-excess averages about 10‰ but regionally it varies due to variation in humidity, wind speed and sea surface temperature. Higher values of d-excess are found in vapour generated under low humidity conditions.

## Use of Stable Isotopes groundwater studies

The dynamics of the water cycle is governed by a series of exchanges among the four major reservoirs of water i.e the Oceans, the ice caps, fresh water (rivers and lakes) and the atmosphere. The circulation of water on the planet and the various stages of water cycle have been studied in terms of isotopes. The water molecules store the information about their origin and pathways in their isotopic composition.

In the hydrological cycle, the ratio of the stable isotopes of H and O changes due to the process of isotopic fractionation which occurs whenever there is change in phase of water i.e during evaporation, condensation, melting and freezing. This causes redistribution of the isotopic molecular species between two phases of the same compound or between two different compounds. During the process of change in phase of water, the heavier isotopes i.e the 18O and 2H or D tend to enrich in the denser phase. Thus, water is enriched in heavier isotopes compared to the corresponding vapour.

Some of the important factors that govern the extent of isotopic fractionation include the evaporation, latitude, altitude and distance from the ocean. Thus, we can get important clues on source of the groundwater through stable isotope composition for e.g., groundwater having source of recharge at higher altitudes will be richer in lighter isotopes and can be distinguished from groundwater recharged at lower altitudes. Similarly, contribution from surface water bodies like reservoirs, ponds and lakes subjected to evaporation can be identified by enrichment in heavier isotopes. Isotopic ratios also help in studying the possible mixing of different types of groundwater, salinisation process and water-rock interaction.

## Applications of isotopic investigations in groundwater studies

Some of the potential applications of isotopic studies in groundwater investigations include

- Understanding the recharge source and dynamics of the aquifers
- Surface water –ground water interaction
- Inter-aquifer interactions
- Mixing of groundwater
- Salinity issues in groundwater
- Understanding Ground water flow path and contamination transport
- Aquifer renewability
- Understanding the submarine ground water discharge
- Characterisation of the springs etc
- Developing strategies to facilitate policies on water and environment protection.

# Isotopic Study Under NAQUIM

National Aquifer Mapping and Management Programme being implemented by Central Ground Water Board was launched during the XIIth Plan period (2012-2017). The programme aims at generating scientific information for facilitating sustainable management of groundwater resources in the country. The objectives of the programme include mapping and characterization of the aquifers, accessing their yield prospects and available resources, ascertaining their chemical quality, delineate area and aquifers specific plan for artificial recharge etc. and finally proposing a plan for sustainable management of the ground water resource with various supply and demand side interventions. As a part of the programme, isotopic investigations were carried out in parts of 12 States of the country namely Andhra Pradesh, Bihar, Gujarat, Karnataka, Kerela, Tamil Nadu, West Bengal, Haryana, Telangana, Goa, Uttar Pradesh and Rajasthan under which nearly 1400 groundwater samples were analyzed for stable isotopes of oxygen (δ18O) and deuterium (δ2H also expressed as δD). The results have been depicted for each of the study area through (i) Cross plot of δD Vs δ18O (ii) spatial distribution of δ18O (iii) Cross Plot of d – excess (‰) Vs δ18O and (iv) spatial distribution of d - excess in groundwater.

Isotopic tracers have helped in improved understanding of the dynamics of the water cycle which is governed by a series of exchanges among the four major reservoirs of water i.e. the Oceans, the ice caps, fresh water (rivers, lakes and groundwater) and the atmosphere. Isotope based investigations are thus finding wider use in improved assessment and understanding of several ground water issues. As water molecules are made up of hydrogen and oxygen atoms, therefore the isotopes of hydrogen and oxygen are of particular interest in water related studies as they act as natural tracers to trace the movement of water.

Under the NAQUIM Programme, a humble beginning of the use of the isotopic signatures in groundwater in select areas from different parts of the country was initiated. A first order assessment of the results reveals the following salient observations:

- Significant impact of the recharge from surface water sources have been indicated in parts of the study area falling in Anantapur district, Andhra Pradesh and Nalgonda district Telangana.
- Possibility of recharge to the aquifers in the eastern part of the Ganga stem in parts of Bihar from the River Ganga.
- Possible mixing of groundwater with sea water in parts of Porbandar district Gujarat and Diu Island in the UT of Dadra & Nagar Haveli and Daman & Diu.
- Faster recharge in the sedimentary aquifers in the Kuttanad area in parts of Kerela State.
- Possible imprints of recharge due to flooding due to NE Monsoon during 2015-16 in some parts of the coastal area of Tamil Nadu state.
- Ground Water recharge from precipitation containing significant proportion of recycled vapour in parts of Goa
- Impact of infiltration rate on modification of isotopic signatures in Lalitpur and Jhansi districts in Bundelkhand Region.
- Overlapping signatures of groundwater in multi-aquifer system in alluvial areas of West Bengal, Bihar, Uttar Pradesh and Haryana.

The results from NAQUIM studies can be fine-tuned with further detailed study involving increased sampling from all possible sources of recharge including the precipitation. In addition, there are several potential applications of isotopic studies in groundwater investigations like Understanding the recharge source and dynamics of the aquifers; Aquifer renewability, Surface water –ground water interaction; Inter-aquifer interactions; Mixing of groundwater; Salinity issues in groundwater; Understanding Ground water flow path and contamination transport; Understanding the submarine ground water discharge; Characterization of the springs etc. Focused study on these aspects needs to be taken up in future to make the best possible use of this emerging technology in addressing challenging issues in groundwater.

# Shodh

## Research Publication by CGWB Officers in Reputed International Journal

**TITLE: WELL HYDRAULICS IN PARTS OF WESTERN VIDARBHA REGION IN DECCAN TRAPS, INDIA**

JOURNAL OF THE GEOLOGICAL SOCIETY OF INDIA, 99, ISSUE 1, PAGE NO.105-110

**MISHRA C., TOPPO S., NAIK P.K., SINGH H.P., RAJ A.**

Abstract : Deccan Traps cover about 15% (500,000 sq. km) of Indiaâ€™s landmass, and about 82% of Maharashtra state. They deliver fluctuating hydraulic results due to their disposition as a multilayered aquifer system. The drawdown and recovery data of eight exploratory wells in Akola, Buldhana and Washim districts of western Vidarbha region in Maharashtra state were analyzed to define the aquifer characteristics in basalts. Conventional methods such as those suggested by Theis (1935), Jacob-Cooper (1946), Chow (1952) and Walton (1962) were used to estimate aquifer parameters such as transmissivity (T) and storativity (S). The advantages and limitations of these methods were critically examined from their applicability perspective. Estimated values of T ranged from 7 to 133 m2/day and those of S from 6.05Ã—10âˆ’4 to 1.63Ã—10âˆ’2, showing poor yields in most parts. In this study, Jacob-Cooper (1945) and Theis recovery (1935) methods were found easy to adopt and yielded rapid results compared to Theis curve matching (1935), Chow (1952) and Walton (1962) methods that typically involve either curve matching or complex computational techniques. Â© 2023, Geological Society of India, Bengaluru, India.

**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 âˆ¼59, âˆ¼69, and âˆ¼73% 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: Hydrogeochemical Appraisal of Groundwater Quality and Suitability for Irrigation in Samoda Nala Watershed, Chhattisgarh, India, usingÂ Statistical and Geographic Information Systems**

Indian Journal of Environmental Protection, 43, Issue 3, page No. 195-209

**Kannukettymukalel I., Dewangan R., Jhariya D., Kishore N.**

Abstract : The current study was carried out in the Samoda Nala watershed, Chattisgarh, India, to determine the spatial variation of groundwater chemistry, its relationship with hydrogeochemistry and other activities. A total of 45 groundwater samples and 13 surface water samples were obtained from the research region and submitted to various geochemical and geographic information system (GIS) studies in order to characterise the general state of the groundwater and surface water in the area. For the analysis of cations and anions, standard analytical techniques were used. Cations, such as Ca2+, Mg2+, Na+, K+Â alongwith anion, like HCO3–, Cl–, F–, NO3–, SO42–Â were analyzed and compared with the BIS standard to find out the quality of water for drinking purposes. Among the anion and cation ions, the NO3–Â ion had a higher concentration in several samples (>38%) than the BIS permissible limit. Furthermore, the correlation analysis of the ions reveals that Cl–TDS, SO42–TDS, Mg2+–HCO3–Â and Na+–Cl–Â have strong positive correlation (>0.7) with each other. The findings, which were then plotted on various bivariate diagrams and the gibbs diagram, to determine the primary mechanism controlling the area's water quality, revealed that rock–water interaction is the most important factor. Furthermore, the GIS–based prediction of the water quality index in light of all of these key ions assisted in identifying locations with good, moderate and poor water quality. The quality of irrigation water demonstrates that SAR, RSC, USSL and Wilcox diagram projected samples in the safe zone, however, the samples calculated for the magnesium hazard reveal that approximately 31% of samples are unsuitable. Validation of the generated water quality index of the study area with reference to the NO3–Â concentration has given 91% accuracy of the obtained result. Â© 2023– Kalpana Corporation.

**Title: Groundwater potential zone demarcation in the Khadir Island of Kachchh, Western India**

Groundwater for Sustainable Development, 20, art. No. 100876

**Goswami A., Gor N., Borah A.J., Chauhan G., Saha D., Kothyari G.C., Barpatra D., Hazarika A., Lakhote A., Jani C., Solanki J., Thakkar M.G.**

Abstract : In the present work, remote sensing, Geographic Information System (GIS), field investigation, and mapping methods/techniques were incorporated to demarcate the groundwater potential zones in the Khadir Island of the Kachchh region. Preliminary work consists of reconnaissance surveys and the preparation of various thematic maps of the region. The lithology (Khadir formation of Mesozoic period), slope, soil, land use and land cover (LULC), lineament density (Faults, fractures and linear valleys), drainage density, and geomorphology thematic maps were prepared using Advanced Land Observation Satellite – Phased Array Type L–band Synthetic Aperture Radar (ALOS PALSAR) data with 12.5 m spatial resolution, Sentinel–2 data (bands 8, 4, and 3), and ICAR– National Bureau of Soil Survey and Land Use Planning and Geological Survey of India (GSI) published maps. The Groundwater Potential Index (GWPI) was determined by integrating and computing the groundwater thematic maps. The groundwater potential map was further validated using the Cohen's Kappa statistic method. The GWPI determines a high groundwater potential zone in the study area, of which about 12.24% and 19.41% of the area are excellent and very good potential zones for groundwater extraction, respectively. The study shows that the Cohen's Kappa coefficient of 0.767, which falls under the â€œGood Strength of Agreementâ€ validates the result and determines that the Western and Eastern parts of the study area have greater groundwater potential zones. Â© 2022 Elsevier B.V.

**TITLE:** **DELINEATING VARIABILITIES OF GROUNDWATER LEVEL PREDICTION ACROSS THE AGRICULTURALLY INTENSIVE TRANSBOUNDARY AQUIFERS OF SOUTH ASIA.**

ACS ES AND T WATER, 3, ISSUE 6, PAGE NO. 1547-1560

**MALAKAR P., BHANJA S.N., DASH A.A., SAHA D., RAY R.K., SARKAR S., ZAHID A., MUKHERJEE A.**

Abstract : Groundwater depletion in South Asiaâ€™s 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.

**TITLE:** **ASSESSMENT OF LAND USE AND MONSOON IMPACT ON HIGH NITRATE GROUNDWATER AND HEALTH RISK IN THE HARD ROCK AQUIFER, SOUTH INDIA**

ENVIRONMENTAL GEOCHEMISTRY AND HEALTH, VOL.45, ISSUE-7

**SENTHILKUMAR M., RAJMOHAN N.**

Abstract : Groundwater sustainability in hard rock aquifers is compromised largely due to nitrate contamination from anthropogenic sources resulting in diminishing potable resources and attendant health issues. A purpose-driven study through an integrated approach was undertaken in the area of interest (hard rock aquifer) to assess the variations in nitrate concentration and resultant health impacts in response to variations in monsoon and land use patterns. Groundwater samples (n = 284) were collected for a period of three years (2017–2019) and analysed. From the analytical data, it is inferred that 27% and 9% of groundwater samples in the study area have high NO3− values of > 45 mg/l and > 100 mg/l, respectively. NO3− contamination zones mapping illustrates that NO3−contaminated area (> 45 mg/l) varied seasonally 1164 km2 (2017), 1086 km2 (2018) and 1640 km2 (2019)) and high-risk area (NO3− > 100 mg/l) has reduced drastically during 2018 due to dilution by monsoon (277 km2 (2017), 41 km2 (2018), 634 km2 (2019)). The lowest NO3− and Cl−concentrations are recorded during 2018 which coincides with high rainfall (2061 mm). NO3− concentrations in response to land use pattern indicate that the hot spots (NO3− > 45 mg/l and > 100 mg/l) are observed in groundwater samples of residential areas which are vulnerable to contamination from domestic wastewater, septic tanks and other pollutants. Further, wastewater infiltration facilitated the dissolution of certain minerals in the unsaturated zone which enhanced the accumulation of NO3− and other ions in this aquifer. Mineral weathering, denitrification and evaporation processes also affected the groundwater chemistry. The health risk model (HQoral) indicates that groundwater in 1261 km2 (2017), 1232 km2 (2018) and 1669 km2 (2019) is unsuitable for drinking (HQ > 1) and causes adverse health risks to the local inhabitants. The study has identified areas from the central and southeastern regions significantly affected by nitrate pollution underpinning the necessity of using treated groundwater for drinking purposes. © 2023, The Author(s), under exclusive licence to Springer Nature B.V.

# SOCIAL MEDIA HIGHLIGHTS

**Central Ground Water Board** @CGWB_CHQ

A Tier-III training programme was organized by Central Ground Water Board, West Central Region, Ahmedabad at Rajoda, Taluka Bavla, Ahmedabad district. @MoJSDoWRRDGR

5:09 PM · Jan 2, 2023 · 1,233 Views

**Central Ground Water Board** @CGWB_CHQ

Central Ground Water Board, SER organised Nadi Utsav 2023 at Kalimati village, Mayurbhanj, Odisha Under India @75 Azadi ka Amrit Mahotsav. @MoJSDoWRRDGR


4:32 PM · Feb 15, 2023 · 2,036 Views

**Central Ground Water Board** @CGWB_CHQ

Inaugural function of mandatory training on "Maintenance Management " is organised at RGNGWTRI, Naya Raipur. The inagural Session of mandatory training was chaired by Sh. Nidhish Verma and Sh. Sourabh Gupta, RD, RGNGWTRI. @MoJSDoWRRDGR

3:55 PM · Jan 17, 2023 · 1,277 Views

**Central Ground Water Board** @CGWB_CHQ

राजभाषा संसदीय समिति की दूसरी उपसमिति द्वारा केंद्रीय भूमि जल बोर्ड, रांची प्रभाग का निरीक्षण सफलता पूर्वक संपन्न हुआ। @MoJSDoWRRDGR

Translate Tweet

5:50 PM · Jan 3, 2023 · 1,169 Views

**Central Ground Water Board** @CGWB_CHQ

Sh. Subodh Yadav, Joint Secretary (DoWR, RD & GR) Ministry of Jal Shakti interacted with officers of CGWB regarding PMKSY-HKKP-GW scheme. @MoJSDoWRRDGR


5:04 PM · Jan 24, 2023 · 1,209 Views

**Central Ground Water Board** @CGWB_CHQ

Monitoring for January month is being carried out in different parts of Madhya Pradesh. @MoJSDoWRRDGR

5:31 PM · Jan 15, 2023 · 2,525 Views

**Central Ground Water Board** @CGWB_CHQ

Officers from CGWB, KR along with officers from CWC conducted ground Truthing in Pullampara Gram Panchayat, Kerala for 4th National Water Award-2023 @MoJSDoWRRDGR

5:28 PM · Mar 13, 2023 · 2,081 Views

**Central Ground Water Board** @CGWB_CHQ

Inaugural function of 6 weeks training on "Certificate Course in Water Auditing" is organised at Auditorium of RGNGWTRI, Naya Raipur.The session of training was chaired by Sh.TBN Singh, Member(East- IC), Sh.Nidhish Verma and Sh.Sourabh Gupta, RD, RGNGWTRI,Raipur. @MoJSDoWRRDGR

10:09 PM · Mar 20, 2023 · 1,820 Views

# SOCIAL MEDIA HIGHLIGHTS

**Central Ground Water Board**
@CGWB_CHQ

Scientists from CGWB, SUO, Jodhpur conducted Preliminary Yield Test (PYT) and prepared litholog at Bari site, Tiwari block, Jodhpur. Discharge obtained is 276 Lpm. @MoJSDoWRRDGR

3:15 PM · Apr 20, 2023 · 369 Views

**Central Ground Water Board**
@CGWB_CHQ

Chairman, CGWB attended a two-day water Conclave- 2023 organized by Haryana Irrigation and Water Resources Department and the Haryana Water Resources Authority.
@MoJSDoWRRDGR


6:35 PM · Apr 26, 2023 · 339 Views

**Central Ground Water Board**
@CGWB_CHQ

The Inaugural function of 3-Day training on "Mentoring Skill" was organized at RGNGWTRI, Naya Raipur. The inaugural Session of training was chaired by Sh. Sourabh Gupta, RD, RGNGWTRI, Raipur, and Dr Ashwin Janaikar, RT-Mentoring, DoPT.
@MoJSDoWRRDGR

4:47 PM · May 2, 2023 · 403 Views

**Central Ground Water Board**
@CGWB_CHQ

केंद्रीय भूमि जल बोर्ड, मध्य पूर्वी क्षेत्र, पटना द्वारा राजभाषा हिंदी कार्यशाला का आयोजन किया गया जिसमें मुख्य वक्ता रहे श्री श्रीकृष्ण चंद्र श्रीवास्तव, वरिष्ठ अनुवाद अधिकारी, राज्य एकक कार्यालय, भारतीय भूवैज्ञानिक सर्वेक्षण।
@MoJSDoWRRDGR

10:59 AM · Apr 3, 2023 · 492 Views

**Central Ground Water Board**
@CGWB_CHQ

Scientist from CGWB, SUO, Jodhpur conducted Preliminary Yield Test (PYT) and prepared litholog at Rawalgarh site, Balesar block, Jodhpur. Discharge obtained is 108 Lpm.
@MoJSDoWRRDGR

3:54 PM · Apr 19, 2023 · 407 Views

**Central Ground Water Board**
@CGWB_CHQ

RGNGWTRI, Raipur organised a meeting on TNA workshop to be held in Delhi. Sh.Subhodh Yadav, JS (Admn,GW & IC) chaired the meeting. Chief Engineers from NWA, CWC, Director from NERIWALAM, Deputy Secretary from MoJS, Regional Directors from RGNGWTRI and NCCR, Raipur @MoJSDoWRRDGR

10:31 AM · Jun 12, 2023 · 166 Views

**Central Ground Water Board**
@CGWB_CHQ

Scientist from CGWB, SUO, Jodhpur conducted Preliminary Yield Test (PYT) and prepared litholog at Olndroka Dam (upstream), Jodhpur. Discharge obtained is 20 Lpm
@MoJSDoWRRDGR

3:34 PM · May 10, 2023 · 396 Views

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1. Aquifer Performance Test (APT) conducted by officers of CGWB, SER, Bhubaneswar at Patbil Exploratory Site, Karanjia Block, Mayurbhanj.
2. Geophysicists of CGWB, NCR, Bhopal carried out Geophysical Survey at Burhanpur district, Madhya Pradesh.
3. Central Ground Water Board, SER organised Nadi Utsav 2023 at Uparbeda village, Kusmi Block, Mayurbhanj, Odisha under India 75 Azadi ka AmrIt Mahotsav.
4. International Women's Day Celebration at various offices of Central Ground Water Board.
5. केंद्रीय भूमिजल बोर्ड, मुख्यालय फरीदाबाद में स्वच्छता पखवाड़े का आगाज किया गया, जो की 16.03.2023 से 31.03.2023 तक चलेगा। इसी कड़ी में कार्यालय परिसर में सफाई सभी अधिकारियों एवम स्टाफ द्वारा की गई। जिसमे अध्यक्ष, सभी सदस्य, एवम निदेशक प्रशासन, कार्यालय प्रमुख, एवम सभी ने बढ़ चढ़ के अपनी हिस्सेदारी ली।
6. World Water Day 2023 celebrated at Central Headquarters and Regional offices of CGWB.
7. One day Workshop organized by Central Ground Water Board, MER on "National Aquifer Mapping and Management (NAQUIM) Program". Hon'ble MOS, Environment, Forest, Climate change and Consumer affairs, Sh. Ashwini Choubey Ji graced the program.

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1. SR, Hyderabad won Best Region Award for AAP 2022-2023. Chairman CGWB congratulated and awarded RD, SR Hyderabad team.
2. A team of Officers from CGWB CHQ, WCR, NCR attended a meeting of Second Mission of the EU expert for the works related to risk assessment in Tapi River basin.
3. Officer of CGWB, SUO, Jodhpur conducted Preliminary Yield Test (PYT) and prepared litholog at Tiwari block, Jodhpur. Discharge obtained is 198 Lpm.
4. Officer of CGWB, ER shared and presented outputs of NAQUIM findings of Cooch Behar district before the representatives of District Administration. The Meeting was chaired by ADM, Shri Ravi Ranjan (IAS) and Officers from line departments were also present in meeting.
5. Central Ground Water Board, North Central Region, Bhopal conducted Public Interaction Program on topic "Local Groundwater Issues and Management" at Sandawata village, Sarangpur block, Rajgarh district.
6. Dr. M. Senthil Kumar, Sc-D, CGWB Faridabad gave a presentation on Groundwater Scenario of India, management initiatives, NAQUIM, Groundwater Resources Augmentation and community led initiatives in India at 2nd Environment and Climate Sustainability Working Group Meeting at Gandhinagar, Gujarat
7. Chairman, CGWB attended a two-day water Conclave- 2023 organized by Haryana Irrigation and Water Resources Department and the Haryana Water Resources Authority.

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1. Meeting of the India-Hungary Joint Working Group (JWG) held in Shram Shakti Bhawan on 25th April 2023. Shri Subodh Yadav, JS (GW, IC and Admin) lead the Indian delegation.
2. माननीय संसदीय राजभाषा समिति द्वारा केंद्रीय भूमि जल बोर्ड, क्षेत्रीय कार्यालय देहरादून का राजभाषायी निरीक्षण किया गया। माननीय समिति द्वारा देहरादून कार्यालय में राजभाषा हिंदी के प्रचार एवं उत्कृष्ट कार्यान्वयन पर प्रसन्नता जताई गई।
3. Central Ground Water Board organized a workshop on NAQUIM 2.0 at CSRMS Campus, New Delhi.
4. Regional Director's meeting chaired by Sh. Sunil Kumar, Chairman at CGWB, CHQ
5. Scientists from CGWB, NHR Dharamshala conducted PYT & prepared the litholog at Sanauran site Rait block of district Kangra, Himachal Pradesh. Discharge recorded is 3-3.5 LPS.
6. A compendium of Stable Isotope Studies under NAQUIM is released by Sh. Sunil Kumar, Chairman, CGWB and Sh. K. C. Naik, Former Chairman, CGWB
7. CGWB, CHQ organized a 2 days training programme on "Training of Trainers on Source Sustainability", which was attended by officers from all the regional offices of CGWB.