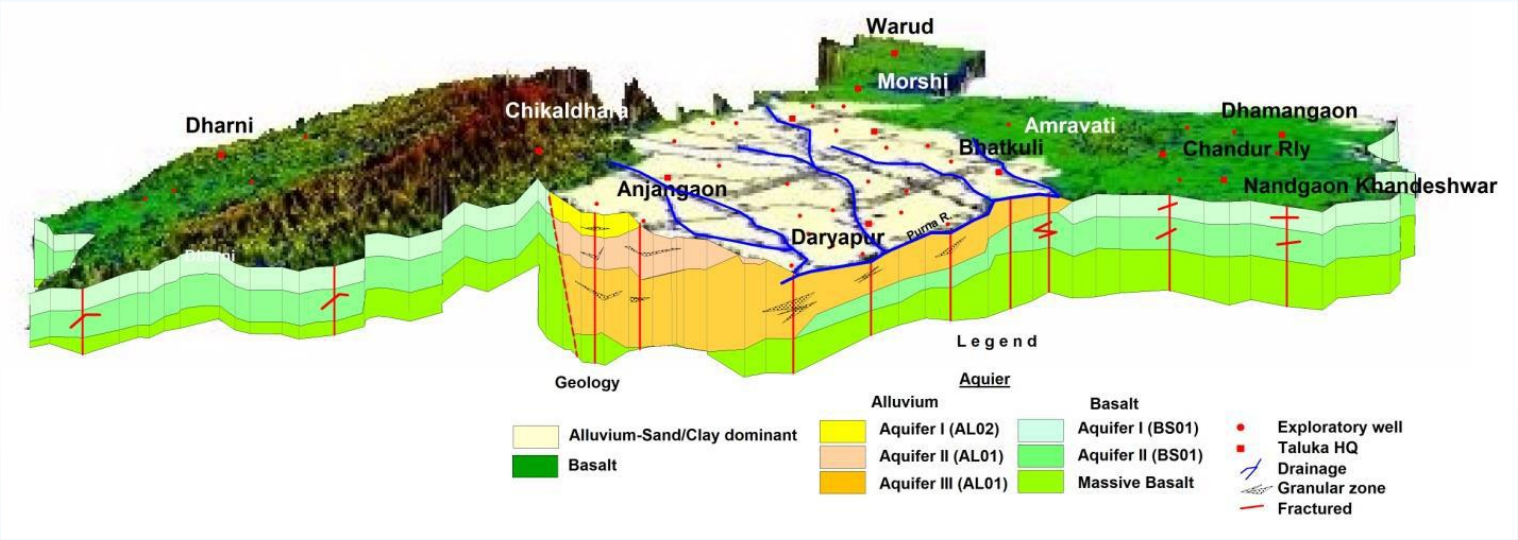
GOVERNMENT OF INDIA
MINISTRY OF JAL SHAKTI
DEPARTMENT OF WATER RESOURCES, RIVER DEVELOPMENT & GANGA REJUVENATION
CENTRAL GROUND WATER BOARD

ANNUAL REPORT 2018-19



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Compilation by-

Dr. Rakesh Singh, Scientist B
Sh. S. N. Dwivedi, Scientist C
Ms Shilpi Gupta, Scientist B
Dr. M. Senthil Kumar, Scientist C

Sh Ajit Singh, Draftsman
Sh. Sompal, UDC

Contents

EXECUTIVE SUMMARY

Central Ground Water Board (CGWB), a subordinate office of the Department of Water Resources, River Development and Ganga Rejuvenation, Government of India, is the National Apex Organisation entrusted with the responsibilities of providing scientific inputs for management, exploration, monitoring, assessment, augmentation and regulation of ground water resources of the country. Central Ground Water Board was established in 1970 by renaming the Exploratory Tube wells Organization (ETO) under the Ministry of Agriculture, Government of India. Later, it was merged with the Ground Water Wing of the Geological Survey of India in Year 1972. The Board carries out its activities through 18 Regional Offices, 17 Divisional offices and 10 State Unit offices located in States/UTs.

National Aquifer Mapping and Management Programme (NAQUIM)

NAQUIM is one of the important Programme of Department of Water Resources, River Development and Ganga Rejuvenation being implemented by Central Ground Water Board. Under this program, it is envisaged to cover nearly 25 lakh km^2 area of the country for which Aquifer Maps are to be prepared and management plans to be formulated for sustainable management of ground water resources in the country. Several activities such as data collection, data compilation and data generation for preparation of Aquifer Maps and Management Plans are being taken up in phased manner. The areas to be covered have been prioritised considering over-exploitation, ground water contamination and other issues. The cumulative coverage under NAQUIM, since 2012 (upto March 2019) is 10.83 lakh sq. km (6.31 lakh km^2 during 2012-17, 2.36 lakh km^2 during 2017-18 & 2.16 lakh km^2 during 2018-19). Thus, nearly 56.33% of the total mapable area identified (24.8 lakh sq. km) for aquifer mapping has been covered till March 2019.

Ground Water Exploration

Ground Water Exploration is carried to study the sub-surface hydrogeological set up of the aquifer, their interlayering and to evaluate aquifer parameters of aquifer systems. During the year 2018-19, the Board under its in-house Ground Water Exploration programme has constructed 824 wells (612 Exploratory Wells (EW), 204 Observation Wells (OW) and 08 Piezometers (Pz's)to assess the ground water potential in different hydrogeological set-up of the country. Priority was accorded to Over Exploited/ Critical/ Semi-Critical/ Drought Prone and areas affected with groundwater pollution etc. Out of 824 wells constructed, 690 wells were constructed in hard rock, 133 wells in alluvium and 1 well in Bouldary formation including 102 exploratory wells drilled in the tribal and 32 wells in drought prone areas.

Monitoring of Ground Water Observation Wells

The Board monitors the ground water level in the country four times a year (Jan/ May/ Aug/ Nov) through a network of around 23,000 (dug Wells 16485 & piezometers 6480) Ground Water Observation Wells. The ground water samples are collected during the pre-monsoon monitoring and analysed for the purpose of ascertaining the changes in chemical quality of ground water. Monitoring of Ground Water Observation Wells for May, August, November 2018 & January 2019 were completed and reports have been prepared describing fluctuation of water levels during each measurement compared to monitoring of previous year, decadal average and pre-monsoon period to depict detailed information regarding short term and long term changes in the ground water regime.

Geophysical Studies

During 2018-19, a total of 1859 Vertical Electrical Soundings (VES), 67.17 line km 1D resistivity profiling and 49 nos. of borehole logging have been conducted in various parts of the country to ascertain water bearing layer at different depths as well as in finalizing the tubewell assembly.

Water Quality Analysis

During the year, 28205 ground water samples have been analyzed, out of which 21549 water samples have been analyzed for determination of basic constituents, while 6608 water samples have been analysed for the Trace elements like As, Cd, Co, Cr, Cu Fe, Mn, Ni, Pb, Zn etc and 48 samples for pesticides. Ground quality analysis helps in understanding variation in water quality and pin pointing areas facing issues of geogenic and anthropogenic contamination of groundwater.

Reports and Information Booklets

Results of investigations carried out by Central Ground Water Board are suitably documented in the form of reports and maps which are categorized as Ground Water Year Books, State Reports (Hydrogelogical/ Exploration/ Geophysical/ Chemical), District Ground Water Brochures and Basic Data Reports. During 2018-19, 6 State Reports, 198 District Groundwater Brochures and 23 Ground Water Year Books were prepared & issued.

Water Supply Investigations

The Board carries out short-term water supply investigations for Government departments and defence establishments and helps in augmenting their water supply. During 2018-19, the Board conducted 151 such investigations

Dissemination and Sharing of Technical Know-how

The officers of CGWB participated in various seminars/ symposia/ workshop/ conference to share their experiencesin the Ground Water and also for getting exposure to new ideas/ technological developments in the Ground Water science with other experts. The officers of the Board also participated in various meetings /committees etc. to render advice on ground water development and management in specific areas.

Dynamic Ground Water Resources Estimation

The Annual Replenishable Ground Water Resources as on March 2017 of the Country have been assessed as 432 billion Cubic Metres (bcm) and the Net Annual Ground Water Availability has been estimated as 393 bcm. Annual Ground Water Draft as on March, 2017 for all uses is 249 bcm. The Stage of Ground Water Development of the country has been worked out as 63%.

Artificial Recharge Studies

Artificial recharge and rainwater harvesting help in sustainaing groundwater and neutralizing the impact of groundwater withdrawal from the aquifer. The Board provides technical guidance & also caters to the capacity building of central & state orgainsation in the field of groundwater. During the year, total of 92 artificial recharge structures (54 check dams, 4 percolation tanks, 2 sub-surface barrier, 26 recharge shaft and 6 piezometers) have been constructed in coordination with state implementing agencies under guidance of CGWB.

Human Resources Development

It has been the earnest endeavour of the Board to keep its technical personnel abreast with the latest developments in all aspects related to ground water development & management. Besides the officers of the Board, officers from State Departments were also included in the training programme organized by the Board. During the year 2018-19, 112 training programmes (44- Tier I, 20- Tier II and 48- Tier III) were conducted by RGI and a total of 7691 trainees (776- Tier I, 579- Tier II and 6336- Tier-III) were trained including 2282 female participants.

National Hydrology Project (NHP)

National Hydrology Project is the continuation of Hydrology Project- Phase II, with an approach of Integrated Water Resources Management for the whole country. NHP will help in gathering Hydro-meteorological data which will be stored and analyzed on a real time basis and can be seamlessly accessed at State/District/village level.

CGWB has taken the following activities under the NHP:

- Domain Specific Training through RGI, Raipur for officers from State and Central Agencies

- National Level Workshop on Rejuvenation of springs for water security through Springshed Development in Hilly Areas of the Country"
- Establishment of Center of Excellence for groundwater modelling
- Awareness Raising Programme on State Specific Ground Water Issues
- Institutions Capacity Enhancement through various national and international programs/ trainings.

Central Ground Water Authority

Central Ground Water Authority (CGWA) has been entrusted with the responsibility of regulating ground water development and management in the country and issuing necessary directives for the purpose. During the year 2018-19, 1627 NOCs have been issued online using "Web Based Application of Reciept and Issue of NoC for abstraction of Ground Water (www.cgwb-noc.gov.in)" application. In addition, 55 renewals of NOCs have also been issued.

IEC Activity- Mass awareness programs in Tribal Area

During the year 2018-19, nine mass awareness programs related to Water Conservation were carried out by CGWB in tribal areas of Chhattisgarh, Karnataka, Kerala, Manipur/Tripura, Rajasthan, Andaman & Nicobar Islands, Sikkim, Daman & Diu and Uttrakhand State. These programmes were attended by around 1360 participants.

CHAPTER 1

AN OVERVIEW

1.1 CENTRAL GROUND WATER BOARD

The Central Ground Water Board, the National apex organization dealing with Ground Water under the Ministry of Water Resources, River Development and Ganga Rejuvenation, Government of India is vested with the responsibilities to carry out ground water investigation studies, exploration, monitoring of development, management and regulation in the country.

1.2 MANDATE AND OBJECTIVES

The mandate of the Central Ground Water Board is to "Develop and disseminate technologies, monitor and implement national policies for the scientific and sustainable development and management of India's ground water resources including groundwater exploration, assessment, conservation, augmentation, protection from pollution and distribution based on principles of economic and ecological efficiency and equity". Commensurate with the above mandate, the objectives laid down for the Central Ground Water Board are:-

- Aquifer mapping for delineation & disposition of Aquifer Systems to prepare aquifer maps & management plans
- Periodic long term monitoring of ground water regime for creation of time series database through existing and enhanced ground water observation wells.
- Capacity building in ground water development and management through training, information dissemination, education and awareness
- To enhance ground water sustainability through artificial recharge and rainwater harvesting measures for arresting the depleting trends of ground water.
- Regulation of ground water over development and sustainable management of ground water resources in coordination with State Government Organizations.
- Technical assistance to Defence and Govt. organizations for providing feasible sites for ground water sources for their water supply schemes.

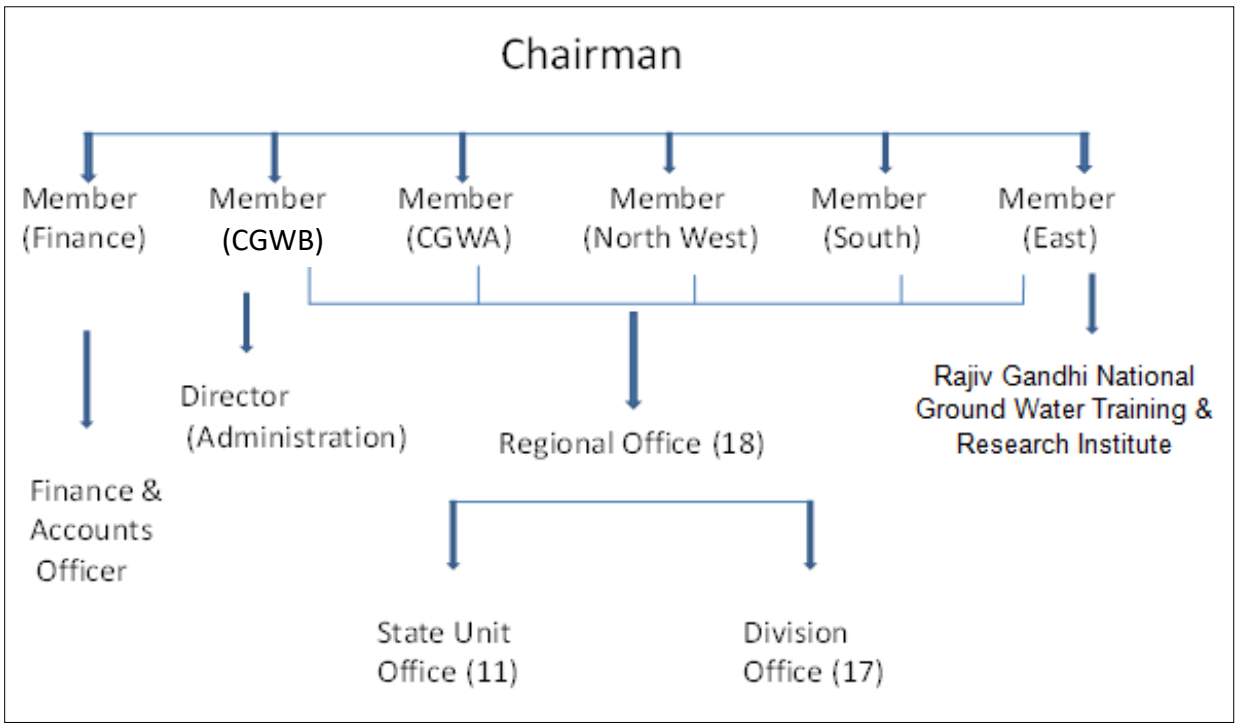
1.3 ORGANIZATIONAL SET UP

The Central Ground Water Board is headed by the Chairman and six full time Members namely, Member (Head Quarter- HQ), Member (North & West), Member (South), Member (East & NGI), Member (CGWA) and Member (Finance). The other Members of the Board are all ex-officio being the nominees of institutions in related fields of expertise. The ex-officio members are:

1. The Joint Secretary (A), Ministry of Water Resources, River Development and Ganga Rejuvenation.

2. The Joint Secretary (GW), Ministry of Water Resources, River Development and Ganga Rejuvenation.
3. The Joint Secretary & Financial Adviser, Ministry of Water Resources, River Development and Ganga Rejuvenation.
4. The Joint Secretary, Ministry of Environment & Forests.
5. The Chief Engineer, IMO (WP &P), CWC.
6. The General Manager, ONGC, Ministry of Petroleum & Natural Gas.

Structure of Central Ground Water Board



1. MEMBER (CGWB-HQ)

The Member (CGWB-HQ) looks after for the following activities-

- Policy planning and coordination of various activities of CGWB.
- Coordination with other Members of the Board in monitoring of implementation of Annual Action Plan.
- Work pertaining to procurements, Material Management and operation.
- Progress Monitoring of all schemes, Documentation and publication.
- Research, Innovation with various Institutions and Bilateral Cooperation.
- Activities related to NHP, NWM
- Monitoring of Zonal & compilation of National GW Resources Assessment.

- Application of advanced techniques including RS/GIS, Database Management, e-Governance.
- Monitoring of Zonal activities related to Water Conservation, Artificial Recharge, IES activities and training.
- Administration and Human Resources Management.
- Administrative and Technical supervision of the Activities of SUO, Delhi.

For discharging the multifarious duties assigned to Member (CGWB), four verticals have been created. The details of activities under verticals are as below:

Vertical 1.Planning and coordination (NAQUIM & Survey Investigation), Central Progress Mointioring Cell (CPMC) and Reports & Publication

Cell	Activities
Planning and coordination for various activities under Groundwater Management & Regulation Scheme	PMU: Policy planning and coordination of activities for NAQUIM Programme for coverage of aquifer mapping & Mangement Plans under the Scheme, finalization of Aquifer maps & management plans.
	Research, Innovation and Bilateral Cooperation through MoUs with various Institutions/BIS matters
	Application of advanced techniques including RS/GIS / GW Modelling
	Spring Study
	GWMR Scheme Related matters & EFC Preparation
CPMC	Monitoring physical & financial progress of all the activities in all zones, Coordination with the Ministry/ Regional Offices of CGWB/ Other Ministries & Organistaions
Library and Publication	Oprationalization of E library, publication of reports under NAQUIM and wider dissemination / AIMS (Aquifer Information & Management System)

Vertical 2. Procurement & Exploration

- Materials requirement planning for in-house exploratory drilling operations.
- Procurement planning for all goods earmarked for centraled procurement
- Preparation of specifications for drilling rigs, machineries, equipment and other drilling tools and accessories.
- Preparation of tender document for procurement of goods , works and services through e – tendering / DeM
- Procurement / hiring of vehicles for all field formations.

- procurement of goods , works and sevices for NHP and processing of bills for centralized procurement , procurements made by field officers through DGS & D
- Processing of procurement cases of field formation beyond the financial power delegated to field formations
- Arranging physical verification of stores of all field formations
- Processing of survey off cases of surplus/ obsolete and unserviceable equipment/ materials
- Monitoring of progress of exploratory drilling operations.
- Land and building cases of all field formation
- Implementation of e- procurement in all field formations
- Submission of reports and returns to MoWR, RD & GR, replies to audit observations etc.

Vertical 3. GW Monitoring Resources, Artificial Recharge, IEC & Database Management

Cell	Duties
GW monitoring	Coordination with Regions for Monitoring of water levels & Quality
NDC	HW/SW planning Management of Data received from throughout the country
WRIS/NWIC Coordination and update	Updating of database in WRIS/ NSDI Coordination with NHP
Planning for Construction of Piezometer and DWLR	Planning for Construction of Piezometer and DWLR
Map and drawing section	Preparation of GIS datasets, maps etc
Database Management	Managing respository for database being created under NAQUIM
GW Resources	Estimation of GWR on regular intervals
e-Governance	Implementation of e-office, eHRMs,e-Samiksha,
	Web site update and maintenance.
Artificial Recharge & IEC	Planning & Coordination for AR as per EFC and IEC activities
NHP & Center of Excellence, Modelling	Planning & Coordination & Execution as per EFC
NWM, Bhujal News	Coordinating all activitiesrelated to NWM including Climate Change, Bhujal News Publication

Vertical 4. Human Resource Development

In – Charge Director (Administration)

2. MEMBER (SOUTH)

The Member (South) looks after the following activities:

- Implementation of all the activities pertaining to the Regions under his jurisdiction (CR/SR/SWR/SECR/KR) as per Annual Action Plan, physical and Financial Achievements Administrative & Technical supervision of the Regional Directorates and Divisional offices of CR/SR/SWR/SECR/KR.
- Planning and execution of all outsourcing Activities.
- GW Monitoring and Resources Assessment, Documentation and Publications.
- Material Management and operations
- Water conservation and Artificial Recharge, IEC activities
- Coordination with respective State Govt.

3. MEMBER (North & West)

The Member (North & West) looks after the following activities:

- Implementation of all the activities pertaining to the Region under their Jurisdiction (WCR/NWR/NWHR/NHR/NCR/WR) as per Annual Action Plan ,Physical and Financial Achievements Administrative & Technical supervision of the Regional Directorates and Divisional offices of WCR/NWR/NWHR/NHR/NCR/WR.
- Planning and execution of all outsourcing Activities.
- GW Monitoring and Resources Assessment, Documentation and Publications.
- Material Management and operations
- Water conservation and Artificial Recharge, IEC activities
- Coordination with respective State Govt.

4. MEMBER (EAST)

The Member (East) looks after the following activities.

- Implementation of all the activities pertaining to the Region under their jurisdiction (NER/MER/SER/ER/NCCR) as per Annual Action Plan, Physical and Financial Achievements, Administrative & Technical Supervision of the Regional Directorates and Divisional officers of NER/MER/SER/ER/NCCR.
- Planning and execution of all outsourcing Activities.
- GW Monitoring and Resources activities.
- Material Management and operations
- Water conservation and Artificial Recharge, IEC activities
- Coordination with respective State Govt.
- Rajiv Gandhi National Ground Water Training and Research Institutes (NGI)*

***Rajiv GandhiNational Ground Water Training and Research Institute-** Rajiv Gandhi National Ground Water Training and Research Institute (RGI) located at Raipur, Chhattisgarh caters to

the training requirements of Central Ground Water Board and also many Central and State Govt. Organizations, Academic Institutes, NGOs etc. During XII Plan, RGI under "HRD and Capacity Building Scheme" of Ministry of Water Resources, River Development and Ganga Rejuvenation is implementing a three tier training programme keeping in view the requirements of the National Aquifer Management Program. These trainings enable creation of trained workforce for implementation of Program / Scheme for overall sustainable development of ground water resources.

5. MEMBER (CGWA)

The Member (CGWA) looks after the following activities.

- Policy planning and implementation.
- Regulation of Ground Water Development and management
- Clearance for Ground Water withdrawal
- Legal matters pertaining to CGWA.
- Implementation of all the activities pertaining to the Region under their Jurisdiction (NR/UR) as per Annual Action Plan, physical and Financial Achievements, Administrative & Technical supervision of the Regional Directorates and Divisional offices of NR/UR.
- Planning and execution of all outsourcing activities in NR/UR.
- GW Monitoring and Resources Assessment, Documentation and Publications.
- Material Management and operations
- Water conservation and Artificial Recharge , IEC activities
- Coordination with respective State Govt
- Parliamentary matters and VIP reference.

6. MEMBER (FINANCE)

The Member (Finance) looks after the following activities

- Financial monitoring of Schemes implemented by CGWB
- All matters pertaining to Budget Estimates, Revised Estimates, Demand for Grants, Supplementary Grants
- Liaison with Ministry on all Financial and Budgetary matters
- Submission of Expenditure returns to the Ministry and Controller of Accounts.
- Scrutiny of cases relating to procurement of stores, equipment, machinery etc.
- Disposal of Audit Paras, Audit Notes and Audit Objections.
- Advice and appraise the superiors on financial matters of the Board from time to time.

Central Ground Water Board undertakes various studies activities through its 18 Regional Directorates (Table 1.1) supported by 17 Engineering Divisions (Table 1.2) and 10 State Unit Offices (Table 1.3).

Table 1.1- REGIONAL OFFICES OF CGWB

Sl. No.	REGIONS & REGIONAL OFFICES		STATES
1	**NWR, Chandigarh**	North Western Region, Chandigarh	Punjab
			Haryana
			Chandigarh
2	**NWHR, Jammu**	North Western Himalayan Region, Jammu	Jammu & Kashmir
3	**NHR, Dharamshala**	North Himalayan Region, Dharamshala	Himachal Pradesh
4	**WCR, Ahmedabad**	West Central Region, Ahmedabad	Gujarat
			Daman & Diu
5	**NCR, Bhopal**	North Central Region, Bhopal	Madhya Pradesh
6	**WR, Jaipur**	Western Region, Jaipur	Rajasthan
7	**NR, Lucknow**	Northern Region, Lucknow	Uttar Pradesh
8	**UR, Dehradun**	Uttranchal, Dehradun	Uttarakhand
9	**ER, Kolkata**	Eastern Region, West Bengal	West Bengal
			Sikkim
			Andaman & Nicobar Islands
10	**NER, Guwahati**	North Eastern Region, Guwahati	Assam
			Arunachal Pradesh
			Manipur
			Meghalaya
			Mizoram
			Nagaland
			Tripura
11	**MER, Patna**	Mid Eastern Region, Patna	Bihar
			Jharkhand
12	**SER, Bhubaneswar**	South Eastern Region, Bhubaneswar	Odisha
13	**NCCR, Raipur**	North Central Chhatisgarh Region, Raipur	Chhattisgarh
14	**CR, Nagpur**	Central Region, Nagpur	Maharashtra
			Pune
			Dadra & Nagar Haveli
15	**SWR, Bengaluru**	South Western Region, Bengaluru	Karnataka
			Goa
16	**SECR, Chennai**	South East Central Region, Chennai	Tamil Nadu
			Puducherry
17	**SR, Hyderabad**	Southern Region, Hyderabad	Andhra Pradesh
			Telangana
18	**KR, Thiruvananthapuram**	Kerala Region, Thiruvananthapuram	Kerala

Table 1.2- ENGINEERING DIVISION OFFICES OF CGWB

DIVISION		STATE
I	**Ahmedabad**	Gujarat
		Daman & Div
II	**Ambala**	Punjab
		Haryana
		Chandigarh
		New Delhi
III	**Varanasi**	Uttar Pradesh
IV	**Chennai**	Tamil Nadu
		Puducherry (UTP)
		Kerala
V	**Ranchi**	Bihar
		Jharkhand
VI	**Nagpur**	Maharashtra
		Dadra & Nagar Haveli
VII	**Guwahati**	Assam
		Arunachal Pradesh
		Meghalaya
		Manipur
		Nagaland
		Tripura
VIII	**Jammu**	Jammu & Kashmir
IX	**Hyderabad**	Andhra Pradesh
		Telangana
X	**Bhubneshwar**	Odisha
XI	**Jodhpur**	Rajasthan
XII	**Bhopal**	Madhya Pradesh
XIII	**Raipur**	Chhatisgarh
XIV	**Bangalore**	Karnataka
		Goa
XV	**Kolkata**	West Bengal
		Sikkim
		Andaman & Nicobar
XVI	**Bareilly**	Uttar Pradesh
		Uttarakhand
XVII	**Dharamshala**	Himachal Pradesh

Table 1.3- STATE UNIT OFFICE's (SUO) OF CGWB

	SUO	STATE	REGIONAL OFFICE
1	Agartala	Tripura	NER, Guwahati
2	Allahabad	Uttar Pradesh	NR, Lucknow
3	Belagavi	Karnataka	SWR, Bengaluru
4	Itanagar	Arunachal Pradesh	NER, Guwahati
5	Jodhpur	Rajashtan	WR, Jaipur
6	R. K. Puram	New Delhi	
7	Pune	Maharashtra	CR, Maharashtra
8	Ranchi	Jharkhand	MER, Patna
9	Shillong	Meghalaya	NER, Guwahati
10	Vishakhapatnam	Andhra Pradesh	SR, Hyderabad

CHAPTER 2

NATIONAL AQUIFER MAPPING AND MANAGEMENT PROGRAMME (NAQUIM)

INTRODUCTION

The National Aquifer Mapping & Management Programme has been taken up country-wide under "Ground Water Management and Regulation" Central Sector Scheme of the Ministry of Water Resources, RD & GR. The major objectives of the program are:

- Delineation and characterization of aquifers in three dimensions to understand their disposition
- Identification and quantification of groundwater issues
- Development of suitable groundwater management plans for interventions to ensure sustainability of ground water resources.

Under the initiative the existing available information of aquifer is compiled, synthesized and data gaps are filled through new data generation through exploration and then preparation of aquifer disposition in 3-D and aquifer-wise management plans suggesting various interventions to optimize ground water withdrawal, identifying aquifers of potable groundwater for drinking purpose in quality affected areas and sustainable management of groundwater resources.

METHODOLOGY & APPROACH

A multidisciplinary scientific approach using advanced tools / techniques including remote sensing, GIS, geophysical techniques, ground water modelling etc. is being followed with broad objective of preparation of aquifer maps and development of management plans. In order to study the application of advanced techniques, initially six pilot projects were taken up by the Board in 5 different States representing the hydrogeological complexity of the country during XII plan. The areas were in Maharashtra (part of Nagpur district), Rajasthan (parts of Dausa and Jaisalmer districts), Bihar (part of Patna district), Karnataka (part of Tumkur district) and Tamilnadu (part of Cuddalore district). The learning of the Pilot projects have been synthesized and adopted nationwide for implementing Aquifer Mapping and Management programme.

The flow diagram showing steps for preparation of aquifer maps and management plans are indicated below:

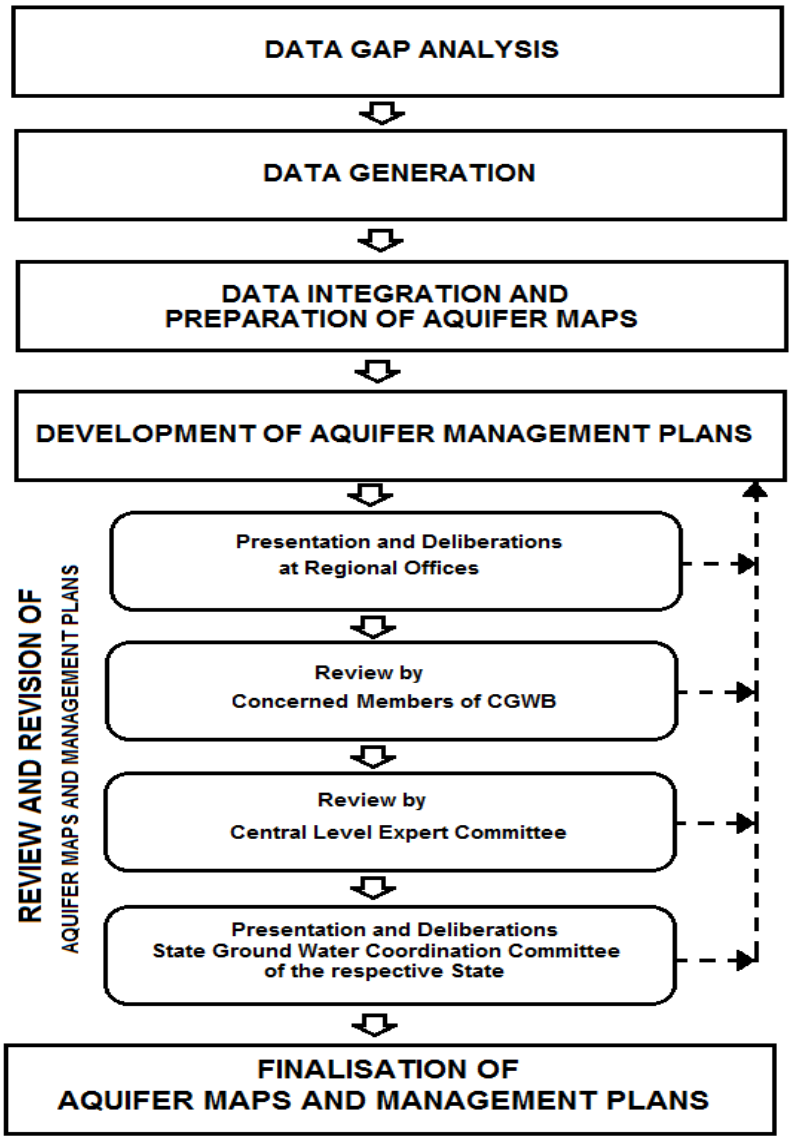


Fig.2.1 Summary of methodology and approach of the Aquifer Mapping and Management Programme

A mutli-tier evaluation process has been put in place to ensure quality of outputs. The aquifer maps and management plans prepared are first reviewed by the Regional Director of the respective regions of the Board. The revised maps and management plans are then presented before the concerned Member of the zone at the central headquarters level. Subsequently the finalized maps and management plans are presented before the National level expert committee (NLEC) having domain specialists, ground water specialists from JNU, Delhi; IIT, Roorkee; Ex-Chairman of CGWB; Agriculture experts etc. Agriculture scientists of ICAR have also been associated in finalization of management plans. In order to coordinate on various

issues related to aquifer mapping, between the State and Union Government, State Ground Water Coordination Committee (SGWCC) has been formed in each State and UT, headed by the Principal Secretary of the concerned department. The final outputs are shared and deliberated in State Ground Water Coordination Committee to have mutual agreement on the proposed aquifer-wise ground water management plans which are shared with the respective State for suitable implementation.

MAJOR ACHIEVEMENTS

National Aquifer Mapping and Management Programme (NAQUIM) was initiated in year 2012 and out of ~32 lakh km^2 of the entire country, an area of ~25 lakh km^2 has been identified to be covered under aquifer mapping in phases. During the XII plan (2012-17), major thrust was on an area of 5.26 lakh km^2 covering parts of eight priority States (Haryana, Punjab, Rajasthan, Gujarat, Andhra Pradesh, Telangana, Karnataka, Tamil Nadu) and Bundelkhand areas of Uttar Pradesh and Madhya Pradesh. These areas have been prioritized considering over-exploitation, ground water contamination and other issues. In addition to these priority areas, aquifer mapping was also taken up in other parts of the country.

During the period 2018-19, aquifer maps and management plans were developed for an area of 2.16 lakh km^2 (Table2.1).

Table 2.1: State wise area covered under National Aquifer Mapping and Management Programme during 2018-19

S.No	State/UT	Area for which aquifer maps and management plans have been prepared (km^2) during 2018- 19
1	Andhra Pradesh	8500
2	Assam	7101
3	Bihar	10736
4	Chandigarh	115
5	Chhattisgarh	10730
6	Gujarat	19507
7	Goa	3702
8	Himachal Pradesh	2540
9	Jharkhand	9846
10	Karnataka	12226
11	Kerala	2966
12	Madhya Pradesh	6606
13	Maharashtra	22228
14	Mizoram	700

15	Meghalaya	3741
16	Odisha	2500
17	Rajasthan	32472
18	Tamil Nadu	7672
19	Telangana	9385
20	Tripura	559
21	Uttar Pradesh	24964
22	Uttarakhand	2000
23	West Bengal	14455
24	A&N Islands	800
25	Sikkim	280
	Total	**216331**

MEETING OF NATIONAL INTER-DEPARTMENTAL STEERING COMMITTEE (NISC)

National Interdepartmental Steering Committee (NISC) on Aquifer Mapping & Management Program (NAQUIM) has been constituted by the Ministry of Water Resources, River Development and Ganga Rejuvenation with Secretary (WR, RD & GR) as the Chairman and Additional Secretary (WR, RD & GR) as Vice Chairman. NISC draws Members from various Central Ministries/ Departments related to Water Resources such as NWM, MoDW&S, MoES, MoRD, MoUD, MoS&T, CWC, CGWB, CSIR, JS(A&GW), Planning Commission etc. Principal Secretaries of related departments from States of Uttar Pradesh, Rajasthan, Punjab, Haryana, Gujarat, Tamil Nadu, Maharashtra, Andhra Pradesh (Undivided) are also Members of NISC. Starting from the first meeting on 21.11.2013 six meetings were held by the end of 2017.

The Seventh meeting of NISC was held on 9th August 2018. In the Seventh meeting of NISC, Major achievements were highlighted by Member Secretary (NISC) during the meeting. The salient points of EFC memo (2017-20) of Ground Water Management & Regulation were discussed in brief including major activities proposed; new initiatives of Bridge cum Bhandara under Aquifer Rejuvenation Scheme; Micro-level Aquifer Management Plan (GP/Village level); Public Interaction Programmes and Mathematical Modeling for Aquifer Management Plan under NAQUIM.The outcome of Aquifer Mapping was acknowledged by state Groundwater Department during the meeting and based on the outcome of NAQUIM; States are planning to implement the management plans.

MAJOR OUTCOMES OF NAQUIM

Aquifer maps and management plans prepared as a part of this programme have been shared with the respective State Governments through State Ground Water Coordination Committees (SGWCC), which are headed by the concerned Principal Secretaries of the

respective States. The maps and management plans are helping the agencies (State Govts) involved in water management in better decision making. Aquifer mapping programme has provided detailed information on the aquifer dispositions and their characteristics, which are necessary inputs for groundwater management. As a part of this programme, region specific groundwater management plans have been prepared which suggest appropriate demand and supply side management interventions to improve sustainability of ground water resources. Notable actions initiated on the basis of outputs of aquifer mapping and management programme are outlined below.

- Project on Tapi Mega Recharge has been initiated as an outcome of Aquifer mapping study. This project envisages to recharge ground water to the tune of 358.92 million m3/ year benefiting an area of 2.3 lakh hectare.
- Plan of revival of Rajgir springs was prepared and action points identified upon which the Government of Bihar has initiated the implementation.
- Construction of wells after careful site selection through Aquifer mapping in drought affected areas of Latur district Maharashtra on war footing during May- June 2016. A total of 25 wells were constructed and handed over to the State Govt.
- Successful wells (18 nos) were drilled in water scarce villages in Tikamgarh district for State PHED.
- On the basis of study, improvised well design was proposed to deal with groundwater contamination in Rosanabad area of Haridwar city, which was discussed and accepted by the State Government.
- Tamilnadu Water Supply and Drainage Board (TWAD) has constructed wells tapping Fluoride safe aquifers in upper Ponnaiyar Aquifer system based on the findings of Aquifer Mapping.
- Arsenic safe alternate aquifers were delineated in Bairiya Block of Ballia District and Karanda Block of Ghazipur District in Uttar Pradesh. Wells tapping arsenic safe aquifers in 30 villages in Bairiya Block and 15 villages in Karanda Block were constructed by CGWB
- The issue of rising water levels in parts of Mehrauli Block in Delhi-NCR has been investigated through Aquifer Mapping and the findings were highly appreciated by the Hon'ble Delhi High Court in its judgment.
- Based on Aquifer mapping recommendations, Govt of Tamilnadu has initiated actions to control withdrawal of ground water in the coastal areas of Cuddalore District.
- As a part of Aquifer mapping programme in RiBhoi district, Meghalaya, CGWB has drilled 18 successful bore wells. Based on the study the State Government is initiating ground water based irrigation for the first time in the State.
- CGWB is working in coordination with MGNREGS for effective implementation of water conservation measures based on NAQUIM outputs.

- In the State of Kerala, based on the findings of aquifer mapping, two Panchyats (Vadakarapathi and Eruthenpathi) of Chittur block have prepared water security plans.
- Based on the reports of aquifer mapping studies, Govt of Kerala has initiated artificial recharge and water conservation programmes. For this purpose, the State govt has also sought assistance of CGWB in identifying sites.
- Maharashtra State Govt, utilising the outcomes of the National aquifer mapping and management programme has undertaken schemes for source water sustainability under National Rural Drinking Water Programme (NRDWP) in 10 districts viz. Nasik, Jalgaon, Ahmednagar, Pune, Aurangabad, Jalna, Latur, Amravati, Buldana and Nagpur.

INTERVENTIONS FOR AQUIFER REJUVENATION

The main objective of the project is Aquifer Rejuvenation through construction of suitable area specific Artificial Recharge structures to establish successful & replicable site specific techniques for similar water stressed/ over exploited/ semi critical areas and projecting the impact in terms of sustainability of resources on a long term basis.

Innovative schemes for Aquifer Rejuvenation to develop/ update area specific methodologies based on proven/ innovative technologies in coordination with State Governments/ Institutions/ identified PSUs have been taken up.

In the study, artificial recharge structures have been constructed in parts of following blocks of three Aspirational Districts of Maharashtra, Andhra Pradesh and Telangana state.

Similarly, construction of Bridge cum Bandhara (BCB) has been initiated in Maharashtra state. A detailed hydrogeological study at all the sites was taken up to study the impact assessment on ground water regime of the proposed Bandharas (pre-project & post-project).

MICRO LEVEL AQUIFER MANAGEMENT PROGRAMME

Micro Level Aquifer Management Plans have been prepared for representative Gram Panchayats in various hydrogeological typologies across the country. In 2018-19 110 Microlevel Aquifer Management plan have been prepared. Selection of the Panchayats were made on the basis of the stage of ground water development, ground water contamination profile, ground water development prospects including requests of the State Agencies to address any specific ground water related problems.

FACILITATING PUBLIC INTERACTION ON AQUIFER MAPS AND MANAGEMENT PLANS

Aquifer maps and Management plans being prepared by CGWB are shared with the State Agencies for implementation. Implementation of the management plans by the State agencies is expected to improve the groundwater situation by de-stressing the aquifers. To facilitate interaction among stake holders including communities on the Aquifer maps and management plans for greater public participation CGWB organised 46 Public Interaction

Programmes during 2018-19 in which nearly 6972 participants including representatives from Panchayats, Block and district level administrations, farmers, health and sanitation workers, NGOs and other stakeholders participated and were sensitised on Aquifer Maps and management Plans .

CHAPTER 3

GROUND WATER EXPLORATION

Ground Water Exploration aided by drilling is one of the major activities of the Board. It is aimed at delineation of aquifers in different hydrogeological setups and determination of their hydraulic parameters. The exploratory drilling operations have enabled demarcation of aquifers both in lateral and vertical extensions and evaluation of various aquifer parameters, designing of suitable structures and assessment of their yield potential in various hydrogeological settings. These studies have helped in identifying areas worthy for future ground water development. Ground Water exploration contributes to a large extent in guiding the States to implement ground water development schemes.

Groundwater exploration is being carried out by the Board through its fleet of 82 drilling rigs (27 Direct Rotary, 53 Down the Hole and 01 Dual Rotary). During the year 2018-19, Central Ground Water Board under its in-house Ground Water Exploration programme constructed 824 wells (EW- 612, OW- 204, Pz- 8). Priority was accorded for exploration in Over Exploited / Critical/ Semi-Critical/ Drought Prone and areas affected with ground water pollution etc. The statement showing State and Division & Region wise distribution of boreholes drilled/ completed during 2018-19 is presented in Table 3.1 & 3.2(a) & (b) & Fig 3.1 & Fig. 3.2. Out of 824 exploratory wells, 690 wells were constructed in hard rock, 133 wells in alluvium and 1 well in bouldary formations (Table 3.4) including 137 wells constructed in Tribal areas and 40 wells in Drought prone areas (Table 3.5) of the country.

Fig. 3.1 Autoflow Well at Washim District, Maharashtra

Fig. 3.2 High Yielding wells at Nimone, Shirur Taluka, Pune District, Maharashtra

The Board since inception has drilled 40951 bore holes (including 7210 bore holes through outsourcing) as on 31.03.2019 to identify worthy areas for ground water development in the country. The statement showing State-wise distribution of boreholes drilled/completed till March 2019 in the country is presented in Table 3.3.

Table 3.1 State wise Wells constructed by CGWB during the Year 2018-19 (till 31th March 2019)

Sr. No.	STATE/U.T	EW	OW	PZ	TOTAL
1	Andhra Pradesh	54	12	0	66
2	Arunachal Pradesh	0	0	0	0
3	Assam	9	5	0	14
4	Bihar	8	3	0	11
5	Chhattishgarh	48	14	0	62
6	Goa	0	0	0	0
7	Gujarat	27	13	0	40
8	Haryana	0	0	0	0
9	Himachal Pradesh	10	3	0	13
10	Jammu & Kashmir	18	11	0	29
11	Jharkhand	20	10	0	30
12	Karnataka	52	20	0	72
13	Kerala	13	1	0	14
14	Madhya Pradesh	41	9	0	50
15	Maharashtra	69	13	0	82
16	Manipur	0	0	0	0
17	Meghalaya	8	4	0	12
18	Mizoram	0	0	0	0
19	Nagaland	0	0	0	0
20	Orissa	47	13	0	60
21	Punjab	11	0	0	11
22	Rajasthan	40	10	0	50
23	Sikkim	0	0	0	0
24	Tamil Naidu	61	14	0	75
25	Tripura	0	0	0	0
26	Telangana	23	12	0	35
27	Uttarakhand	0	0	0	0
28	Uttar Pradesh	30	25	2	57
29	West Bengal	21	12	0	33
30	Chandigarh(UT)	2	0	0	2
31	New Delhi(UT)	0	0	6	6
	TOTAL	**612**	**204**	**8**	**824**

Table 3.2(a) Division - wise wells constructed by Central Ground Water Board during 2018-19

Division	Target 2018-19				Achievement (01.04.18 To 31.03.2019)				Achievement (%)
	EW	OW	PZ	T	EW	OW	PZ	T	
I.Ahmedabad	23	17		40	27	13	0	40	100.00%
II.Ambala	10		10	20	13	0	6	19	95.00%
III.Varanasi	23	16		39	22	15	2	39	100.00%
IV.Chennai	51	32		83	74	15	0	89	107.23%
V.Ranchi	29	17		46	28	13	0	41	89.13%
VI.Nagpur	40	20		60	69	13	0	82	136.67%
VII.Guwahati	16	8		24	17	9	0	26	108.33%
VIII.Jammu	16	12		28	18	11	0	29	103.57%
IX.Hyderabad	52	16		68	77	24	0	101	148.53%
X. Bhubneshwar	48	22		70	47	13	0	60	85.71%
XI.Jodhpur	29	18		47	40	10	0	50	106.38%
XII.Bhopal	28	20		48	41	9	0	50	104.17%
XIII.Raipur	39	21		60	48	14	0	62	103.33%
XIV. Bangalore	44	13		57	52	20	0	72	126.32%
XV.Kolkata	21	14		35	21	12	0	33	94.29%
XVI.Bareilly	10	6		16	8	10	0	18	112.50%
XVII. Dharamshala	10	10		20	10	3	0	13	65.00%
TOTAL	**489**	**262**	**10**	**761**	**612**	**204**	**8**	**824**	**108.28%**

Table 3.2(b). Region - wise wells constructed by Central Ground Water Board during 2018-19

Region	Target 2018-19				Achievement 2018-19 (01.04.18 To 31.03.2019)				Achievement %
	EW	OW	PZ	T	EW	OW	PZ	T	
NWHR. Jammu	16	12	0	28	18	11	0	29	103.57%
NWR. Chandigarh	10	0	10	20	13	0	6	19	95.00%
WR. Jaipur	29	18	0	47	40	10	0	50	106.38%
WCR. Ahmedabad	23	17	0	40	27	13	0	40	100.00%
NCR. Bhopal	28	20	0	48	41	9	0	50	104.17%
NCCR. Raipur	39	21	0	60	48	14	0	62	103.33%

CR. Nagpur	40	20	0	60	69	13	0	82	136.67%
NR. Lucknow	32	22	0	54	30	25	2	57	105.56%
MER. Patna	29	17	0	46	28	13	0	41	89.13%
ER. Kolkata	21	14	0	35	21	12	0	33	94.29%
NER. Guwahati	16	8	0	24	17	9	0	26	108.33%
SER. Bhubaneshwar	48	22	0	70	47	13	0	60	85.71%
SR. Hyderabad	52	16	0	68	77	24	0	101	148.53%
SWR. Bangalore	44	13	0	57	52	20	0	72	126.32%
SECR. Chennai	44	27	0	71	61	14	0	75	105.63%
KR. Trivandrum	7	5	0	12	13	1	0	14	116.67%
UR. Dehradun	1	0	0	1	0	0	0	0	0.00%
NHR. Dharamsala	10	10	0	20	10	3	0	13	65.00%
TOTAL	**489**	**262**	**10**	**761**	**612**	**204**	**8**	**824**	**108.28%**

Table 3.3: Status of Cumulative Boreholes Drilled by CGWB in States & UTs (as on 31.03.2019)

S No.	STATE/ UT	(I) Through Outsourcing (Contractual)				(II) Through Departmental Rigs						TOTAL (I+II)
		EW	OW	PZ	Total	EW	OW	PZ	SH	DW	Total	
A.	**STATES**											
1	**Andhra Pradesh**	254	79	0	333	808	396	307	9	4	1524	1857
2	**Arunachal Pradesh**	0	0	0	0	46	10	0	1	1	58	58
3	**Assam**	0	0	0	0	426	198	59	16	42	741	741
4	**Bihar**	104	20		124	307	190	74	10	514	1095	1219
5	**Chhattisgarh**	300	0	105	405	792	254	161	0	28	1235	1640
6	**Goa**	13	1	0	14	58	18	14	0	31	121	135
7	**Gujarat**	305	31		336	1109	508	498	27	255	2397	2733
8	**Haryana**	75	55	80	210	406	271	229	23	170	1099	1309
9	**Himachal Pradesh**	0	0	0	0	246	37	5	1		289	289
10	**Jammu & Kashmir**	21	0	0	21	457	106	37	8	114	722	743
11	**Jharkhand**	109	14	0	123	437	218	46	4	71	776	899
12	**Karnataka**	804	146	0	950	1518	696	354	7	5	2580	3530

13	**Kerala**	10	0	0	10	564	201	231	16	13	1025	1035
14	**Madhya Pradesh**	555	41	80	676	1316	717	176	8	149	2366	3042
15	**Maharashtra**	92	2	88	182	1635	533	167	2	166	2503	2685
16	**Manipur**	0	0	0	0	29	14	1	0	2	46	46
17	**Meghalaya**	0	0	0	0	114	35	2	2	8	161	161
18	**Mizoram**	0	0	0	0	3	3	0	0		6	6
19	**Nagaland**	0	0	0	0	15	6	1	0	3	25	25
20	**Orissa**	449	7	67	523	1644	406	150	21	191	2412	2935
21	**Punjab**	121	105	0	226	220	212	108	20	14	574	800
22	**Rajasthan**	735	173	0	908	1374	511	573	93	591	3142	4050
23	**Sikkim**	0	0	0	0	31	9	0	0		40	40
24	**Tamil Nadu**	413	198	179	790	1281	435	278	13	93	2100	2890
25	**Tripura**	0	0	0	0	64	31	1	5	22	123	123
26	**Telangana**	292	45	0	337	737	512	509	5	27	1790	2127
27	**Uttarakhand**	20	4	0	24	72	6	3	1	129	211	235
28	**Uttar Pradesh**	474	148	0	622	1041	703	202	40	501	2487	3109
29	**West Bengal**	231	65	100	396	561	273	177	12	82	1105	1501
TOTAL (A)		**5377**	**1134**	**699**	**7210**	**17311**	**7509**	**4363**	**344**	**3226**	**32753**	**39963**
B.	**UNION TERRITORIES**											
1	**Andaman & Nicobar**	0	0	0	0	46	13	0	1	0	60	60
2	**Chandigarh**	0	0	0	0	9	17	14	2	15	57	57
3	**Dadra & NagarHaveli**	0	0	0	0	14	1	0	0	0	15	15
4	**Delhi**	0	0	0	0	149	64	166	13	380	772	772
5	**Daman & Diu**	0	0	0	0	0	0	7	0	0	7	7
6	**Pondicherry**	0	0	0	0	30	20	8	5	14	77	77
TOTAL (B)		0	0	0	0	248	115	195	21	409	988	988
GRAND TOTAL (A+B)		**5377**	**1134**	**699**	**7210**	**17559**	**7624**	**4558**	**365**	**3635**	**33741**	**40951**

Table 3.4 Division / State / Formation wise Achievement during 2018-19 (as on 31.03.2019)

DIVISION	STATE/ UT	HARD ROCK				ALLUVIUM				BOULDARY				TOTAL			
		EW	OW	PZ	T	EW	OW	PZ	T	EW	OW	PZ	T	EW	OW	PZ	T
I.AHMEDABAD	Gujarat	19	4		**23**	8	9		**17**				**0**	27	13	0	**40**
II.AMBALA	Haryana				**0**				**0**				**0**	0	0	0	**0**
	Punjab				**0**	11			**11**				**0**	11	0	0	**11**
	Delhi				**0**	2		6	**8**				**0**	2	0	6	**8**
III.VARANASI	Uttar Pradesh	15	7		**22**	7	8	2	**17**				**0**	22	15	2	**39**
IV.CHENNAI	Tamil Nadu				**0**	2	3		**5**				**0**	2	3	0	**5**
	Kerala	72	12		**84**				**0**				**0**	72	12	0	**84**
V.RANCHI	Bihar	6	2		**8**	2	1		**3**				**0**	8	3	0	**11**
	Jharkhand	20	10		**30**				**0**				**0**	20	10	0	**30**
VI.NAGPUR	Maharashtra	69	13		**82**				**0**				**0**	69	13	0	**82**
VII.GUWAHATI	Assam				**0**	7	5		**12**				**0**	7	5	0	**12**
	Arunachal Pradesh				**0**				**0**				**0**	0	0	0	**0**
	Meghalaya	10	4		**14**				**0**				**0**	10	4	0	**14**
	Tripura				**0**				**0**				**0**	0	0	0	**0**
VIII.JAMMU	Jammu & Kashmir	17	11		**28**				**0**	1			**1**	18	11	0	**29**
IX.HYDERABAD	Andhra Pradesh	54	12		**66**				**0**				**0**	54	12	0	**66**
	Telangana	23	12		**35**				**0**					23	12	0	**35**
X.BHUBANESWAR	Orissa	44	11		**55**	3	2		**5**				**0**	47	13	0	**60**
XI.JODHPUR	Rajasthan	23	9		**32**	17	1		**18**				**0**	40	10	0	**50**
XII.BHOPAL	Madhya Pradesh	41	9		**50**				**0**				**0**	41	9	0	**50**
XIII.RAIPUR	Chattisgarh	48	14		**62**				**0**				**0**	48	14	0	**62**
XIV.BANGALORE	Karnataka	47	18		**65**				**0**				**0**	47	18	0	**65**
	Kerala	5	2		**7**				**0**				**0**	5	2	0	**7**
XV.KOLKATTA	West Bengal	12	2		**14**	9	10		**19**				**0**	21	12	0	**33**
XVI.BAREILLY	Uttarkhand				**0**				**0**				**0**	0	0	0	**0**
	Uttar Pradesh				**0**	8	10		**18**				**0**	8	10	0	**18**
XVII.DHARAMSHALA	Himachal Pradesh	10	3		**13**				**0**				**0**	10	3	0	**13**
TOTAL		**535**	**155**	**0**	**690**	**76**	**49**	**8**	**133**	**1**	**0**	**0**	**1**	**612**	**204**	**8**	**824**

Table 3.5: Division / State / Head wise Achievement during 2018-19 (as on 31.03.2019)

DIVISION	STATE/ UT	NORMAL				TRIBAL				DROUGHT				TOTAL			
		EW	OW	PZ	T	EW	OW	PZ	T	EW	OW	PZ	T	EW	OW	PZ	T
I.AHMEDABAD	Gujarat	27	13		**40**				**0**				**0**	27	13	0	**40**
II.AMBALA	Haryana				**0**				**0**				**0**	0	0	0	**0**
	Punjab	11			**11**				**0**				**0**	11	0	0	**11**
	Delhi	2		6	**8**				**0**				**0**	2	0	6	**8**
III.VARANASI	Uttar Pradesh	7	8	2	**17**				**0**	15	7		**22**	22	15	2	**39**
IV.CHENNAI	Tamil Nadu	61	14		**75**				**0**				**0**	61	14	0	**75**
	Kerala	13	1		**14**				**0**				**0**	13	1	0	**14**
V.RANCHI	Bihar	8	3		**11**				**0**				**0**	8	3	0	**11**
	Jharkhand	20	10		**30**				**0**				**0**	20	10	0	**30**
VI.NAGPUR	Maharashtra	69	13		**82**				**0**				**0**	69	13	0	**82**
VII.GUWAHATI	Assam	7	5		**12**				**0**				**0**	7	5	0	**12**
	Arunachal Pradesh				**0**				**0**				**0**	0	0	0	**0**
	Meghalaya				**0**	10	4		**14**				**0**	10	4	0	**14**
	Tripura				**0**				**0**				**0**	0	0	0	**0**
VIII.JAMMU	Jammu & Kashmir	18	11		**29**				**0**				**0**	18	11	0	**29**
IX.HYDERABAD	Andhra Pradesh	54	12		**66**				**0**					54	12	0	**66**
	Telangana				**0**	23	12		**35**				**0**	23	12	0	**35**
X.BHUBANESWAR	Orissa	38	11		**49**	9	2		**11**				**0**	47	13	0	**60**
XI.JODHPUR	Rajasthan				**0**	23	9		**32**	17	1		**18**	40	10	0	**50**
XII.BHOPAL	Madhya Pradesh	4	1		**5**	37	8		**45**				**0**	41	9	0	**50**
XIII.RAIPUR	Chattisgarh	48	14		**62**				**0**				**0**	48	14	0	**62**
XIV.BANGALORE	Karnataka	47	18		**65**				**0**				**0**	47	18	0	**65**
	Kerala	5	2		**7**				**0**				**0**	5	2	0	**7**
XV.KOLKATTA	West Bengal	21	12		**33**				**0**				**0**	21	12	0	**33**
XVI.BAREILLY	Uttarkhand				**0**				**0**				**0**	0	0	0	**0**
	Uttar Pradesh	8	10		**18**				**0**				**0**	8	10	0	**18**
XVII.DHARAMSHALA	Himachal Pradesh	10	3		**13**				**0**				**0**	10	3	0	**13**
TOTAL		**478**	**161**	**8**	**647**	**102**	**35**	**0**	**137**	**32**	**8**	**0**	**40**	**612**	**204**	**8**	**824**

3.1 Development of Exploratory Well

Once constructed, a tube-well is developed to increase its specific capacity to prevent sand rushing into the well and to obtain maximum well life. Thereafter, pumping tests are conducted for evaluating aquifer parameters i.e. Transmissivity, storage co-efficient and well parameters viz. specific capacity and well efficiency, with a view to evolve efficient design for tube wells, assessment of yield capabilities and spacing criteria for tube wells. Total of 244 tubewells were developed and tested during the year 2018-19 (table 3.6).

Table 3.6: Status of Development & Pumping Test of Exploratory Wells by CGWB in AAP 2018-19

DIVISION	STATE	No. of Wells tested during the year 2018-19	Balance No. of wells to be tested (Backlog)
I. Ahmedabad	Gujarat	4	128
II. Ambala	Haryana	0	5
	Punjab	0	15
	Delhi	0	
III. Varanasi	Utter Pradesh	22	100
IV. Chennai	Tamilnadu	4	11
	Kerala	0	3
V. Ranchi	Bihar	0	7
	Jharkhand	0	39
VI. Nagpur	Maharashtra	67	23
VII. Guwahati	Assam	6	28
	Meghalaya	10	16
	Tripura	1	1
	Arunachal Pradesh	0	10
VIII. Jammu	Jammu&Kashmir	0	21
IX. Hyderabad	Andhra Pradesh	18	8
	Telangana	10	4
X. Bhubaneswar	Orissa	8	40
XI. Jodhpur	Rajasthan	41	116
XII. Bhopal	Madhya Pradesh	0	21
XIII. Raipur	Chhattisgarh	2	13
XIV. Bangalore	Karnataka	17	46
	Kerala	0	
XIV. Kolkata	West Bengal	2	31
XV. Bareilly	Uttar Pradesh	18	37

	Uttaranchal	0	3
XVI.Dharamshala	Himachal Pradesh	18	15
	TOTAL	**244**	**593**

3.2 TAKING OVER OF EXPLORATORY WELLS BY STATE AGENCIES

The exploratory drilling sites are selected in consultation with the State Government Departments considering that successful exploratory wells on completion of scientific studies can be converted into production wells once taken over by States for water supply.

Till March, 2019, a total of 17559 exploration wells have been drilled by the Board out of which 14197 successful exploratory wells were offered to the States and 6921 wells have so far been accepted/taken over by State Governments, while 4797 successful wells are yet to be accepted/taken over by them and 2479 successful wells are yet to be handed over after the completion of scientific studies by the Board. The status of handing over of exploratory wells drilled by Central Ground Water Board to the State Government as on 31-03-2019 is presented in table 3.7.

Table 3.7 Status of Handing over of Wells drilled by CGWB

S.No.	States	Total Wells drilled	No. of Successful Wells	No. of Wells Handed Over		No. of Wells yet to be handed over to state agencies
				No. of wells accepted by the state agencies	No. of wells offered to the state agencies but yet to be accepted	
A. STATES						
1	Andhra Pradesh	808	572	401	145	26
2	Arunachal Pradesh	46	41	25	4	12
3	Assam	426	403	239	93	71
4	Bihar	307	271	103	143	25
5	Chhattisgarh	792	703	175	375	153
6	Goa	58	49	0	49	0
7	Gujarat	1109	749	439	124	186
8	Haryana	406	233	145	68	20
9	Himachal Pradesh	246	227	102	88	37
10	Jammu & Kashmir	457	346	191	86	69
11	Jharkhand	437	331	100	165	66
12	Karnataka	1518	1328	692	479	157
13	Kerala	564	433	298	76	59
14	Madhya Pradesh	1316	958	545	188	225
15	Maharashtra	1635	1383	927	264	192

16	Manipur	29	21	14	0	7
17	Meghalaya	114	112	56	21	35
18	Mizoram	3	3	3	0	0
19	Nagaland	15	9	5	1	3
20	Orissa	1644	1546	489	854	203
21	Punjab	220	193	80	85	28
22	Rajasthan	1374	1035	258	542	235
23	Sikkim	31	10	6	0	4
24	Tamil Nadu	1281	1015	549	228	238
25	Tripura	64	62	33	12	17
26	Telangana	737	575	377	92	106
27	Uttrakhand	72	62	23	10	29
28	Uttar Pradesh	1041	853	359	350	144
29	West Bengal	561	501	196	201	104
TOTAL(A)		**17311**	**14024**	**6830**	**4743**	**2451**
B. UNION TERRITORIES						
1	Andaman & Nicobar	46	12	0	10	2
2	Chandigarh	9	9	6	0	3
3	Dadra & Nagar Haveli	14	8	8	0	0
4	Delhi	149	131	64	44	23
5	Pondicherry	30	13	13	0	0
Total(B)		**248**	**173**	**91**	**54**	**28**
GRAND TOTAL(A+B)		**17559**	**14197**	**6921**	**4797**	**2479**

3.3. HIGH YIELDING WELLS

During 2018-19, CGWB under its scientific exploratory drilling programme has explored high yielding aquifers in various parts of the Country based on hydrogeological studies coupled with remote sensing and geophysical techniques. During the year 2018-19, a total of 108 High Yielding Wells with discharge ranging from 180 to 2850 litres per minute have been explored in the different states of the country (table 3.8). Such studies will help in identifying similar ground water sources in other parts of the state having similar hydrogeological conditions and in guiding the State agencies to adopt the follow up action with regard to ground water development for drinking water supply and meeting other demands. State wise details of High Yielding Wells explored during 2018-19 is presented in Table 3.8 below.

Table 3.8 High Yielding Wells Explored during 2018-19

HIGH YIELDING WELLS 2018-19					
Sr. No.	**State**	**District**	**Location / Village**	**Block/ Taluk / Mandal**	**Discharge (lpm)**
1.	Andhra Pradesh	Kadapa	Nagavaram vill.	Chitvel Mandal	255
		Kadapa	T. Sundupalli	Sundupalli	408
		Kadapa	Shanti Nagar	Sidhout	402.6
		YSR Kadapa	Chintaraupalli	Vontimitta	402
		Kadapa	T. Sundupalli	T. Sundupalli	180
		Kadapa	Chitarajupalle	Vontimitta	402.6
		Kadapa	Kothachoparavaripalli	Nandalur	240
		Kadapa	Gangaperuru	Vontimitta	826
		Kadapa	Gangaperuru	Vontimitta	480
		Krishna	Vinnakota	Krishna	900
		Kadapa	Pullapatru	Nandalur	591
		Kadapa	Upparapalli	Chennuru	826
2.	Telangana	Khammam	Vepakuntla	Raghunathapalem	591.6
		Khammam	Madharam	Singareni	240
		Khammam	Marlapadu	Kalluru	591.6
		Hassan	Konnanoor	Arkalgud	225
3.	Chhattisgarh	Jamtara	Palojori	Fathepur	342
		Rajnandgaon	Musra (Khurd)	Fathepur	1320
		Korba	Pachara	Podi Uproda	360
4.	Jharkhand	Dumka	Bedia	Jama	720
		Jamtara	Bhanderbera	Nala	720
		Dumka	Mahura	Saraiyahat	234
		Pakur	Dumarsol	Pakuria	720
		Pakur		Pakuria	480
		Pakur	Pathpahari	Pakuria	180
5.	Kerala	Idukki		Thodupuzha	510
		Ernakulam	Neriyamangalam	Neriyamangalam	555
6.	Karnataka	Bangalore (rural)	Devarahosahalli	Nelamangala	591
		Belagavi	Kittur	Bailahongal	540
		Hassan	Nagavara	Alur	300
		Tumkur	Byatar Hoshalli	Turuvakere	868.8
		Bangalore (rural)	Hanmanthanayana Gowedana Palya	Nelamangala	330
		Belagum	Govinakoppa	Bailahoingal	300
		Tumkur	Hosahalli	Turuvakere	984
		Hassam	Halli Mysore		960
		Belgam		Govinkoppa	403.8

				Bailhongal	
		Belagavi	Gudus	Hukkeri	345
		Tumkur	Laxmipura	Kunigal	240
		Belagavi	Yelimunoli	Hukkeri	300
		Tumkur	Ippadi	Kunigal	300
7.	Rajasthan	Sikar	Fatehpur Sikri	Dhandhan	1500
		Sikar	Fatehpur Sikri	Biraniya	720
		Jhalawar	Kayasara	Dag	900
		Jhalawar	Pagariya		1000
		Karauli	Mangree	Karauli	1302
		Lunkaransar	Adsar	Adsar	215
		Dungargarh	Jodhasar	Jodhasar	220
8.	Madhya Pradesh	Dewas	Khategog		1500
		Dewas	Mawasi		720
		Dhar	Sandla	Sardarpur	1140
		Dhar	Sandla	Sardarpur	1500
		Dhar	Kiloi Kildi	Sardarpur	342
		Ujjain	Sandawda	Khachrod	1488
		Ujjain	Jahirniy	Khachrod	1140
		Betul	Biroli Jhilpa	Pattan	300
9.	Maharashtra	Pune	Shingave	Ambegaon Taluka	465
		Pune	Shingave	Ambegaon Taluka	1075
		Washim	Mothegaon	Risod Taluka	190
		Washim	Dapuri	Risod Taluka	180
		Pune	Nimone	Shirur	720
		Amravati	Adhao	Chikhaldara	180
		Amravati	Jalgaon	Dhamangaon	939.6
		Amravati	Belora	Nandgaon Khandeshwar	240
		Osmanabad	Dasmegaon	Washi	720
		Amravati	Chikli	Chikaldhara	210
		Amravati	Chikli	Chikaldhara	729
10.	Gujarat	Ahmedabad	Chandisar	Dholka	480
		Narmada	Umran	Dediapada	1028
		Narmada	Mulkapada	Dediapada	540
		Narmada	Mulkapada	Dediapada	660
		Narmada	Bhadod	Sagbara	1560
11.	Tamil nadu	Krishnagiri	Mallapadi	Bargur	600
		Krishnagiri	Mallapadi	Bargur	600

		Krishnagiri	Veppanapalli	Veppanapalli	960
		Krishnagiri	Veppanapalli	Veppanapalli	600
		Krishnagiri	Gurbarapalli	Veppanapalli	450
		Krishnagiri	Unisetty	Kelamangalam	360
		Krishnagiri	Udanpalli	Kelamangalam	360
		Krishnagiri	Peddathalapalli	Kelamangalam	450
		Madurai	Kuppanampatti	Usilampatti	331.8
		Namakkal	Pillur	Parmathy	180
		Namakkal	Andivalasu	Thiruchengode	1200
		Ramanadhapuram	Paramakudi		1477
		Namakkal	Manpachipali	Tiruchengode	2850
		Nagapattinam	Poravacherry		2400
		Nagapattinam	Manakkudi	Thalanayar	2310
12.	Jammu & Kashmir	Udhampur	Krimchi		900
		Poonch	Meandhar		600
		Reasi	Talwara		120
		Poonch	Meander		600
		Poonch	Surhoti	Mendhar	420
		Udhampur	Kanjli		480
13.	West - Bengal	Hooghly	Nilarpur	Jangipara	2580
		Murshidabad	Etore	Nabagram	2280
		Purulia	Napapara	Puncha	240
		Purba Medinipur	Kasaria	Khejuri- II	840
		Hooghly	Uttar Simla	Uttar Simla	1860
14.	Meghalaya	West Jaintia Hills	Khanduli village		228
		West Garo Hills	Rongram	Rongram	480
		West Garo Hills	Dadenggre	Dadenggre	480
15.	Odisha	Khurda	IDCO Biotech Park		1020
		Khurda	IDCO Biotech Park		960
		Khurda	Jagannathpur	Balianta	1140
		Angul	Urukula	Kishore nagar	330
16.	Himachal Pradesh	Kangra	Kaishwari road, N&MRC, Nagrota Bagwan	Nagrota	360
		Kullu			420
17	Bihar	Aurangabad	Manju Rakha	Aurangabad Sadar	600
		Aurangabad	Madanpur		300

lpm- litres per minute

CHAPTER 4

GEOPHYSICAL STUDIES

Geophysical investigations are used for exploration of groundwater and in delineating the underground structures which control the occurrence, distribution and movement ground water.Application of geophysical techniques for ground water investigations on regular basis commenced in CGWB during the seventies. The Board has made extensive use of both the surface and the subsurface (well logging) geophysical techniques in the search of groundwater and proper construction of water wells. The findings of the geophysical studies, as a practice, are combined with the hydrogeological and geomorphologic investigations to place them on firm footing. The techniques have become an integral part of the ground water exploration programme.

The Borehole geophysics is used in groundwater to obtain information pertaining to lithology, fractures, permeability, porosity and, water quality so as to delineate subsurface disposition of aquifers. Borehole-geophysical logging determines the character and thickness of the different geologic units in drilled boreholes. Saline / brackish water bearing aquifers are present in different parts of India. Fresh water bearing aquifers are often intervened by the saline water aquifers. Such information is essential for proper placement of casing and screens in water-supply wells and for characterizing and remediation of problems related to ground-water salinity. The proper positioning and condition of casing and screen pipes in a well can be rapidly evaluated with geophysical logging.

Various other techniques like Self Potential, Induced Polarization, Mise-a-la-masse of electrical method*,* refraction seismic, electromagnetic – the Horizontal Loop, Very Low Frequency (VLF) & Transient Electromagnetic *and* magnetic, Imaging Resistivity 2-D survey and Heliborne Survey are incorporated through several foreign aided collaborative groundwater projects and other CSIR department of India.

Central Ground Water Board conducts surface geophysical surveys specially the traditional Electrical Resistivity survey in soft and hard rock formations to delineate the ground water bearing zones/structures pin-pointing sites for construction of boreholes and providing inputs for formulating proposals for constructing artificial recharge structures. Geophysical survey has also been conducted for delineating the bedrock topography and sandy horizon of non – perennial channel. Apart from these, resistivity survey (VES) were also carried out during the year for short-term water supply investigation on request of other Government organization and Public Sector Undertakings.

GEOPHYDICAL STUDIES FOR NAQUIM PROGRAMME

Under the Aquifer mapping programme, Central Ground Water Board has objective for delineating the aquifers upto 300 m depth in areas underlain by soft rock and upto 200 m in areas underlain by hard rock formations, and geophysical survey and techniques play a vital role during exploration to understand aquifer location and disposition. Geophysical techniques are widely used in delineating aquifers. Analysis of vertical electrical resistivity sounding and electrical resistivity profiling (VES) data collected and interpreted have shown wide range of resistivities obtained as shown in Fig. 4.1 and 4.2.

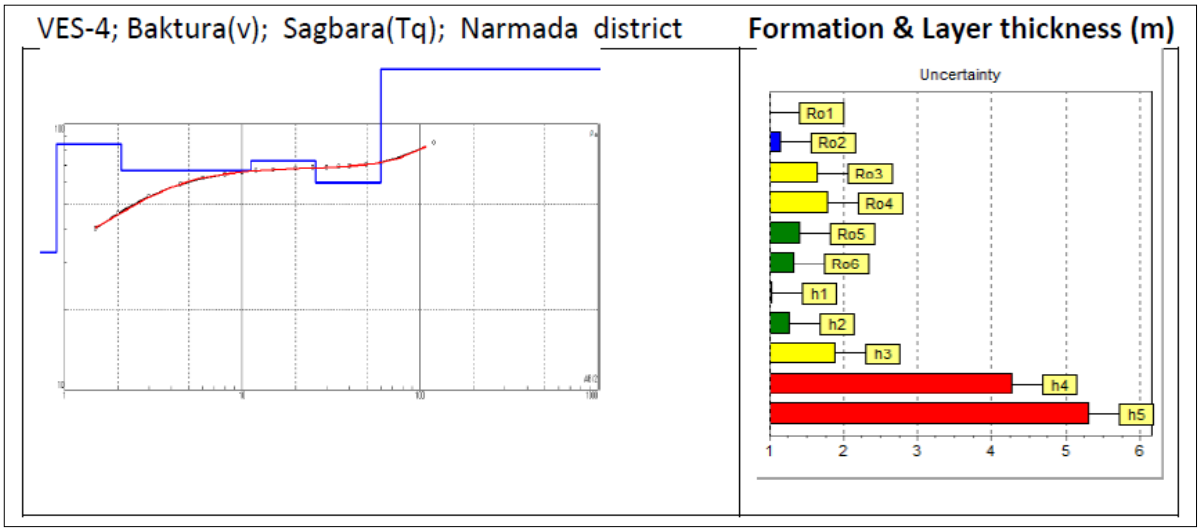


Fig. 4.1.Geophysical study in Baktura and Sagbara village in Narmada district, Gujarat

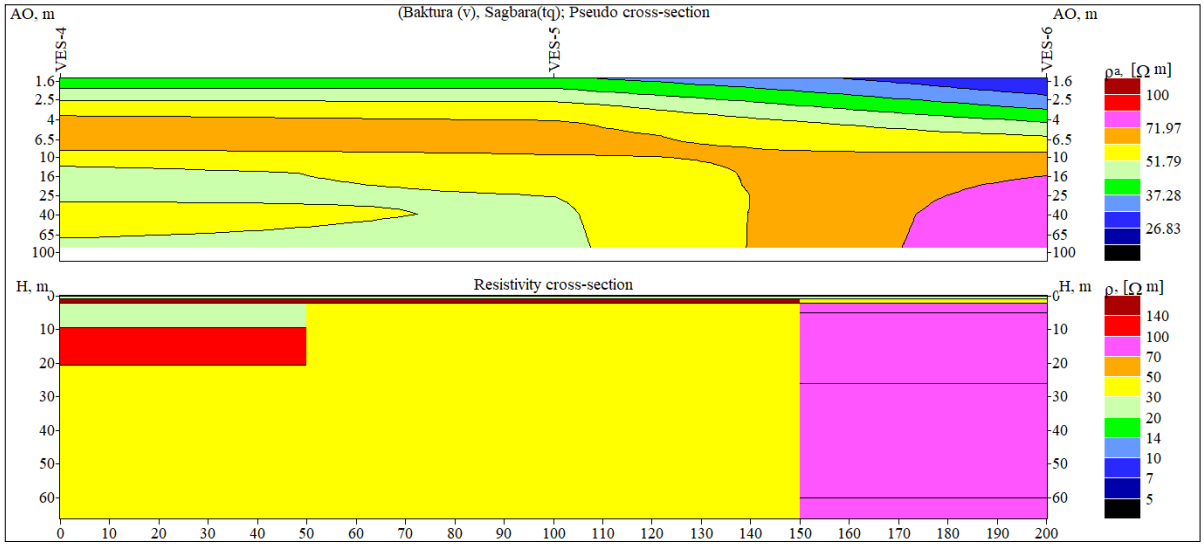


Fig. 4.2. Showing Pseudo and Resistivity cross-section of Baktura village, Taluka: Sagbara in Narmada district, Gujarat

During the year 2018-19, geophysical investigations have been carried out for Aquifer Mapping and 1859 VES, 67.17 line Km 1D profiling, 39 line Kms 2-D profiling (O/s.) and 49 borehole logging were carried out (Table 4.1) in various areas in the country.

Table 4.1 GEOPHYSICAL ACITVITY PROGRESS during 2018-19

Region	State	VES (I/h.)	VES O/s. (WAPCOS + BKD)	GRP with VES O/s. in BKD	1D Profiling/ 2D Imaging (I/h)	2D Imaging (O/s)	Geophysical Logging (I/h.)
CR, Nagpur	Maharashtra	112	256		5.2		
ER, Kolkata	Andaman & Nicobar Islands	7					
ER, Kolkata	Sikkim	0					
ER, Kolkata	West Bengal	97					7
KR, Trivandrum	Kerala	100			5		
MER, Patna	Bihar	60			10.5		1
MER, Patna	Jharkhand	82					
NCCR, Chhattisgarh	Chhattisgarh	100					
NCR, Bhopal	Madhya Pradesh	9		666		20	
NR, Lucknow	Uttar Pradesh	201	258	152	6.55	19	15
NWHR, Jammu	Jammu and Kashmir	20					
NWR, Chandigarh	Chandigarh						1
NWR, Chandigarh	Haryana	69					
NWR, Chandigarh	Punjab	62					4
SECR, Chennai	Tamilnadu	154			5		11
SER, Bhubaneswar	Odisha	53					6

SR, Hyderabad	Andhra Pradesh	174			6.38		
SR, Hyderabad	Telangana	128			5.94		
SWR, Bangalore	Karnataka	153	850		12		
UR, Dehradun	Uttarakhand	51			5.2		
WCR, Ahmedabad	Gujarat	52			5.4		4
WR, Jaipur	Rajasthan	175					
		1859	**1364**	**818**	**67.17**	**39**	**49**

I/h.- Inhouse O/s.- Outsourcing BKD - Bundelkhand

CHAPTER 5

GROUNDWATER QUALITY STUDIES

Central Ground Water Board has 16 Regional Chemical Laboratories to carry out chemical analysis of major and minor inorganic constituents in water samples. The Chemical laboratories are well equipped to carry out Basic, Trace metal and Toxic elements determinations using sophisticated instruments like Atomic Absorption Spectrophotometer (AAS), Digital PC based UV- VIS Spectrophotometer, Ion meter, Flame Photometer, pH meter, Conductivity meter, and Nephelometer. The laboratories are also provided with Electronic Monopan and Top loading Balances, Deionizer, Double Distillation Plant, Hot Air Oven, Water Bath, Magnetic Stirrer and Hot Plates. Four Regional Laboratories at Kolkata, Hyderabad, Lucknow and Raipur are also equipped with Gas Chromatograph (GC) to undertake the analysis of organic pollutants (Pesticides) at µg/l level. The Chemical Laboratory at Hyderabad is additionally equipped with Inductive Coupled Plasma Spectrometer (ICPS) for sequential analysis of multiple toxic elements with high accuracy. Total Organic Carbon (TOC) analyzer is installed in the Regional Chemical Laboratory at Kolkata. The chemical analysis data generated by these laboratories is utilized for evaluating the groundwater quality in compliance with National Standards (BIS 2012), to study the impact of anthropogenic activities on ground water quality, demarcate areas of water quality deterioration and assess the point and non-point sources of ground water pollution so as to take necessary action for management of ground water resources.

During 2018-19, 28205 ground water samples have been analyzed, out of which 21549 water samples have been analyzed for determination of basic constituents, while 6608 water samples have been analysed for the Trace elements like As, Cd, Co, Cr, Cu Fe, Mn, Ni, Pb, Zn etc and 48 samples for pesticides. The details of water samples analyzed by different chemical laboratories during 2018-19 are presented in table 5.1 and fig. 5.1.

Training is organised at Rajiv Gandhi National Ground Water Training and Research Institute (RGNGWTRI), Raipur, Chhattisgarh for training man power on chemical analysis, interpretation and validation of data on water chemistry. Besides the analytical work, chemists from the various laboratories have participated in mass awareness programmes and trade fairs and have prepared exhibits, posters, handouts diagrams, etc. on water quality display. They have demonstrated the testing of various chemical parameters present in water and their impact on human body. The importance of water quality for artificial recharge to ground water through rain water harvesting and impact of quality of the water being used for drinking, agricultural and industrial purposes has also been explained to farmers, visitors and students.

Table 5.1 Region-wise Ground Water Samples analysed during 2018-19

Region	Number of Samples		
	Basic parameters	Heavy metals	Pesticides
NWR, Chandigarh	815	644	48
WCR, Ahmedabad	789	781	
NCR, Bhopal	1518		
WR, Jaipur	1266	588	
NR, Lucknow	1645	854	
ER, Kolkata	1812	1757	
NER, Guwahati	671	1224	
MER, Patna	543		
SER, Bhubneshwar	1517	343	
NCCR, Raipur	1532	117	
CR, Nagpur	1962		
SWR, Bangalore	2307		
SECR, Chennai	2810	76	
SR, Hyderabad	1550	107	
KR, Trivendrum	812	117	
TOTAL	**21549**	**6608**	**48**
	28205		

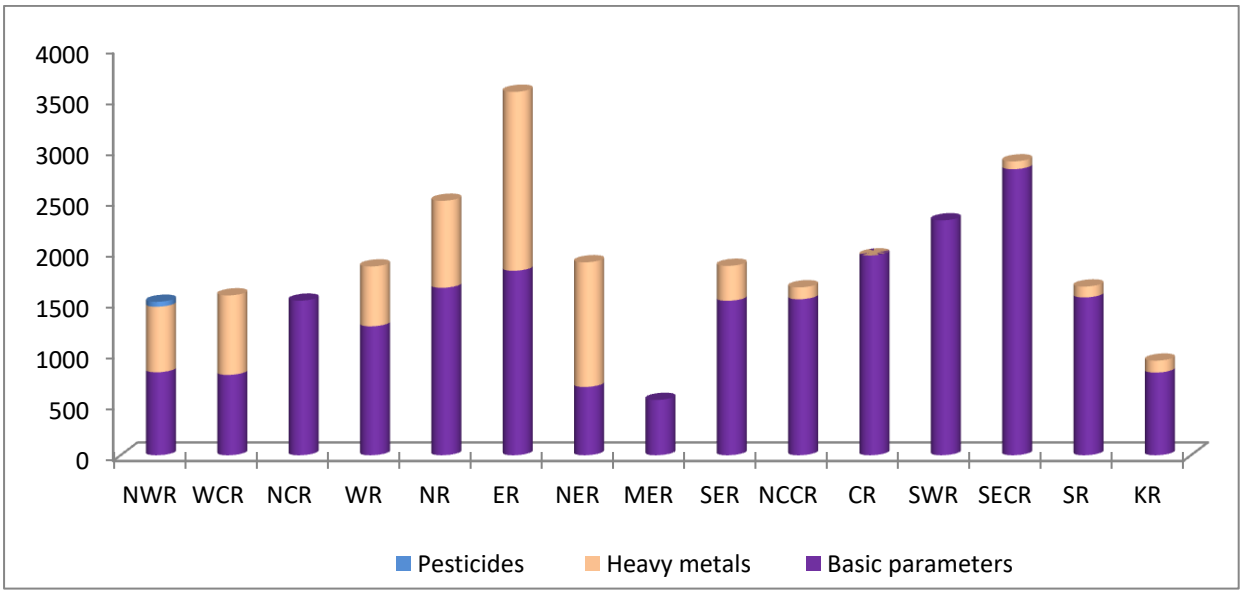


Fig. 5.1: Region Wise Water Sample Analysis during 2018-19

CHAPTER 6

WATER SUPPLY INVESTIGATIONS

The Board provides assistance to Defence and Government agencies / establishments to solve their immediate water supply problems by selecting suitable sites for construction of ground water abstraction structures. During 2018-19, 151 Water Supply Investigations were carried out by the Board. Region wise/ state wise status in this connection is given in table 6.1 and fig. 6.1.

Table 6.1Region / State wise Water Supply investigations during 2018-19

	Regions	States	Number of Water Supply Investigations
1	**NWR, Chandigarh**	Chandigarh	5
2		Punjab	4
3		Haryana	1
4	**NWHR, Jammu**	Jammu & Kashmir	72
5	**NHR, Dharmshala**	Himachal Pradesh	6
6	**NCR, Bhopal**	Madhya Pradesh	4
7	**WR, Jaipur**	Rajasthan	1
8	**NR, Lucknow**	Uttar Pradesh	13
9	**UK, Dehradun**	Uttarakhand	3
10	**NER, Guwahati**	Assam	24
11		Arunachal Pradesh	3
12		Meghalaya	1
13		Tripura	1
14	**CR, Nagpur**	Maharashtra	1
15	**SWR, Banglore**	Karnataka	5
16	**SECR, Chennai**	Tamil Nadu	4
17		Puducherry	1
18	**SR, Hyderabad**	Andhra Pradesh	1
19		Telangana	1
			151

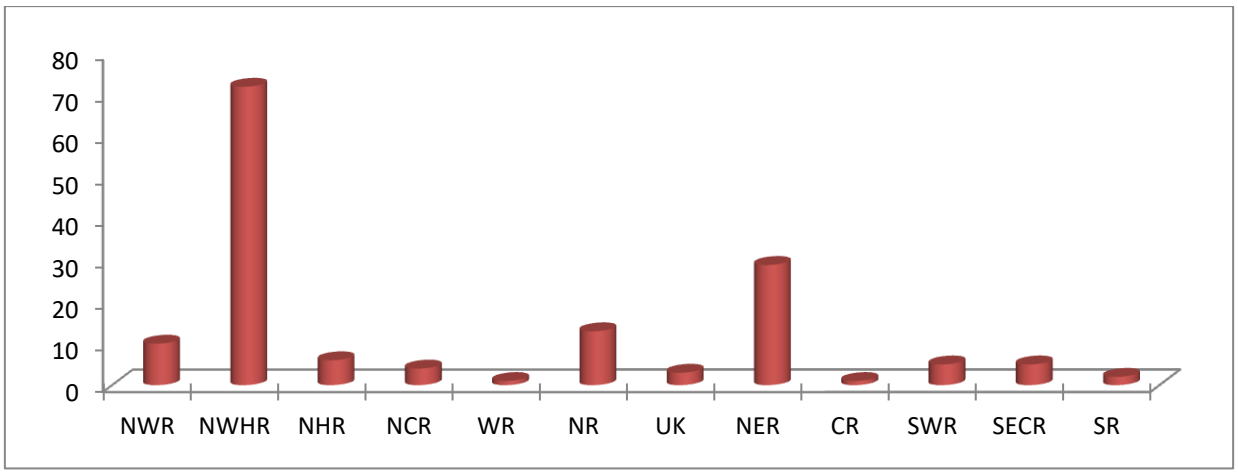


FIg 6.1: Region wise status of Short Term Water Supply Investigations during 2018-19

CHAPTER 7

GROUND WATER REGIME MONITORING

Ground water regime monitoring is one of the key activities of Central Ground Water Board (CGWB). Monitoring of ground water regime is an effort to obtain information on ground water level and chemical quality through representative sampling. The primary objective of ground water monitoring is to record the response of various natural and anthropogenic stress on the groundwater regime which impacts the recharge and discharge parameters with reference to geology, climate, physiography, land use pattern and hydrologic characteristics on a regional scale. The key applications of the groundwater data acquired during regime monitoring in the country are

- The data is used for volumetric estimation of groundwater resources.
- To assess the impact of groundwater recharge and draft on long term basis
- To categorise area into overexploited, critical, semi-critical and safe based on long term water level trend analysis.
- In deciding the depth of water well drilling as well as depth of lowering the pumps.
- Help in designing, implementation and monitoring of the effectiveness of groundwater management, protection and conservation program
- To identify groundwater quality affected areas for taking remedial measures.
- To plan groundwater recharge interventions and study the impact in time and space.

At present, CGWB has a network of 22965 (Dug Wells: 16485 and Piezometers: 6480) ground water observation wells throughout the Country. The state wise breakup is given below.

Table 7.1. State-wise distribution of the Ground Water Observation Wells

Sl No	Name of the State/UTs	Number of GW Monitoring Stations (March 2019)		
		DW	PZ	Total
State's				
1	Andhra Pradesh	699	165	864
2	Arunachal Pradesh	29	4	33
3	Assam	389	34	423
4	Bihar	729	32	761
5	Chhattisgarh	1160	268	1428
6	Delhi	17	70	87
7	Goa	96	44	140
8	Gujarat	620	244	864
9	Haryana	523	805	1328

10	Himachal Pradesh	128	0	128
11	Jammu & Kashmir	269	11	280
12	Jharkhand	472	6	478
13	Karnataka	1466	318	1784
14	Kerala	1384	236	1620
15	Madhya Pradesh	1210	319	1529
16	Maharashtra	1719	179	1898
17	Manipur	0	0	0
18	Meghalaya	52	12	64
19	Nagaland	25	7	32
20	Odisha	1511	89	1600
21	Punjab	173	847	1020
22	Rajasthan	707	463	1170
23	Tamil Nadu	816	470	1286
24	Telangana	311	440	751
25	Tripura	90	10	100
26	Uttar Pradesh	871	260	1131
27	Uttarakhand	39	165	204
28	West Bengal	832	934	1766
Union Territories (UT's)				
1	Andaman & Nicobar	110	2	112
2	Chandigarh	1	36	37
3	Dadra & Nagar Haveli	18	0	18
4	Daman & Diu	11	3	14
5	Pondicherry	8	7	15
TOTAL		**16485**	**6480**	**22965**

The ground water levels are measured manually four times a year during the months of January, March/April/ May, August and November coinciding with crop season and onset of monsoon as well as to capture deepest and shallowest water level in the hydrological year. The ground water regime monitoring started in the year 1969 by Central Ground Water Board.

Ground water samples are collected once a year during the month of March/April/May to obtain background information of ground water quality changes on regional scale.

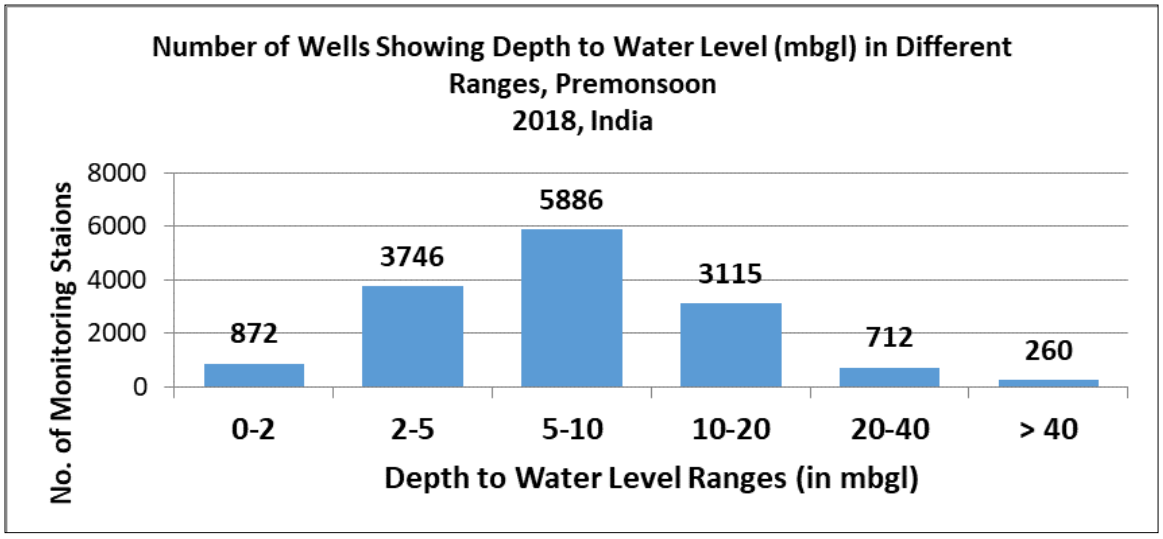
The database thus generated forms the basis for planning the ground water development and management programme. This data is used for assessment of ground water resources and changes in the regime consequent to various development and management activities.

7.2 Ground Water Level Scenario

Depth to Water Level – Pre Monsoon 2018

The ground water level data for Premonsoon 2018 indicates that out of the total 14591 wells analysed, 872 (6 %) wells are showing water level less than 2 m bgl (metres below ground level), 3746 (26%) wells are showing water level in the depth range of 2-5 m bgl, 5886 (41 %) wells are showing water level in the depth range of 5-10 m bgl, 3115 (21%) wells are showing water level in the depth range of 10-20 m bgl, 712 (5%) wells are showing water level in the depth range of 20-40 m bgl and the remaining 260 (2%) wells are showing water level more than 40 m bgl. The maximum depth to water level of 114.00 m bgl is observed in Bikaner district of Rajasthan whereas the minimum is less than 1 m bgl.

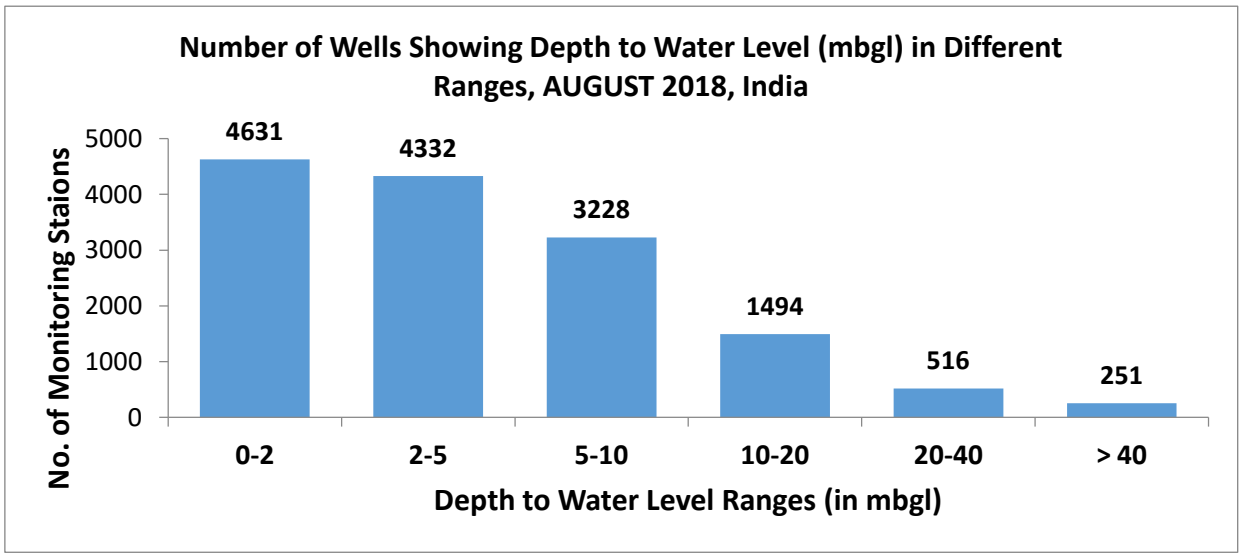
Water level data of Premonsoon 2018 for the country reveals that the general depth to water level of the country ranges from 5 to 20 m bgl. To be more specific, in major parts of the country, water level is observed to be in the range of 5 to 10 m. Very shallow water level of less than 2 m bgl is also observed locally, in isolated pockets, in few states, such as Assam, Andhra Pradesh, Maharashtra, and Odisha. Major part of the state of Assam shows water level in the range of 2-5 m bgl. In the eastern coastal region of Odisha and Andhra Pradesh, water level og 2-5 m bgl can be observed. In major parts of north-western and western states, depth to water level is generally deeper and ranges from about 10- 40 m bgl. In parts Delhi and Rajasthan, water level of more than 40 m bgl is also recorded. Also, small pockets in Tamil Nadu shows water level of more than 40 m bgl. The peninsular part of country recorded a water level in the range of 5 to 20 m bgl.



Depth to Water Level – August 2018

The ground water level data for August 2018 indicate that out of the total 14452 wells analysed, 4631 (32 %) wells are showing water level less than 2 m bgl (metres below ground level), 4332 (30%) wells are showing water level in the depth range of 2-5 m bgl, 3228 (22 %) wells are showing water level in the depth range of 5-10 m bgl, 1494 (10%) wells are showing water level in the depth range of 10-20 m bgl, 516 (4%) wells are showing water level in the depth range of 20-40 m bgl and the remaining 251 (2 %) wells are showing water level more than 40 m bgl. The maximum depth to water level of 129.40 m bgl is observed in Bikaner District of Rajasthan whereas the minimum is less than 1 m bgl.

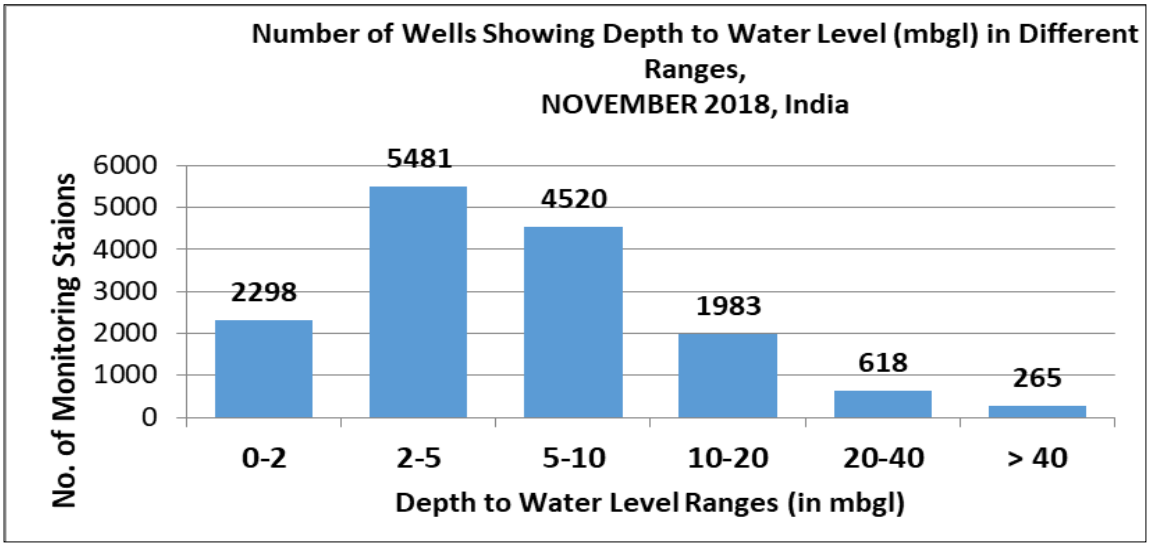
Ground water level data of August 2018 for the country reveals that the general depth to water level of the country ranges from 0 to 5 m bgl. Very shallow water level of less than 2 m bgl is observed in almost all the states, such as Assam, Andhra Pradesh, Bihar, Chhatishgarh, Goa, Gujarat, Himachal Pradesh, Jammu & Kashmir, Jharkhand, Madhya Pradesh, Maharashtra, Odisha, Tripura, and West Bengal. In major parts of north-western and western states, depth to water level is generally deeper and ranges from about 10- 40 m bgl. In parts Delhi, Haryana and Rajasthan, water level of more than 40 m bgl is also recorded. The peninsular part of country recorded a water level in the range of 2 to 10 m bgl. The maximum depth to water level of 129.00 m bgl is observed in Bikaner district of Rajasthan whereas the minimum is less than 1 m bgl.



Depth to Water Level – Post Monsoon 2018

The ground water level data for November 2018 indicates that out of the total 15165 wells analysed, 2298 (15 %) wells are showing water level less than 2 m bgl (metres below ground level), 5481(36%) wells are showing water level in the depth range of 2-5 m bgl, 4520 (30 %) wells are showing water level in the depth range of 5-10 m bgl, 1983 (13%) wells are showing water level in the depth range of 10-20 m bgl, 618 (4%) wells are showing water level in the depth range of 20-40 m bgl and the remaining 265 (2 %) wells are showing water level more than 40 m bgl. The maximum depth to water level of 130.20 m bgl is observed in Bikaner district of Rajasthan.

Perusal of depth to water level data of November 2018 indicates that in general depth to water level ranges from 2 to 10 m bgl as observed at about 66% of the monitoring stations. Very shallow water level of less than 2 m bgl is observed in few states, such as Assam, Odisha, Andhra Pradesh, Maharashtra, Gujarat and Uttar Pradesh, in small patches. Eastern part of the country, covering the states of Assan, Bihar, Odisha, Chhattisgarh, and Eastern UP shows water level in the range of 2-5 m bgl. In major parts of north-western and western states, depth to water level is generally deeper and ranges from about 10- 40 m bgl. In parts Delhi, Haryana and Rajasthan, water level of more than 40 m bgl is also recorded. The peninsular part of country recorded a water level in the range of 5 to 10 m bgl. The maximum depth to water level of 130.20 m bgl is observed in Bikaner district of Rajasthan whereas the minimum is less than 1 m bgl.

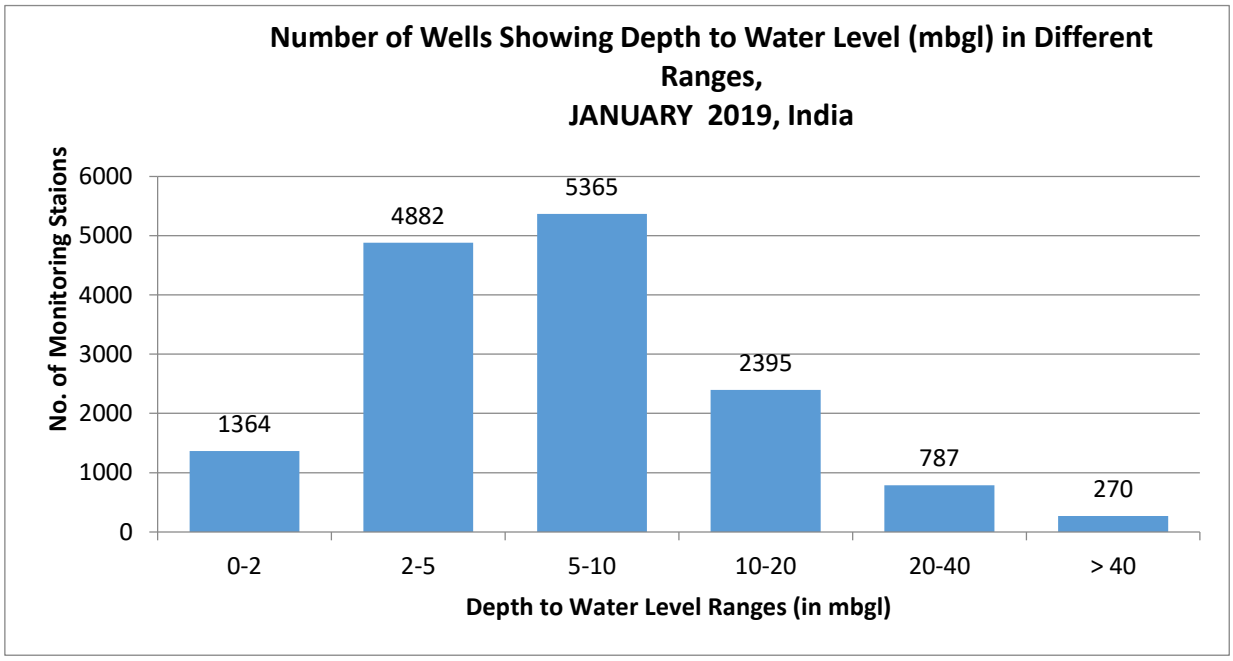


Depth to Water Level – January 2019

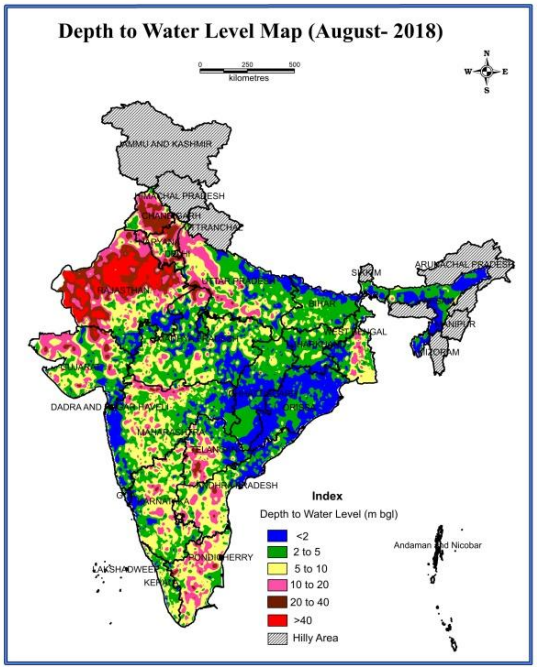
The ground water level data for January 2019 indicates that out of the total 15063 wells analysed, 1364 (9 %) wells are showing water level less than 2 m bgl (metres below ground level), 4882(32%) wells are showing water level in the depth range of 2-5 m bgl, 5365 (36 %) wells are showing water level in the depth range of 5-10 m bgl, 2395 (16%) wells are showing

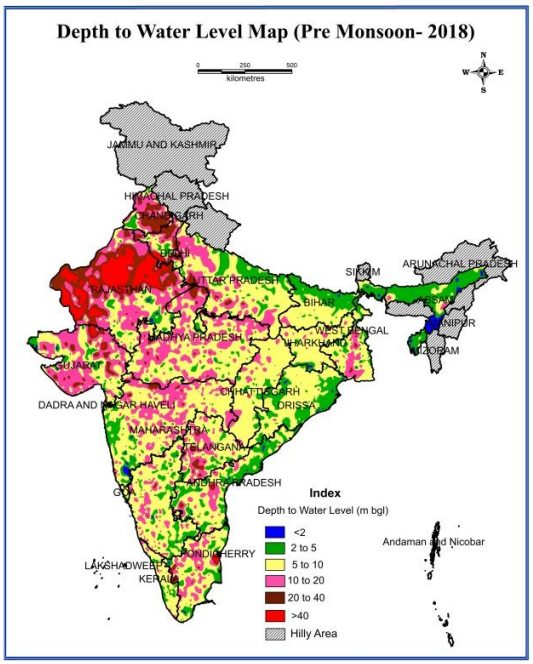
water level in the depth range of 10-20 m bgl, 787 (5%) wells are showing water level in the depth range of 20-40 m bgl and the remaining 270 (2 %) wells are showing water level more than 40 m bgl. The maximum depth to water level of 127.95 m bgl is observed in Bikaner district of Rajasthan.

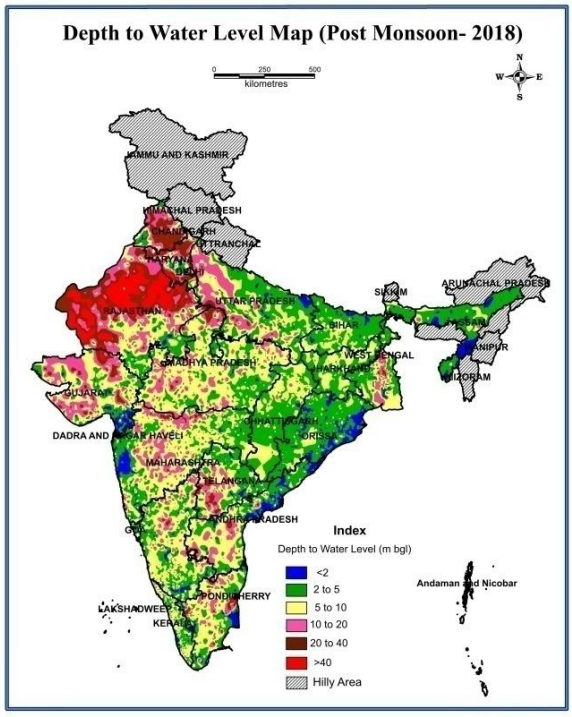
Perusal of depth to water level data of January 2019 indicates that in general depth to water level ranges from 2 to 10 m bgl as observed at about 68% of the monitoring stations. Very shallow water level of less than 2 m bgl is observed in few states, such as Assam, Odisha, Andhra Pradesh and in small isolated patches in Maharashtra, and Uttar Pradesh. Eastern part of the country, covering the states of Assam, northern part of Bihar, Odisha and Eastern UP shows water level in the range of 2-5 m bgl. In major parts of north-western and western states, depth to water level is generally deeper and ranges from about 10- 40 m bgl. In parts Delhi, Haryana and Rajasthan, water level of more than 40 m bgl is also recorded. The peninsular part of country recorded a water level in the range of 5 to 10 m bgl with intermittent more than 10 m water level. The maximum depth to water level of 127.95 m bgl is observed in Bikaner district of Rajasthan whereas the minimum is less than 1 m bgl.

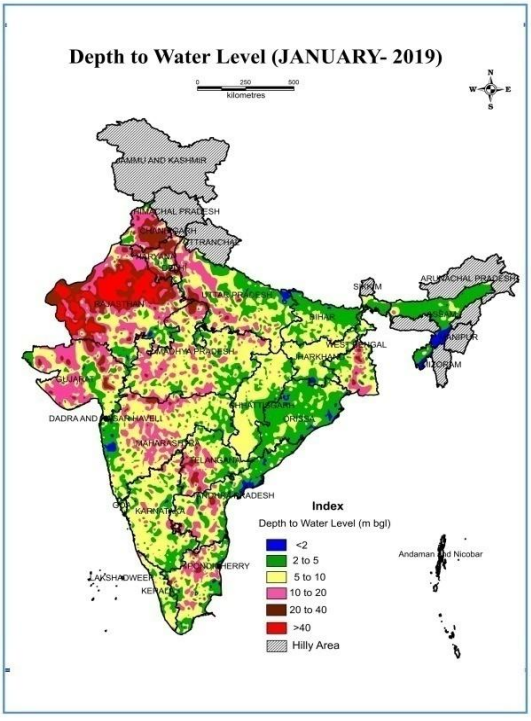


DEPTH TO WATER LEVEL MAPS AT A GLANCE (2018-2019)









CHAPETR 8

RE-ASSESSMENT OF DYNAMIC GROUND WATER RESOURCES

The assessment of Ground water resource is carried out to determine the prevailing ground water scenario of the country. It also indicates the impact of the on-going ground water management practices on the groundwater resources. In 2017, MoWR, RD&GR constituted a Central Level Expert Group (CLEG) for over-all supervision of the re-assessment of ground water resources in the entire country. The groundwater resources assessment for reference year 2017 at the State Level have been carried out jointly by State Groundwater Departments and Central Ground Water Board under the supervision of State Level Committees, with technical guidance from Central Level Expert Group.

The dynamic ground water resources of India has been estimated for the entire country for the reference years 1972, 1985, 1995, 2004, 2009, 2011, 2013 & 2017 (latest) till now. The previous GEC- 97 methodology was revised to GEC-2015 methodology, taking into consideration of improvement in data availability and assessment techniques. GWRA 2017 has been carried out using GEC-2015 methodology.

The national compilations have been hosted in CGWB website and also have been shared with all Regional Directors for sharing with respective State counterpart. As per GWRA 2017, the total annual ground water recharge has been assessed as 431.86 bcm. Keeping an allocation for natural discharge, the total annual extractable ground water resources is assessed as 392.70 bcm. The annual groundwater extraction (as in March, 2017) is 248.69 bcm. The average stage of groundwater extraction for the country as a whole works out to be about 63%.

Out of the total 6881 assessment units in the country, 1186 units (17%) in various States have been categorized as 'Over-Exploited' indicating ground water extraction exceeding the total annual ground water recharge. In addition, 313units (5%) are'Critical', 972 units (14%) are 'semi-critical' and 4310 assessment units (63%) have been categorised as 'Safe'. Apart from this, there are 100 assessment units (1%), which have been categorised as 'Saline' as major part of the ground water in the phreatic aquifers is brackish or saline.

In respect of West Bengal, the results of GWRA-2017 indicated a huge variation with respect of previous assessment of resources and the reasons for the changes in West Bengal was not found reasonable and adequate and further, SLC has also not approved the GWRA- 2017 assessment. Hence, CLEG recommended that the results of 2013 assessment in respect of West Bengal may be used in place of GWRA-2017 assessment for national compilation of GWRA-2017 with a rider that after approval of GWRA-2017 by SLC of WestBengal, a corrigendum may be issued separately, incorporating the results of GWRA- 2017.

The state wise ground water resource data & categorization of assessment units as per Dynamic Ground Water Resources of India, 2017 are given in Annexure I & II.

STATE-WISE GROUND WATER RESOURCES OF INDIA, 2017 (in BCM)

ANNEXURE- I

S. No.	States / Union Territories	Ground Water Recharge					Total Natural Discharges	Annual Extractable Ground Water Resource	Current Annual Ground Water Extraction				Annual GW Allocation for for Domestic Use as on 2025	Net Ground Water Availability for future use	Stage of Ground Water Extraction (%)
		Monsoon Season		Non-monsoon Season		Total Annual Ground Water Recharge			Irrigation	Industrial	Domestic	Total			
		Recharge from rainfall	Recharge from other sources	Recharge from rainfall	Recharge from other sources										
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	States														
1	**Andhra Pradesh**	9.96	5.62	1.21	4.42	21.22	1.07	20.15	7.85	0.14	0.90	8.90	1.48	12.31	44.15
2	**Arunachal Pradesh**	1.89	0.18	0.95	0.01	3.02	0.36	2.67	0.00	0.00	0.01	0.01	0.03	2.64	0.28
3	**Assam**	20.22	0.43	7.28	0.74	28.67	4.42	24.26	1.97	0.06	0.69	2.73	0.79	21.43	11.25
4	**Bihar**	19.83	3.95	3.14	4.50	31.41	2.43	28.99	10.78	0.66	1.83	13.26	1.83	15.78	45.76
5	**Chhattisgarh**	7.82	1.36	0.76	1.64	11.57	1.00	10.57	3.98	0.05	0.67	4.70	0.79	5.76	44.43
6	**Delhi**	0.13	0.06	0.03	0.11	0.32	0.02	0.30	0.09	0.02	0.24	0.36	0.29	0.02	119.61
7	**Goa**	0.19	0.03	0.01	0.05	0.27	0.11	0.16	0.02	*	0.03	0.05	0.04	0.07	33.50
8	**Gujarat**	15.95	3.40	0.00	3.02	22.37	1.12	21.25	12.84	0.11	0.63	13.58	0.90	7.98	63.89
9	**Haryana**	3.56	2.55	1.03	3.00	10.15	1.01	9.13	11.53	0.34	0.63	12.50	0.72	0.87	136.91
10	**Himachal Pradesh**	0.34	0.02	0.11	0.04	0.51	0.05	0.46	0.20	0.00	0.19	0.39	0.34	0.16	86.37
11	**Jammu & Kashmir**	1.00	0.50	0.88	0.51	2.89	0.29	2.60	0.20	0.07	0.50	0.76	0.50	1.84	29.47
12	**Jharkhand**	5.25	0.13	0.41	0.42	6.21	0.52	5.69	0.80	0.22	0.56	1.58	0.56	4.13	27.73
13	**Karnataka**	6.59	4.36	2.67	3.22	16.84	2.05	14.79	9.39	*	0.95	10.34	1.14	5.41	69.87
14	**Kerala**	3.91	0.04	0.68	1.13	5.77	0.56	5.21	1.22	0.01	1.44	2.67	1.57	2.41	51.27
15	**Madhya Pradesh**	27.10	1.51	0.82	6.99	36.42	1.95	34.47	17.43	0.22	1.24	18.88	1.72	15.84	54.76
16	**Maharashtra**	20.59	2.29	0.53	8.23	31.64	1.74	29.90	15.10	0.003	1.22	16.33	2.28	12.91	54.62
17	**Manipur**	0.23	0.01	0.17	0.02	0.43	0.04	0.39	0.00	0.00	0.00	0.01	0.04	0.34	1.44
18	**Meghalaya**	1.37	0.01	0.43	0.02	1.83	0.19	1.64	0.03	0.00	0.01	0.04	0.02	1.59	2.28
19	**Mizoram**	0.16	0.00	0.05	0.00	0.21	0.02	0.19	0.00	0.00	0.01	0.01	0.01	0.18	3.82
20	**Nagaland**	1.65	0.03	0.52	0.00	2.20	0.22	1.98	0.00	0.00	0.02	0.02	0.02	1.96	0.99
21	**Odisha**	10.53	2.34	1.50	2.37	16.74	1.17	15.57	5.28	0.14	1.15	6.57	1.30	8.85	42.18
22	**Punjab**	5.54	11.83	1.31	5.25	23.93	2.35	21.58	34.56	0.20	1.01	35.78	1.41	1.09	165.77
23	**Rajasthan**	9.74	0.78	0.24	2.44	13.21	1.22	11.99	14.85	0.00	1.92	16.77	2.67	0.88	139.88
24	**Sikkim**	5.20	0.00	0.43	0.00	5.63	4.11	1.52	0.00	0.00	0.00	0.00	0.01	1.51	0.06
25	**Tamil Nadu**	6.67	9.41	1.89	2.26	20.22	2.02	18.20	13.06	0.00	1.67	14.73	1.85	5.66	80.94
26	**Telangana**	7.56	1.42	1.88	2.76	13.62	1.25	12.37	7.09	*	1.00	8.09	1.39	4.26	65.45
27	**Tripura**	0.80	0.06	0.40	0.26	1.53	0.29	1.24	0.02	0.00	0.08	0.10	0.11	1.11	7.88
28	**Uttar Pradesh**	37.73	11.67	1.59	18.93	69.92	4.60	65.32	40.89	*	4.95	45.84	5.96	20.36	70.18
29	**Uttarakhand**	1.15	0.93	0.09	0.87	3.04	0.15	2.89	1.30	0.13	0.22	1.64	0.22	1.25	56.83
30	**West Bengal****	18.71	1.51	5.26	3.85	29.33	2.77	26.56	10.84	*	1.00	11.84	1.53	14.19	44.60
	Total States	251.36	66.41	36.30	77.06	431.13	39.09	392.04	221.33	2.38	24.77	248.47	31.52	172.82	63.38
	Union Territories														
1	**Andaman & Nicobar**	0.35	0.00	0.02	0.00	0.37	0.04	0.33	0.00	0.00	0.01	0.01	0.01	0.32	2.74
2	**Chandigarh**	0.02	0.01	0.00	0.01	0.04	0.00	0.04	0.00	*	0.03	0.03	0.03	0.00	89.00
3	**Dadra & Nagar Haveli**	0.06	0.00	0.00	0.01	0.07	0.00	0.07	0.01	*	0.01	0.02	0.01	0.04	31.34
4	**Daman & Diu**	0.02	0.00	0.00	0.00	0.02	0.00	0.02	0.01	0.00	0.00	0.01	0.00	0.00	61.40
5	**Lakshdweep**	0.01	0.00	0.00	0.00	0.01	0.01	0.004	0.00	0.00	0.002	0.002	0.00	0.00	65.99
6	**Puducherry**	0.09	0.07	0.02	0.05	0.23	0.02	0.20	0.11	*	0.04	0.15	0.04	0.05	74.33
	Total UTs	0.54	0.08	0.05	0.07	0.73	0.08	0.66	0.13	0.00	0.10	0.23	0.10	0.43	34.51
	Grand Total	251.90	66.49	36.34	77.13	431.86	39.16	392.70	221.46	2.38	24.87	248.69	31.62	173.25	63.33

Note: *Industrial and domestic draft has not been estimated separately in Goa, Himachal Pradesh, Karnataka, Rajasthan, Tamil Nadu, Uttar Pradesh, Chandigarh, Dadra & Nagar Haveli and Puducherry

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

ANNEXURE II

CATEGORIZATION OF BLOCKS/ MANDALS/ TALUKAS IN INDIA (2017)												
S.No.	States / Union Territories	Total No. of Assessed	Safe		Semi-Critical		Critical		Over-Exploited		Saline	
			Nos.	%	Nos.	%	Nos.	%	Nos.	%	Nos.	%
	States											
1	**Andhra Pradesh**	670	501	75	60	9	24	4	45	7	40	6
2	**Arunachal Pradesh**	11	11	100	0	0	0	0	0	0	0	0
3	**Assam**	28	28	100	0	0	0	0	0	0	0	0
4	**Bihar**	534	432	81	72	13	18	3	12	2	0	0
5	**Chattisgarh**	146	122	84	22	15	2	1	0	0	0	0
6	**Delhi**	34	3	9	7	21	2	6	22	65	0	0
7	**Goa**	12	12	100	0	0	0	0	0	0	0	0
8	**Gujarat**	248	194	78	11	4	5	2	25	10	13	5
9	**Haryana**	128	26	20	21	16	3	2	78	61	0	0
10	**Himachal Pradesh**	8	3	38	1	13	0	0	4	50	0	0
11	**Jammu & Kashmir**	22	22	100	0	0	0	0	0	0	0	0
12	**Jharkhand**	260	245	94	10	4	2	1	3	1	0	0
13	**Karnataka**	176	97	55	26	15	8	5	45	26	0	0
14	**Kerala**	152	119	78	30	20	2	1	1	1	0	0
15	**Madhya Pradesh**	313	240	77	44	14	7	2	22	7	0	0
16	**Maharashtra**	353	271	77	61	17	9	3	11	3	1	0
17	**Manipur**	9	9	100	0	0	0	0	0	0	0	0
18	**Meghalaya**	11	11	100	0	0	0	0	0	0	0	0
19	**Mizoram**	26	26	100	0	0	0	0	0	0	0	0
20	**Nagaland**	11	11	100	0	0	0	0	0	0	0	0
21	**Odisha**	314	303	96	5	2	0	0	0	0	6	2
22	**Punjab**	138	22	16	5	4	2	1	109	79	0	0
23	**Rajasthan**	295	45	15	29	10	33	11	185	63	3	1
24	**Sikkim**	4	4	100	0	0	0	0	0	0	0	0
25	**Tamil Nadu**	1166	427	37	163	14	79	7	462	40	35	3
26	**Telangana**	584	278	48	169	29	67	11	70	12	0	0
27	**Tripura**	59	59	100	0	0	0	0	0	0	0	0
28	**Uttar Pradesh***	830	540	65	151	18	48	6	91	11	0	0
29	**Uttarakhand**	18	13	72	5	28	0	0	0	0	0	0
30	**West Bengal** **	268	191	71	76	28	1	0	0	0	0	0
	Total States	**6828**	**4265**	**62**	**968**	**14**	**312**	**5**	**1185**	**17**	**98**	**1**
	Union Territories											
1	**Andaman & Nicobar**	36	35	97	0	0	0	0	0	0	1	3
2	**Chandigarh**	1	0	0	1	100	0	0	0	0	0	0
3	**Dadra & Nagar Have**	1	1	100	0	0	0	0	0	0	0	0
4	**Daman & Diu**	2	1	50	0	0	1	50	0	0	0	0
5	**Lakshdweep**	9	6	67	3	33	0	0	0	0	0	0
6	**Puducherry**	4	2	50	0	0	0	0	1	25	1	25
	Total UTs	**53**	**45**	85	**4**	8	**1**	2	**1**	2	**2**	4
	Grand Total	**6881**	**4310**	**63**	**972**	**14**	**313**	**5**	**1186**	**17**	**100**	**1**
Note												
Blocks- Bihar, Chattisgarh, Haryana, Jharkhand, Kerala, M.P., Manipur, Mizoram, Orissa, Punjab, Rajasthan, Tripura, Uttar Pradesh,												
Taluks -Karnataka, Goa, Gujarat, Maharashtra												
Mandals - Andhra Pradesh, Telangana												
Districts/Valley- Arunachal Pradesh, Assam, Himachal Pradesh, Jammu & Kashmir, Meghalaya, Mizoram, Nagaland												
Islands - Lakshdweep, Andaman & Nicobar Islands												
Firka-Tamil Nadu												
Region - Puducherry												
UT - Chandigarh, Dadar & Nagar Haveli, Daman & Diu												
Tehsil-NCT Delhi												
***Uttar Pradesh:** There are total 820 block and 10 Cities												
**The Ground Water resources assessment as on 2013 has been considered for the state of West Bengal												

CHAPTER 9

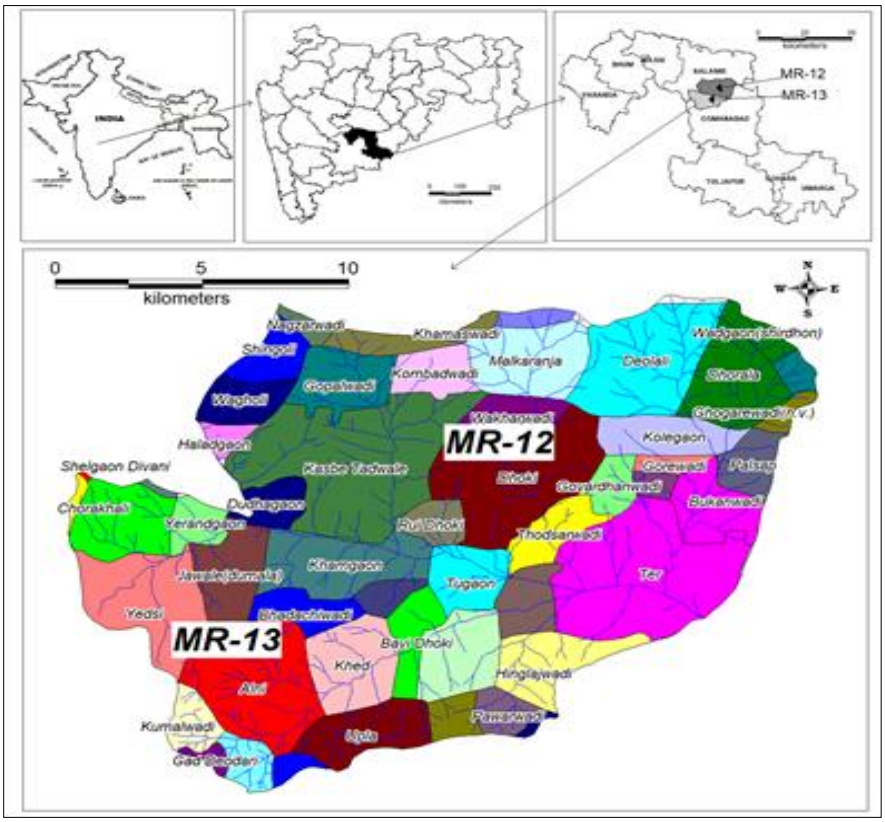
AQUIFER REJUVENATION BY ARTIFICAL RECHARGE

Aquifer Rejuvenation project through Artificial Recharge (AR) has been implemented by Central Ground Water Board (CGWB), Ministry of Water Resources, RD & GR in selected over-exploited blocks in the Country under Aspirational District program. As a part of this, Aquifer rejuvenation project has been initiated by -

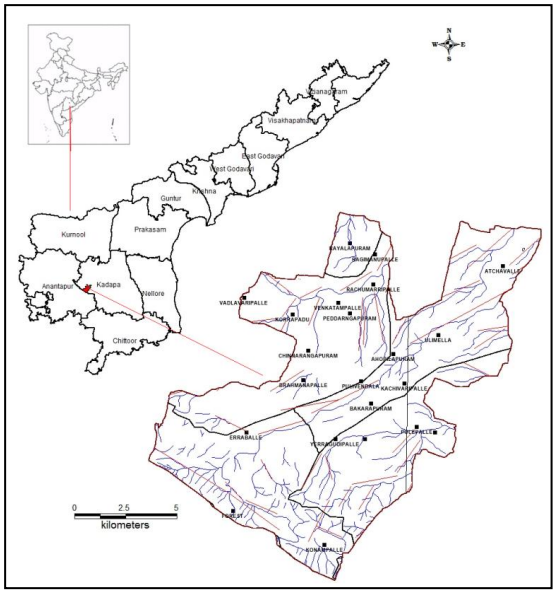
- CGWB, CR, Nagpur in MR-12 & MR-13 (Water Shed 12 & 13 in Manjra (MR) sub basin, Godavari basin) Over Exploited water shed of Osmanabad Taluka, Osmanabad District, Maharashtra State
- CGWB, SR, Hyderabad in-- Pulivendula mandal (Over Exploited), YSR Kadapa District, Andhra Pradesh State &
  - in Bachannapeta mandal (erstwhile Warangal district), Telangana State

on a pilot basis to assess the impact of artificial recharge on aquifer rejuvenation and resultant agro-economical improvements by constructing site specific artificial recharge structures.

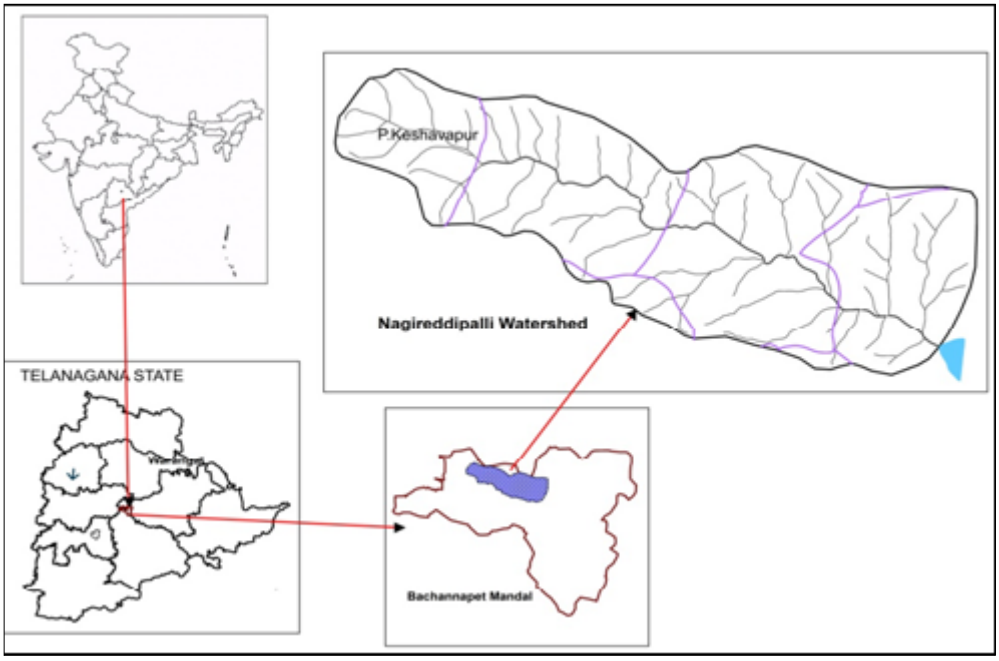
The location wise details of area undertaken are as below:



MR-12 & MR-13 Over Exploited water shed of Osmanabad Taluka, Osmanabad District, Maharashtra state



Pulivendula mandal (Over Exploited), YSR Kadapa District, Andhra Pradesh



Bachannapeta mandal, erstwhile Warangal district, Telangana State

The construction of AR structures started in all the three areas during Nov - Dec 2018. The progress till March 2019 is as below.

S.No.	Name of the Block	**Progress** (till March, 2019)
1	Osmanabad Block (Osmanabad District, Maharashtra)- Semi Critical	• Check Dam (CD): 33 under progress. Most of the structures are completed 60% to 85 %. Reported these will be completed soon.

2	Pulivendula (Dist. YSR Kadapa, A.P.)- Over Exploited	• Check Dam: All 16 completed, • Percolation Tank: All 4 completed • Sub Surface Barrier: 01 completed. • Recharge Shafts: 26 completed, 05 in progress out of 36 • Piezometer: 06 completed, 01 under progress out of 12
3	Bachennapet (Dist. Warangal, Telangana)- Over Exploited	• Check Dam: 05 completed, 01 under progress • Sub Surface Barrier: 01 completed.

Photographs of activities at some the sites in Osmanabad distt., Maharashtra

90% completed CD

Percolation pond under construction

Sub-surface barrier under construction

Anticipated impact of artificial recharge structures:

- Artificial recharge structures will augment ground water resources, by utilizing the monsoon runoff and also the surface water released from the canal to the existing MI tanks in the area.
- Helps in sustenance of bore wells during *rabi* season and soil moisture availability.
- Helps in stabilization of ayacut under ground water irrigation and increased financial returns to the farmers.
- By utilizing surface water for enhanced groundwater recharge, evaporation losses can be reduced.

As part of Aquifer Rejuvenation through Artifical Recharge Structures, construction of Bridge cum Bandhara (BCB) has been initiated in Maharashtra state. A detailed hydrogeological study at all the sites was taken up to study the impact assessment on ground water regime of the proposed Bandharas (pre-project & post-project). Five locations have been identified for construction of BCBs in Maharashtra state:

i) On Jamb river of Sarwadi Village (NH-6), Tehsil: Karanja, District: Wardha
ii) On Nala near AjraPhata Village, Tehsil: Samhdrapur, Distrcct: Wardha
iii) On Pigdi River, Tiwasa village, Tehsil: Tiwasa, District: Amravati
iv) On Yasoda River, near Deoli village, Tehsil: Deoli, District: Wardha
v) On Wagholi River, near village Jamni, Tehsil: Selu, District: Wardha

CHAPTER 10

NATIONAL HYDROLOGY PROJECT

National Hydrology Project (NHP) is the continuation of HP-I and HP-II, a Central Sector Scheme of Ministry of Water Resources, River Development and Ganga Rejuvenation (MoWR, RD&GR). NHP will help in gathering of Hydro-meteorological data which will be stored and analysed on a real time basis and can be seamlessly accessed by users and duration of this project is for 8 years starting from FY 2016-17

A brief of various activities taken by CGWB under NHPduring FY 2018-19 is given below:

1. Organized 2 Nos of Domain Specific Training through RGI, Raipur for officers from State and Central Agencies *viz*.,

   • 02 weeks training on Mathematical Modelling of Ground Water System – Total Participants 18 Nos (15 Central + 03 State).

   • 01 week training on Well Hydraulics & Pumping Test Data Analysis - Total Participants 08 Nos (08 Central).

2. Organized 06 Nos of Awareness Raising Programme on State Specific Ground Water Issues through different Regional Offices of CGWB

1) NER, Guwahati inAgartala, Tripura
2) ER, Kolkata in Andhaman, A&N Islands
3) SER, Bhubaneswar inBhubaneswar, Odisha
4) KR, Trivandrum in Trivandrum, Kerala
5) SR, Hyderabad in Visakhapatnam, Andhra Pradesh
6) NCR, Bhopal in Bhopal, Madhya Pradesh

3. Organized National Level Workshop on Rejuvenation of springs for water security through Springshed Development in Hilly Areas of the Country" at Dharmshala, Himachal Pradesh by CGWB, NHR, Dharmshala

4. Center of Excellence (CoE) for Ground Water Modeling has been established with 4 Regional Hubs (North-CHQ, Faridabad also Head Quarter for CoE for Modelling, South-SECR, Chennai, East-Bhubaneshwar and West-WCR, Ahmadabad)to facilitate and support all Implementing agencies under NHP for activities related to Ground Water Modelling. Also organized 2 days Review cum Workshop on Ground Water Modelling at CHQ Faridabad for officers from CGWB.

5. 05 No. of officers were imparted 5 days training on Water Information & Analytics Generation using Free Online Tools under NHP at NWA, Pune

CHAPTER 11

CENTRAL GROUND WATER AUTHORITY (CGWA)

Central Ground Water Authority (CGWA) has been entrusted with the responsibility of regulating and controlling ground water development and management in the country. The functions/ responsibilities of CGWA include:

(i) Exercise of powers under section 5 of the Environment (Protection) Act, 1986 for issuing directions and taking such measures in respect of all the matters referred to in sub-section (2) of section 3 of the said Act.

(ii) To resort to penal provisions contained in sections 15 to 21 of the said Act.

(iii) To regulate and control, management and development of ground water in the country and to issue necessary regulatory directions for the purpose.

(iv) Exercise of powers under section 4 of the Environment (Protection) Act, 1986 for the appointment of officers.

Important activities of CGWA during the period mentioned are given below:

1. PROCESSING OF APPLICATIONS FOR GRANT / RENEWAL OF NO OBJECTION CERTIFICATE (NOC) FOR GROUND WATER WITHDRAWAL

As per the directives of Hon'ble NGT issuance of NOC and renewal for existing/new industries/ infrastructure/ mining projects except for drinking/domestic use and/or green belts in Over –exploited and Critical blocks in Segment B Phase-I of Ganga Basin from Haridwar to Unnao and for all Over-exploited, Critical and Semi-critical (OCS) Assessment Units have been kept on hold till further orders w.e.f. 19.11.2019 and 01.03.2019 respectively.

CGWA continued to evaluate applications from Industries/ Infrastructure Units / Mining Projects for grant of NOC for ground water withdrawal as per provisions of the extant guidelines. A total of 1627 nos. of new NOCs were issued and 55 nos. of NOCs renewed during the period.

2. MONITORING OF COMPLIANCE OF CONDITIONS STIPULATED IN THE NOC

CGWA has developed online self-compliance format for the project proponent to upload the compliance conditions as stipulated in the NOC and the same is being monitored by the Regional Offices for ensuring the compliance conditions by the project proponent.

Subsequently, Show-cause Notices were issued to units, which were not found to have fully complied with the NOC conditions. Orders for sealing of bore/tube wells and/ or disconnection of electricity supply through the concerned DCs/ DMs were also issued in respect of units, which did not give satisfactory replies to the show-cause notices.

3. REVISION OF GUIDELINES FOR GROUND WATER REGULATION

Pursuant to the observations of the Hon'ble NGT in various matters and with a view to make ground water regulation in the country more effective, the process of revision of existing guidelines of Central Ground Water Authority had commenced during the previous year. Comments received from the Public were reviewed by an expert committee constituted by Water Resources, River Development & Ganga Rejuvenation and the guidelines modified appropriately. The guidelines, after approval of Central Ground Water Authority and minor modifications by the Ministry, were notified in the Gazette of India (Extraordinary) on 12.12.2018.

As per the directions of Hon'ble NGT vide OA No. 176/2015 dated 3.1.2019 a Committee was to be constituted by the Ministry of Environment, Forest and Climate Change. The report has to be submitted in April 2019.

4. 42nd Meeting of Central Ground Water Authority

The 42nd meeting of Central Ground Water Authority was held on 14.09.2018 under the Chairmanship of Sh. K. C. Naik, Chairman, CGWA at CGWA Jamnagar House, Mansingh Road, New Delhi.

The Authority approved the revised guidelines of CGWA as well as took the decision to authorize Regional Directors/ Heads of Offices of CGWB to grant NOC for ground water extraction to those Industries/ Infrastructure Projects located within their jurisdiction, extracting/proposing to extract ground water up to 10 m^3/day.

On Site Inspection by CGWB

On-site inspections were carried out by the Regional Offices of CGWB to check the compliance of NOCs accorded by CGWA before recommending the renewal applications to CGWA, New Delhi. Necessary show- cause notices were issued to the project proponents who have not complied with the conditions of the NOC issued by CGWA.

Updation of NOCAP website portal of CGWA

During the explicit period necessary changes have been made in the NOCAP website portal of CGWA wherein defined table for installation of piezometers with DWLR and telemetry system has been posted for the project proponent to follow the necessary protocol for monitoring of ambient ground water regime.

The NBC Code 2016 indicating computation of water demand as per the population for infrastructure projects have been defined to facilitate project proponent to apply for ground water demand as per the NBC Code to ease out any ambiguity. The NOCAP web portal has also incorporated the check list to be ensured by the Regional Offices for evaluating the project proposals while recommending the same to CGWA, New Delhi for issuance of NOC.

Decentralisation of NOC up to 10 m^3/day

Looking into the huge influx of project proposals where the ground water abstraction demand is up to 10 KLD, the respective Regional Offices of CGWB have been authorized to issue NOC to Industries/ Infrastructure Projects, extracting/proposing to extract ground water up to 10 m^3/day .

CHAPTER 12

HUMAN RESOURCE DEVELOPMENT & RAJIV GANDHI NATIONAL GROUND WATER TRAINING AND RESEARCH INSTITUTE

Rajiv Gandhi National Ground Water Training and Research Institute (RGNGWTRI)

Rajiv Gandhi National Ground Water Training and Research Institute (RGNGWTRI) located at Raipur, Chhattisgarh caters to the training requirements of Central Ground Water Board (CGWB) and also many Central and State Govt. Organizations, Public Sector Undertakings (PSUs), Academic Institutions, NGOs etc. in the field of ground water.From the XII Plan, RGNGWTRI under HRD and Capacity Building Scheme of Ministry of Water Resources, River Development and Ganga Rejuvenationhas been implementing a three-tier training programme keeping in view the requirements of the National Aquifer Mapping Project (NAQUIM). These training courses enable creation of a trained workforce for implementation of NAQUIM and overall sustainable development of the ground water resources of the country.

Human Resources Development

It has been the earnest endeavor of CGWB to keep its technical personnel abreast with the latest developments in all aspects related to ground water development and management across the globe. Besides Officers of the Board, trainees from State Departments, PSUs, NGOs and candidates from abroad also participated in the training courses being organized by CGWB/RGNGWTRI. During the year 2018-19, 112 numbers of Training Courses (44-Tier I, 20-Tier II and 48- TierIII) were conducted by RGNGWTRI and a total of 7691Trainees (776- Tier I, 579-Tier II and 6336- Tier-III) got trained including2282 female participants.National Level training courses (Tier-I) were conducted at RGNGWTRI, Raipur. The State and Block Level training programmes (Tier-II and Tier-III) were organized by the respective Regional Offices of CGWB. The actual expenditure incurredunder HRD & CB Scheme-RGI componentfor FY 2018-19 is Rs3.65 Cr.

Summary details of the training programmes are given in table below.

Training Programmes	Total No. of Trainings Conducted	Total No. of Participants	Female participants
TIER – I (National Level)	44	776	208
TIER – II (State Level)	20	579	149
TIER – III (Block Level)	48	6336	1925
Total	**112**	**7691**	**2282**

Few photographs of theTier – I Training Courses during 2018-19

Certificate distribution by Chairman,CGWB during Valedictory session of Training on ‘Ground Resources Estimation’.

Inauguration of the Training course on ‘Managed Aquifer Recharge’

Trainees doing hands-on practice during the Training Course on‘Applications of Geophysical Techniques’

Valedictory Function of the Training Course on ‘Applications of Remote Sensing and GIS in Ground Water Studies’.

CHAPTER 13

IEC ACTIVITIES

MAJOR IEC ACTIVITIES CARRIED OUT BY CGWB IN 2018-19

Mass awareness programs in Tribal Area:

During the year 2018-19 total nine mass awareness programs related to Water Conservation were carried out by CGWB in tribal areas of Chhattisgarh, Karnataka, Kerala, Manipur/Tripura, Rajasthan, Andaman & Nicobar Islands, Sikkim, Daman & Diu and Uttrakhand State. Around 1360 participants attended these mass awareness programs. Details of the programs organized in different states are given as below.

Chhattisgarh

A Mass Awareness programme was organized on 21 Feb. 2019 at Dongargarh town on "Water Conservation" at KrishiUpajMandi, Dongargarh, Chhatisgarh. The program was inaugurated by Shri.Pradeep Gandhi, Ex Member of Parliament, Rajnandgaon.

A total 210 participants attended the awareness programme out of which 119 participants were female and 101 were male. The participants were mostly farmers, NGOs, youth and private institutions working in the field of ground water in the area. Pamphlets depicting district groundwater - related information in 'अपने जिले को जानिए (Apne Jile Ko Janiye') and two small booklets on ग्रामीण क्षेत्रों में कृत्रिम पुनर्भरण (Artificial Recharge in Rural Area) & छत पर वर्षा जल संचयन (Roof Top Rainwater Harvesting) were distributed among the participants.

The main emphasis was given on the occurrence of Ground Water, its behaviour and Ground Water related issues in Gariaband block. The techniques of artificial recharge of Ground water, rain water harvesting structures, design of rooftop rain water harvesting structures, chemical quality of ground water and local ground water related issues were discussed by the officers of CGWB, NCCR, Raipur.

Karnataka

One day Mass Awareness Programme on “Water Conservation ” under the Tribal sub plan of IEC component of HRD- capacity building Scheme was organized on 08th March, 2019 under the supervision of Dr.A.Subburaj, Head of Office, CGWB, Bengaluru at Madikeri, Kodagu(Tribal) district, Karnataka. Total 257 farmers, representatives from various NGO’s, Self Help Group members, Panchayat Development Officers and officials from different organizationsparticipated in the Mass Awareness programme.

The Chief Guests Smt. Lakshmi Priya IAS, Chief Executive Officer and Shri GudurBheemsen, Deputy Secretary, Zillah Panchayat, Kodagu highlighted the importance of conservation of Water resources, management of existing water resources for both drinking and agriculture purposes and woman’s participation in water conservation sector.During the technical session, important topics, e.g. Water conservation practices, Groundwater situation in Kodagu district, Groundwater Scarcity and Management in domestic and agriculture sector, Water conservation structures & practices were discussed by the officers of CGWB, Bengaluru. All the participants actively took part and discussed various issues on Water conservation and Groundwater related problems.

Special Speech bySmt. LakshmiPriya IAS, Chief Executive Officer, Kodagu District

Participants at the mass awareness program at KaaveriKalakeshtra, Townhall, Madikeri

Tripura

Central Ground Water Board, NER organized a one-day Mass Awareness Campaign on “Water Conservation” inthe College of Agriculture, Lembucherra, Tripura on 28th February, 2019. The programme was inaugurated by the Chief Guest Dr.Debashish Sen, Principal, College of Argriculture, Tripura. Dr. Senemphasised the importance of groundwater development, rain water harvesting

and groundwater management.

The Mass Awareness programme was attended by around 90 participants, mostly tribal population from Lefunga Block, elected representative of local bodies, college students, Government employees, Local Bodies, NGOs and general public.The technical lectures were delivered by the officers of CGWB, SUO, Agartala and professors of College of Agriculture, Tripura. The participants took active participation and interacted during the technical sessions and discussion on various aspects of water conservation and water resource management techniquesespecially in the remote tribal areas of Tripura.

Rajasthan

A mass awareness programme was organized by CGWB, Rajasthan at Rajguru Bhawan in the Ajari village, Pindwara block of Sirohi District on 20th March 2019. Smt. Tipu Bai Garasiya, Pradhan, Pindwara Panchayat Samiti and Shri Chela Ram Meena, Sarpanch, village-Ajari graced the occasion as Chief Guest and Guests of Honour respectively.

The participants were mostly farmers from nearby villages which are under intensive agriculture. The participants were advised to construct individual or community farm ponds (khettalai) wherever possible instead of dugwells and shallow borewells as these are most suitable water conservation structure as per the local hydrogeological &geomorpholical set up. The farmers were also advised to adopt sprinkler and drip irrigation practices. It was recommended to revive existing village pond/water bodies, which are presently defunct because of negligence due to limited subsurface storage availability in thearea. Participants were also made aware of the groundwaterquality. The participants were told about the hazardous constituents present in groundwater, the BIS standards for drinking water and mitigation measures atcommunity andindividual level.

Interactive session between participants and CGWB officers in the mass awareness program at Ajari village, Pindwara

Sikkim

A Mass awareness Programme on “Water Conservation” was organized by CGWB, Kolkata on 20th March, 2019 at NirmanBhawan, Gangtok, Sikkim under Tribal Sub Plan. The program was designed to

- Provide knowledge to the water users in thedomestic, agricultural and industrial sectors to make them understand that conserving theresource would lead to sustainability and bring about economic and social stability.
- Figure out the water related issues in Sikkim.
- To raise awareness among water users to put a stop tothe wastage and propagate water conservation methods.

Total 37 (28 male and 9 female) participants were present from various departments like WR&DD, LR&DMD, RM&DD, Dept. of Soil and Water Conservation Engineering, Students from Sikkim University and different industries including Pharma units. The programme was inaugurated by the Chief Guest Sh. T. P. Shangderpa, Principal Chief Engg, WR&RDD. Heelucidated that Mass awareness program on water conservation is the need of the hour in view of the population and industrial expansion of the state of Sikkim. He emphasised on judicioususe of this precious resource.In the Technical session some important topics, such as Generation of Runoff and Role of Springs in Rural Water Supply Management & Spring Rejuvenation, Role of Soil Water in agriculture and Studies on ongoing soil moisture crisis in Sikkim, DharaVikash work of Spring Study in Sikkim and Kalimpong district of West Bengal, were discussed by the officers of CGWB, ER, Kolkata and Irrigation & Drainage department of Sikkim.

Mass awareness programme organized by CGWB, Kolkata at Gangtok, Sikkim

Daman & Diu

A Tribal mass awareness programme was organized on "Water Conservation" at Zari Village, Daman on 7th February 2019 to emphasize about awareness among local people on water conservation. In total 191 people participated of which 136 were women from different villages. The program was inaugurated by Chief Guest Dr. M. B. Sapra, Veterinary Officer, Daman. Discussion on important topics like Ground Water Scenario of UT of Daman, Artificial recharge of ground water, Agricultural practices with ground water conservation was given by officers of CGWB, Ahmedabad & Agricultural Department UT of Daman. The technical session was followed by a 'Bhavai cultural programme' on water conservation theme.

Address by the Regional Director Sh.D.P.Pati, CGWB, WCR, Ahmedabad in the mass awareness program at Zari Village

Bhavai – a Cultural programme on water conservation at the Venue.

Uttarakhand

A Mass Awareness Campaign was organised by Central Ground Water Board, Uttaranchal Region, Ministry of Water Resources, River Development and Ganga Rejuvenation, Government of India at Block Kalsi, Dehradun on 12thMarch, 2019. The campaign was graced by Shri. P. N Shukla, Deputy Director, Watershed Management, Vikasnagar; Shri. Deep Chand Arya, IFS, DFO, Chakrata Forest Division and Shri. S P Sharma, IFS, DFO, Kalsi Forest Division of Uttarakhan. The mass awareness campaign aimed at spreading awareness regarding conservation of precious natural resources to the villagers around Kalsi Block, Dehradun district. The programme was attended by around183 participants including forest officers and officials, Gram Pradhans and farmers from differentvillages.

Dr.Waseem Ahmad, Superintending Hydrogeologist and Head of the Office, CGWB, Uttaranchal Region interacted with the gathering and focussed on the measures to control potential sources of contamination through septic tanks, soak

pits and grazing grounds and highlighted on the importanceofartificial recharge and rainwaterharvesting.

Few glimpses of MassAwarenessCampaignatKalsi,Dehradun

Kerala

CGWB, Kerala Region conducted a one day mass awareness program on Water Conservation at Palakkad on 7thMarch 2019.The program was attended by around 200 participants, mostly tribes from parts of Attappady area, elected representative of local

Bodies, College students, government employees, employees of Local Bodies, NGOs and General Public.The programme was inaugurated by Shri P.Sivasankaran,Vice-President,Attappady Block Panchayat. He described the scenario of ground water development, rainwater harvesting, wasting of drinking water and the water quality problems in the eastern part of Attappady area. He also emphasised the need for public awareness to protect the ground water from over exploitation, contamination and use of plastic materials. The participants took active participation and interaction during the technical sessions on various aspects of water conservation and water resource management techniques.

Andaman & Nicobar Island

A Mass Awareness Programme on "Water Conservation" was organized by CGWB, Kolkata on 09th March, 2019 at Neil Kendra, Shaheed Dweep (Neil Island), Andaman and Nicobar Island under Tribal Sub Plan. The program was designed to- Provide knowledge to the

common people and water users on the water related issues in Shaheed Deep and raising awareness to prevent the wastage and propagate conservation methods to increase water availability and sustainability.

The inaugural session of the programme was chaired by Sh. Ramkrishna Biswas, Pradhan, Neil Gram Panchayet as Chief Guest. The other dignitaries present on the dais were Smt. Rupali Biswas, Member, Neil Gram Panchayet, Shri J. C. Borgohain, Regional Director, CGWB, Kolkata; Shri AmlanjyotiKar, Superintending Hydrogeologist, CGWB, Kolkata and Smt. Rose Anita Kujur, Scientist– D, CGWB, ER, Kolkata.

Total 100 Nos. (80 male and 20 Female) of participants were present from various areas of Shaheed Deep. Majority of the participants were farmers. Apart from them representatives of various Self Help Group, Govt. Institutions like Schools and Private Agencies like Hotel and Resort also attended the programme.

CHAPTER 14

PUBLIC INTERACTION PROGRAMME (PIP)

Facilitating Public Interaction on Aquifer Maps and Management Plans

Aquifer maps and Management plans being prepared by CGWB are shared with the State Agencies for implementation. Implementation of the management plans by the State agencies is expected to improve the groundwater situation by de-stressing the aquifers. However, there is need to facilitate interaction among stake holders including communities on the Aquifer maps and management plans for greater public participation. Public Interaction Programmes, including water budgeting sessions and aquifer specific interventions, are to be organized in association with Krishi Vigyan Kendra's (KVK's), Panchayats etc. in areas for which aquifer management plans have been shared with the State Agencies. A total of 100 such interaction programmes are proposed to be carried out during 2017-20 targeting the participation of 100-150 participants in each, with representation from Panchayats, block and district level administrations, NGOs, farmers, health and sanitation workers and other stake holders. One national level interaction programme is also proposed for various stakeholders.

In the year 2018-19, 46 PIPs were organized through Regional offices of the board in different states. A total of 6972, including 1629 females, participated in the program. State wise break up of the PIP's organized in AAP 2018-19 is given below in table 14.1.

Table 14.1: Status of Public Interaction Programmes (PIP) in AAP 2018-19

	State	Total number of PIPs conducted (till March 2019)	Total number of participants	No. of Female Participants
1	**Andhra Pradesh**	1	167	23
2	**Assam**	1	151	52
3	**Chattisgarh**	2	275	12
4	**Gujarat**	3	477	
5	**Himachal Pradesh**	1	150	29
6	**Jharkhand**	2	260	136
7	**Karnataka**	3	510	70
8	**Kerala**	2	309	179
9	**Madhya Pradesh**	3	453	58
10	**Maharashtra**	3	564	84
11	**Mizoram**	1	163	75
12	**Odisha**	2	305	104
13	**Punjab**	3	515	11
14	**Rajasthan**	3	453	52
15	**Sikkim**	**0**	**0**	0
16	**SUO- Delhi**	2	169	39
17	**Tamil Nadu**	3	415	211

18	**Telangana**	2	349	62
19	**Uttar Pradesh**	5	835	364
20	**Uttarakhand**	1	155	3
21	**West Bengal**	3	297	65
	Total	**46**	**6972**	**1629**

CHAPTER 15

COLLABORATIVE STUDIES

For value addition to the Aquifer Mapping Programme, Central Ground Water Board has embarked upon collaborative studies with some of the leading research/academic institutions of National importance and other related Central departments.

1. CGWB has undertaken collaborative study **with Indian Institute of Remote Sensing, Dehradun on "Mapping, Modelling and Impact assessment of Land Subsidence in North India"**: The objective of the study include Advanced research and development of innovative geospatial tools & techniques for management and monitoring of groundwater resources and impact assessment due to large scale ground water depletion in the country on regional scale. As part of the study five major drainage basins of NW India have been studied to decipher groundwater depletion scenario. On local scale, the major cities of NW India with records of significant groundwater depletion such as Delhi, Chandigarh, Mehsana (Gujarat), Hisar (Haryana), Ludhiana (Punjab) and Jaipur (Rajasthan)were studied to identify groundwater depletion induced land subsidenceand collateral observations have been collected and analysed for Delhi and Chandigarh test sites. Besides, collateral multi-temporal long-duration classical static DGNSS survey is being done by IIRS for comparison with precision levelling results and validation of differential interferometric synthetic aperture radar (DInSAR) based results. The study has been completed and the report is under preparation.

2. CGWB has undertaken collaborative study **with National Remote Sensing Centre, Hyderabad on "Joint use of Geospatial Technology in Aquifer Mapping and Management":** The objective of the collaborative study includes Satellite data interpretation and capacity building of officers from CGWB and MDWS on application of space technology in groundwater management use of geospatial and other data. Under the collaborative project, NRSC has provided the GIS layers for Lithgeom, geology & structure to CGWB for the priority States which are being used for Aquifer Mapping. Besides, one training Programme has also been conducted by NRSC for capacity building of officers from CGWB. A pilot area in Madhugiri Taluk of Karnataka Districts has been taken up for detailed study as a part of this collaboration.

3. CGWB has undertaken collaboration **with Geological Survey of India, Ministry of Mines, Government of India on Sharing of 1:50,000 Scale Geological Map Data, Hydrogeological Maps for National Project on Aquifer Management":** The objective of the collaboration includes sharing of available 1:50,000 Scale map data

(comprising of Lithological and structure layers), Ground water quality and aquifer mapping data generated out of NAQUIM with GSI.

4. CGWB and **NGRI** entered into an **agreement for carrying out Data generation for Aquifer Mapping with focus on palaeo-channels in parts of Ganga-Yamuna Doab, Allahabad and Kaushambi districts, Uttar Pradesh:** The major objectives of the study include delineation of the geometry and aquifer set-up in the study area, determining Geophysical Characteristics of various litho-units, identification of Major palaeo-channels in the inter - fluve region, preparing lithological model of the area, delineation & possible understanding of the Aquifer system with lithological model developed. A paleochannels approximately 4 km wide and 14 km long with thickness varying upto 40 m within the study domain has been delineated. The study has been completed and the final report is under preparation.

5. Collaborative study **with IIT, Kanpur for ground water modeling:** CGWB has entered into MoA with Indian Institute of Technology (IIT), Kanpur for development of groundwater flow models and preparation of aquifer management plans for parts of Haryana and Punjab and for the entire Bundelkhand region covering parts of Madhya Pradesh and Uttar Pradesh. IIT, Kanpur has compiled the data avialable with CGWB and other agencies and has developed the flow model for the state of Haryana and Punjab. It has been presented before the evaluation committee. The committee has suggested certain changes and asked to give the aquifer management plans. The work for the same is under progress with IIT, Kanpur.

6. CGWB has entered into MoA **with National Institute of Hydrology (NIH), Roorkee, Uttarakhand for analysis of stable isotopes of hydrogen and oxygen in water samples** collected from different parts of the country. So far, about 1000 groundwater samples have been analysed. During 2018-19, two workshops of one week duration were organised at NIH Roorkee on isotopic data interpretation.

CHAPTER 16

CENTRE OF EXCELLENCE FOR GROUND WATER MODELLING

Centre of Excellence (CoE) has been set up with its headquarters in Faridabad and four regional Hubs each at NR, Lucknow, SECR, Chennai, SER, Bhubaneswar& WCR, Ahmedabad who are further looking after the regional offices as listed below.

Regional Hub	Location	Regions
North	NR, Lucknow	NWR, Chandigarh/ NWHR, Jammu/ NHR, Dharamshala/ UR, Dehradun/ SUO, Delhi
South	SECR, Chennai	SR, Hyderabad/ SWR, Bangalore/ KR, Trivandrum
East	SER, Bhubaneswar	ER, Kolkata/ MER, Patna/ NER, Guwahati
West	WCR, Ahmedabad	WR, Jaipur/ NCR, Bhopal/ NCCR, Raipur/ CR, Nagpur

The core activities of Centre of Excellence includes

- Providing technical expertise and hands on support on ground water modelling.
- Coordinate the activities related to Ground Water Modelling with the officers concerned and Mentors.
- Progress monitoring on Modelling assignments to CGWB officers
- Organize regular presentations for exchange of knowledge within CGWB and with other institutions/departments/organizations.
- Standardization of methods and procedures for modelling and preparation of protocols in consultation with TAMC
- Procurement, distribution and maintenance of modelling as well as various GIS software in CGWB
- Coordination with NHP modelling team.
- Inventory of availability of important Software in CHQ as well as at the regional offices of CGWB is completed.

In addition to the regular activities, CoE has also undertaken following activities:

- Compilation of a compendium of important Ground water modelling studies taken up in CGWB since inception is in advanced stage.
- A google group and whats-app group has been created for quick interaction and sharing of ground water modelling related issues faced by CGWB officers during modelling.
- Finalization of modelling target of about 3,40,418 sq. kms has been assigned to the regional offices for the years 2018-20.

- Modelling study for an area of 52,690 sq.kms have been completed and report are under finalization

Important meetings/trainings organized under CoE:

- Two days Brainstorming session was organized at Bhujal Bhawan, CGWB, CHQ, Faridabad on 29th& 30th October, 2018 for the Mentors under Centre of Excellence (CoE) and officers from Regional offices assigned the ground water modelling assignments to discuss regarding the constraints for carrying out modelling studies.
- 3-days training on Visual Modflow software was organized at CHQ, Faridabad during 14th to 16th Nov, 2018 under the aegis of RGI, Raipur for officers assigned the ground water modelling studies.
- Presentation to review the progress of Ground water modelling work was conductedon 12th March, 2019. Officers from ER, Kolkata, NER, Guwahati, UR, Dehradun, MER, Patna attended the meeting and delivered the presentations on ground water modelling studies of their respective area.
- Sh. S. K. Sinha, Suptdg Hydrologist and Ms. Akansha Kushwaha, Asst. Hydrologist attended a Meeting with the Head, Department of Hydrology, IIT Roorkee and Emeritus Professor Dr. G. C. Mishra to discuss the modalities for taking up a pilot study to understand stream-aquifer interaction dynamics.

CHAPTER 17

SEMINAR / WORKSHOP ORGANIZED

1. CGWB, Lucknow organised a workshop on 'Ground Water Management in Uttar Pradesh: Towards Public Participation' on 29th Jan., 2019 at ParikalpBhawan Auditorium, Lucknow. Around 500 delegates from Central, State Govt. Departments, Technical Institutions, NGOs, Gram Pradhans, Sarpanchs from Jal Grams, progressive farmers, research scholars and other stakeholders attended the workshop. It provided a platform to various stakeholders to formulate strategies, showcase demonstrable mechanisms for enrichment of knowledge in understanding the key issues related to groundwater in Uttar Pradesh and formulating possible solutions. Shri U P Singh, Secretary, MOWR, RD & GR, New Delhi was the Chief Guest. Smt. Anita Singh, Principal Secretary, MI & GW, Government of UP, Shri K C Naik, Chairman, CGWB, Dr P Nandkumaran, Member, CGWB and Shri Dhyan Singh, Engineer-in-Chief, UP Irrigation Department were the Guests of Honour. Representatives of NGOs working on ground water management at grass root level shared their success stories and experiences. Technical experts from different organisations presented techniques for water use efficiency and water management.

Address by the Chief Guest, Shri U P Singh, Secretary, MoWR, RD & GR

Release of Booklet on उत्तरप्रदेशमेंभूजलपरिदृश्यएवंप्रबंधन

Jal SaheliSmt Shiv Kumar from Bundelkhand shared her Experience of Women Participation in Water Management

Delegates Participating in the Workshop

2. CGWB, Central Region, Nagpur organised a 'Two-days workshop for Farmers on Rainwater Harvesting & Groundwater Management' in collaboration with Sh. Munghate College of Art & Science, Kurkheda on 13th& 14th Dec. 2018. Sh. Arvind SaokarPorrediwar, Co-operative leader & social worker inaugurated the workshop. The president of the function was Dr. N. V. Kalyankar, Vice-chancellor, Gondwana University.Dr. P. K. Jain, Suptg. Hg. highlighted the activities of CGWB and elaborated the importance of aquifer mapping and management in aspirational areas like Gadchiroli.
3. During the 2 days of workshop, the officers of CGWB delivered lectures on different important topics, i.e. 'Hydrogeology of Gadchiroli&Kurkheda and ground water quality aspects' , 'Rainwater Harvesting& Artificial Recharge to Ground Water in Rural & Urban areas'& 'Ground Water Management with special emphasis on Kurkheda taluka' in Marathi. Apart from this 2 more lectures were delivered by GSDA, Gadchiroli and M/s. Jain irrigation.
4. CGWB officers along with the organizers carried out 'village level programme on ground water management' with the field work in and around Nawargaon village, Kurkhedataluka , to understand the local ground water issues. Thereafter, detailed discussion was held with villagers on those issues of the village and probable solutions to it.
5. One day Workshop on "Sustainable Withdrawal and Effective Utilization of Ground Water and its Management" was organized by the NWR, Chandigarh in collaboration with Indian Institute of Remote Sensing (IIRS), Dehradun on 14.05.2018 at Chandigarh. The workshop was attended by 47 participants of various agencies of the States of Punjab, Haryana, UT/Chandigarh and Educational Institutions.

6. Workshop on "Ground Water Management in Chhattisgarh- A Step Towards Public Participation" was organised by CGWB, NCCR, Chhattisgarh on 8th March 2019, at Pandit Dindayal Upadhyay Auditorium, Science college, Raipur. Shri. Kesari Lal Verma, Vice Chancellor, PanditRavishankar Shukla University, Raipur graced the workshop as Chief Guest and Sh. K.C. Naik, Chairman, CGWB, Faridabad & Sh. T.G. Kosariya, Engineer-In-Chief, PHED, Government of Chhattisgarh were the Guests of Honour on this occasion. The workshop was attended by 726 (Seven Hundred and Twenty-Six) including 609 male and 117 female participants from Jal Mitra, Neer-Nari, Farmers, NGOs, various Central and State Govt.

7. One day Workshop on "Rejuvenation of Springs for Water Security through Springshed Development in Hilly areas of the Country" was organized by the Ministry of Water Resources, River Development & Ganga Rejuvenation & Govt. of Himachal Pradesh on 14th March, 2019 at Dharamshala, Himachal Pradesh. The workshop aims to sensitize states & stakeholders to the need of rejuvenation of springs. The workshop provided a forum to various experts & stakeholders to discuss on issues of spring rejuvenation & water management. Sh U P Singh, Secretary (WR), Ministry of Water Resources was the Chief Guest during the inaugural session and addressed the gathering. Sh Sanjay Kundu, Additional Principal Secretary to Chief Minister of Himachal Pradesh & Lt. Gen. Girish Kumar Surveyor General, Survey of India were the Guests of Honour. The event brought experts and delegates from central & state agencies, civil societies, universities & research institutes throughout the country, together to take stock of current knowledge, share information and best practices on springshed management & rejuvenation, and build consensus on the actions most needed to move forward.

8. One day Workshop on "Sustainable Withdrawal and Effective Utilization of Ground Water and its Management" was organized by the CGWB, Chandigarh in collaboration with Indian Institute of Remote Sensing (IIRS), Dehradun on 14.05.2018 at Chandigarh. The workshop was attended by 47 participants of various agencies of the States of Punjab, Haryana, UT/Chandigarh and Educational Institutions.
9. The Regional Conference of Western States on Water Resources was held on 18th June, 2018 at Mumbai. The meeting was held under the Chairmanship of Shri. Arjun Ram Meghwal Ji, the Hon'ble Minister of State (WR,RD&GR) wherein inter-state, intra and inter-basin water resource issues among the five Western States (Gujarat, Maharashtra, Madhya Pradesh, Goa and Karnataka) were addressed. Shri. K.C. Naik, Chairman, CGWB attended the Conference with Regional Directors of the Board from Gujarat, Karnataka and Madhya Pradesh.
10. A Brain Storming Session on "Water Resources of Eastern and North Eastern States of India" was organized by Centre for Ground Water studies in association with Geological Society of India at CGCRI auditorium, Jadavpur, Kolkata on 8th and 9th of June, 2018. Sh. G.C.Pati Member (East), CGWB, ER & Sh. Amlanjyoti Kar, RD (I/c) Chaired and Co-Chaired in one of the technical sessions.

CHAPTER 18

TECHNICAL DOCUMENTATION AND PUBLICATION

Results of investigations carried out by the Central Ground Water Board aresuitably documented in the form of reports and maps. All the Regionaloffices of the Board have Report Processing Sectionwhich is responsible for the scrutiny and issuance of reports of various assignments carried out by the officers in concerned regional office.

REPORTS

Details of various types of technical reports issued by respective regional offices of the Board are as follows:

State Ground Water Report

State Reports containing complete details of ground water surveys, exploration and other ground water related information are prepared to understand the status of ground water development in the State. Based upon the reports, ground water development perspectives are worked out and future strategies are planned. During 2018-19, 6 state reports (Andhra Pradesh, Karnataka, Tamil Nadu, Jammu-Kashmir, Punjab and Assam) have been submitted.

District Brochures

The Central Ground Water Board also prepares District Brochures for each district containing information collected during ground water surveys, exploration and other related studies. Further, ground water development perspectives are also worked out at district level for the benefit of user agencies. The brocuhres have been found very useful by the stakeholder sectors for planning strategies for future ground water development project at State level. During 2018-19, 198 district brochures were updated.

Ground Water Year Book

The Central Ground Water Board compiles ground water year books to elucidate the changes in ground water levels and water quality. The accurate monitoring of the ground water levels and its quality both in space and time are the main requisite for assessment, scientific development and planning of this vital resource. During 2018-19, 22reports were prepared. Region wise status of preparation of ground water year book is indicated as below.

Status of Ground Water Year Books completed during 2018-19

Sl. No	Region	State	Ground Water Year Book prepared Nos.
1.	North West Himalayan Region	Jammu & Kashmir	1
2.	North Himalayan Region	Himachal Pradesh	1
3.	North Western Region	Punjab, Haryana	2
4.	Western Region	Rajasthan	1
5.	West Central Region	Gujarat	1
6.	North Central Region	Madhya Pradesh	1
7.	Central Region	Maharashtra	1
8.	Mid Eastern Region	Bihar, Jharkhand	2
9.	Eastern Region	West Bengal, Andaman & Nicobar Islands	2
10.	North Eastern Region	North Eastern States	1
11.	South Eastern Region	Odisha	1
12.	Southern Region	Andhra Pradesh, Telengana	2
13.	South Western Region	Karnataka, Goa	2
14.	South Eastern Coastal Region	Tamilnadu, Puducherry	2
15.	Kerala Region	Kerala	1
16.	Uttaranchal Region	Uttarakhand	1
	Total		**22**

PUBLICATIONS

- "A Forensic look into the Lineament, Vegetation, GW linkage: Study of Ranchi District, Jharkhand (India)" by Satiprasad Sahoo, Pulakesh Das, Amlanjyoti Kar and Anirban Dhar published in Elsevier Journal, April 2018.
- "Ground water Quality- An Overview" by M. A. Farooqi, Lubna Kouser, Lalitha B.H and Sooryanarayana K.R for the Water Quality Workshop held on 20th and 21st June 2018 organised by Water Solutions Lab, Divecha Centre for Climatic Change at IISc, Bangalore.
- Dr. P. K. Naik, Suptd. Hg. Co-authored a Paper titled "Evaluation of heavy metal contamination in soil using geochemical indexing approaches and chemometric techniques''- H. Rajkumar, P. K. Naik, M. S. Rishi inInternational Journal of Environmental Science and Technology. https://doi.org/10.1007/s13762-018-2081-4.
- CGWB, KR Region Thiruanathapuram, released two Aquifer Mapping and Management Reports of Trivandrum and Palakkad district (2017-18) - 5926 sq.km and two Special Study Reports carried out as per the direction of Secretary, Water

Resources, Govt. Of Kerala (i) Special Study Report on Post Flood Hydrogeological Scenario in The Flood Plain Areas of Pamba River Basin and (ii) Special Study Report on Post Flood Hydrogeological Scenario In The Flood Plain Areas of Periyar River Basin

- Shri Somnath Bhattacharya, Regional Director, CGWB, CR, Nagpur presented a technical paper on '*Hydrogeology of Maharashtra with special reference to Management Issues'* in Brainstorming Session on 'Surface Water and Groundwater Resources of Western and Central Regions of India: Potentials, Status, Management Issues and Strategies' at Pune University, on 10.01.2019.
- Shri S.S. Hegde, Scientist-D, CGWB, SUO, Pune presented a technical paper titled *'Salinity ingress in Phreatic Aquifer of Coastal Maharashtra'* authored by S.S.Hegde, Anu Radha Bhatia, Catherine Louis and R.K.Sharma in Brainstorming Session on 'Surface Water and Groundwater Resources of Western and Central Regions of India: Potentials, Status, Management Issues and Strategies' at Pune University, organised by Pune University and Geological Society of India on 10.01.2019.
- A Paper titled "Knowledge Guided Integrated Geo-Hydrlogical, geo-Mathematical and GIS bases Groundwater Draft Estimation Modelling in Budhan Pochampalli Water shed, Nalgonda district, Telangana State" by G.Praveen Kumar, P.N.Rao etal (along with NRSC Scientists) is published in the Journal of " Earth Science India-V.11 (IV), October 2018,pp 216-231".
- Four abstracts have been communicated to International Conference on Water and Smart Urbanisation (ICWSU) organised at MRIIRS, Faridabad during March 2019
- Regional Director made presentation of the outcome of the report Aquifer Mapping and Management Plan of Coastal Sedimentary Aquifer Systems of Kerala before District Collector, Alapuzha on 28th January 2019.
- Kollam District Collector released the report 'Mapping of Hard Rock Aquifer System And Aquifer Management Plan of Kollam District ' on 30th January 2019
- Groundwater conservation and management in North Eastern India Adopting Traditional wisdom in Journal of Geological Society of India , Vol 93, Feb-2019, PP-250-251 by SangitaP.Bhattacharjee, AsstHydro geologist.
- Paper entitled "Urgent need for sustainable management of Ground water in fractured aquifers in hard rock terrains of Ranchi urban area" by T.B.N. Singh et. al., CGWB was presented in the National Conference on Ground Water Sustainability at Manav Rachna University.
- Paper entitled ''Characterization of fractured rock aquifer of Jharkhand to mitigate future water challenges by "Sudhansu Shekhar et. al. was presented in the National Conference on Ground Water Sustainability by IAH on 28 March Faridabad.

CHAPTER 19

INFRASTRUCTURE DEVELOPMENT

Infrastructure Development Scheme (IDS) *viz*. Land & Building (CGWB) has been approved with an outlay of **Rs.41.60 Crore** for the period of FY 2018-19. The objective of the scheme is to provide better working environment in the offices, creation of assets and savings on payment of monthly rent.

To achieve this objective, construction work of offices, workshops and stores of various CGWB offices (7 nos.) has been undertaken. The details of these works are as indicated below.

1. Construction of Regional and Divisional office, workshop and store at **Guwahati**.
2. Construction of Regional and Divisional office building at **Ahmedabad**.
3. Construction of Building for Divisional, Workshop & Store Division II at **Ambala**.
4. Construction of Building for Regional, Divisional office and Workshop & Store for Div-VIII at **Jammu**.
5. Construction of boundary Wall and Building for RGI training Institute at **Raipur**.
6. Construction of boundary wall, guard room for Divisional Workshop & Store at **Chennai**.
7. Construction of boundary wall, guard room for Divisional, Workshop & Store at **Jodhpur**.

During the financial year 2018-19, an amount of Rs.4160.00 Lakh was allocated under BE 2018-19 under the ID Scheme. The financial progress up to 31.03.2019 is as under.

S.No.	Name of the office	Nature of work	Expenditure upto March 2019 (Rs. In Cr)
1	NER, Guwahati	Construction of Regional and Divisional office building at Guwahati. (Civil/Electrical)	0.59
2	RGI, Raipur	Construction of training Institute at RGI, Raipur.	9.39
3	Div-IV, Chennai	Construction of boundary wall, guard room at Chennai.	0.50
		Payment of balance land cost at Chennai	1.46
4	WCR, Ahmedabad	Construction of Regional and Divisional office building at Ahmedabad.	7.15
5	Div-II, Ambala	Construction of Divisional office building at Ambala.	1.86
6	Div-XI, Jodhpur	Construction of boundary wall, guard room at Jodhpur.	0.24
7	Div-VIII, Jammu	Construction of Divisional office, workshop & store building at Jammu.	6.84
		Total	**28.03**

CHAPTER 20

PROPAGATION AND PROGRESSIVE USE OF RAJBHASAHA -HINDI LANGUAGE

वर्ष 2018 – 19 के दौरान केंद्रीय भूमिजल बोर्ड में राजभाषा की प्रगति की दिशा में किए गए विशिष्ट एवं उल्लेखनीय कार्य

- केंद्रीय भूमिजल बोर्ड मुख्यालय एवं इसके अधीनस्थ कार्यालयों में राजभाषा अधिनियम 1963 की धारा 3(3) का पूर्णतः अनुपालन किया गया।

- राजभाषा नियम, 1976 के नियम-5 का पूर्णतः अनुपालन किया गया । वर्ष के दौरान हिन्दी में प्राप्त सभी पत्रों के उत्तर अनिवार्य रूप से हिन्दी में ही दिये गए ।

- हिन्दी के प्रगामी प्रयोग संबंधी तिमाही प्रगति रिपोर्ट नियमित रूप से जल शक्ति मंत्रालय, जल संसाधन, नदी विकास और गंगा संरक्षण विभाग, नगर राजभाषा कार्यान्वयन समिति, फ़रीदाबाद एवं राजभाषा विभाग को भेजी गई।
- विभागीय राजभाषा कार्यान्वयन समिति की तिमाही बैठके नियमित रूप से आयोजित की गई तथा बैठक में लिए गए निर्णयों के अनुसार अनुवर्ती कार्रवाई की गई।

- राजभाषा अधिनियम 1963 एवं राजभाषा नियम 1976 का अनुपालन सुनिश्चित करने के लिए जांच बिन्दु बनाए गए ।

- मूल रूप से हिन्दी में कामकाज के लिए प्रोत्साहन योजना के तहत मुख्यालय के 10 कर्मचारियों को नगद पुरस्कार दिये गए।

- मुख्यालय के 15 अनुभागों को शत-प्रतिशत हिन्दी में कार्य करने के लिए विनिर्दिष्ट किया गया।

- मुख्यालय मे दिनांक 14.09.2018 से 28.09.2018 तक हिन्दी पखवाड़ा का आयोजन किया गया । इस दौरान राजभाषा संबंधी कई प्रतियोगिताएं आयोजित की गई तथा समापन समारोह में प्रतिभागियों को नगद पुरस्कार दिये गए।

- केंद्रीय भूमि जल बोर्ड में नियमित रूप से हिन्दी कार्यशाला का आयोजन किया गया।

- हिंदी शिक्षण योजना के अंतर्गत हिंदी टंकण प्रशिक्षण हेतु कर्मचारियों को नामित किया गया ।

- वार्षिक कार्यक्रम में निर्धारित लक्ष्यों के अनुसार हिन्दी पुस्तकों की खरीद की गई।

- अखिल भारतीय स्तर पर विज्ञापनों का प्रकाशन द्विभाषिक / त्रिभाषिक रूप में किया गया।

- राजभाषा विभाग, गृह मंत्रालय द्वारा जारी वार्षिक कार्यक्रम 2018-19 में निर्धारित लक्ष्यों की प्राप्ति सुनिश्चित की गई।

- बोर्ड के अधीनस्थ क्षेत्रीय, प्रभागीय और राज्य एकक कार्यालयों में राजभाषा कार्यान्वयन की प्रगति की समीक्षा की गई और यथावश्यक दिशानिर्देश जारी किए गए ।

- केंद्रीय भूमि जल बोर्ड हिन्दी के प्रगामी प्रयोग व प्रभावी कार्यान्वयन के लिए प्रतिबद्ध है। राजभाषा विभाग द्वारा जारी वार्षिक कार्यक्रम में निर्धारित लक्ष्यों को प्राप्त करने की दिशा में के बोर्ड सतत प्रयत्नशील है।

CHAPTER 21

VIGILANCE ACTIVITIES

Information for Annual Report 2018-19, for the period from 1.4.2018 to 31.3.2019, pertaining to Vigilance Section is given as under:

19 Complaints were brought forward w.e.f. 1.4.2018 and 6 new complaint cases were received during the period. Out of these (19+6) 25 complaints, 12 were closed and 1 complaint was taken up to initiate disciplinary proceedings. Therefore, 12 complaint cases carried forward to next year.

5 cases of disciplinary proceedings were B/F w.e.f. 1.4.2018 and 1 new case of disciplinary proceeding was received during the year. Out of these (5+1) 6 cases 1 case was disposed off. Thus total 5 cases of disciplinary proceedings carried forward to next year.

CHAPTER 22

RTI INFORMATION

The opening balance of RTI applications as on 01.04.2018 were 41 requests and 11 appeals. 738 requests and 61 appeals in RTI applications were received during the year 2018-19. 28 numbers of cases were transferred to other public authorities. 7 applications have been disposed off. An amount of Rs. 7315/- was received towards application fee. Details are given as below.

RTI Information for year 2018-19

Opening balance as on 01.04.2018		**Received during the year** (including cases transferred from other public authorities)		**No. of cases transferred to other public authorities**		**Decisions where Requests/ Appeals Rejected**		**Decisions where Requests/ Appeals Accepted**		**Amount of Charges collected (in Rs.)**
Requests	Appeals	Requests	Appeals	Requests	Appeals	Requests	Appeals	Requests	Appeals	
41	11	738	61	28	0	7	0	649	64	7315

CHAPTER 23

PERSONNEL MANAGEMENT

The Board has been taking necessary action for implementation of Government polices in regard to reservation in services and other benefits to Scheduled Casts, Scheduled Tribes, other Backward Classes, Ex- Servicemen and Handicapped persons.

Efforts have been taken to address the gender related issues. Besides constituting Internal Complaints Committees in each offices to look into the complaints of Women employees ,opportunities have also been given to them to directly meet the Chairman, CGWB and Director(Admn.) and other senior officers for presenting any sort of complains either related to service matters of other nature of complaints. Internal Complaints Committees also made visit many offices to hear the complaints of women employees and taken appropriate actions based on their reports.

CGWB is a subordinate Department of MoWR, RD&GR. As such separate scheme is being run by CGWB. In this context it is confirmed that instructions/schemes initiated by the Ministry are being implemented in letter and spirit.

The sanctioned strength, filled up, vacancy position and category-wise personnel deployed in the Board are presented in table below.

Personnel Deployment in CGWB during the year-2018 - 19

(1st April, 2018 to 31st March, 2019)

GROUP"A"							
Section	**Sanctioned**	**Filled**	**Vacant**	**OBC**	**Handicapped**	**SC**	**ST**
Scientific	403	297	106	40	01	52	17
Ministerial	08	05	03	00	00	00	00
Engineering	56	33	23	09	00	06	04
Total	**467**	**335**	**132**	**49**	**01**	**58**	**21**
GROUP "B"(Gazetted)							
Section	**Sanctioned**	**Filled**	**Vacant**	**OBC**	**Handicapped**	**SC**	**ST**
Scientific	218	115	103	26	01	18	10
Ministerial	44	30	14	00	01	03	05
Engineering	89	49	40	08	00	10	05
Total	**351**	**194**	**157**	**34**	**02**	**31**	**20**

GROUP "B"(Non-Gazetted)							
Section	**Sanctioned**	**Filled**	**Vacant**	**OBC**	**Handicapped**	**SC**	**ST**
Scientific	179	102	77	16	01	20	07
Ministerial	190	140	50	09	05	20	10
Engineering	265	170	95	15	01	53	31
Total	**634**	**412**	**222**	**40**	**07**	**93**	**48**
GROUP "C"							
Section	**Sanctioned**	**Filled**	**Vacant**	**OBC**	**Handicapped**	**SC**	**ST**
Scientific	77	34	43	05	00	09	03
Ministerial	1025	755	270	181	09	162	70
Engineering	1458	1113	345	204	03	240	89
Total	**2560**	**1902**	**658**	**390**	**12**	**411**	**162**
GRAND TOTAL							
Groups	**Sanctioned**	**Filled**	**Vacant**	**OBC**	**Handicapped**	**SC**	**ST**
GROUP"A"	**467**	**335**	**132**	**49**	**01**	**58**	**21**
GROUP "B"(Gazetted)	**351**	**194**	**157**	**34**	**02**	**31**	**20**
GROUP "B"(Non-Gazetted)	**634**	**412**	**222**	**40**	**07**	**93**	**48**
GROUP "C"	**2560**	**1902**	**658**	**390**	**12**	**411**	**162**
Total	**4012**	**2843**	**1169**	**513**	**22**	**593**	**251**

CHAPTER 24

BUDGET AND EXPENDITURE

During 2018-19, expenditure of Rs. 27069.55 lakhs under the Plan and Rs. 22691.98 lakhs under Non - Plan was incurred by the Board to carry out various activities. The Plan - wise expenditure is as indicated below:

Sr. No.	Item of Work	Budget (Rs. in Lakhs)	Revised Estimate (Rs. in Lakhs)	Final Grant (Rs. in Lakhs)	Expenditure (Rs. in Lakhs)
1.	Plan (GWMR+TSP, Gross)	46500.00	27500.00	27746.90	27069.55
2.	Non-Plan	24132.00	23063.00	23053.00	22691.98
3.	RGNGWTRI	587.00	587.00	477.00	363.60
4.	NHP-II (Plan)	892.00	53.60	53.60	40.71
5.	Building for Offices	4160.00	2470.00	2804.00	2803.27
6.	Deduct Recoveries	1500.00	1500.00	1500.00	784.54

CHAPTER 25

PARLIAMENT CELL

1. **Parliament Standing Committee on Water Resources examining various subjects:**
   a. CGWB has submitted responses/answers to the List of Points (LoP's) raised by Estimate Committee (2018-19)in connection with Examination of the subject "Drought Situation in the Country" pertaining toMinistry of Agriculture and Farmers Welfare, Department of Agriculture, Cooperation and Farmers Welfare.
   b. CGWB has submitted responses/answers to the Observations/Recommendations on 24th report on subject Rainwater Harvesting in Metropolitan Cities by Standing Committee on Urban Development (2018-19).
   c. CGWB has submitted responses/answers to the Observation/Recommendations of Twenty third of Parliamentary Standing Committee on Water Resources (2017-18) on examination of the subject "Socio-economic impact of commercial exploitation of Water by Industries". CGWB has also submitted responses/answer to the List of Points (LoP's) raised by the Parliament Standing Committee on Water Resources.
   d. CGWB has submitted responses/answers to 18th report on the action taken by the government on the observations/ recommendation contained in the 13th Report on the subject "Indigenous and Modern forms of Water Conservation – Techniques and Practices" by Parliament Standing Committee on Water Resources (2016-17).
   e. CGWB has submitted responses/answers to the Observations/Recommendations of Twentieth Report of Parliament Standing Committee on Water Resources examining 'Demands for Grants' (2018-19)
   f. CGWB has submitted responses/answers to the Observations/Recommendations of Twenty SecondReport of Parliament Standing Committee on Water Resources examining 'Demands for Grants' (2018-19)
   g. CGWB has submitted material to the List of Points (LoP's) raised by Parliament Standing Committee on Water Resources examining 'Demand for Grants' (2018-19).

2. **Matters Related to Consultative Committee of Ministry of Water Resources, River Development and Ganga Rejuvenation**
   CGWB has submitted Action taken Report on Minutes of the Meeting of the Consultative Committee of Ministry of Water Resources, RD & GR held on 20.11.2018.

3. **Matters Related to Lok Sabha and Rajya Sabha Assurance**
   a. CGWB has furnished suitable replies / material for framing the replies to Assurance on Parliament Questions of Ministry of Water Resources, River Development and Ganga Rejuvenation.
   b. CGWB has submitted Action Taken Report on subject monitoring of Uranium Contamination in Ground Water in Rajasthan to the reply for Government Assurance of Ministry of Water Resources, River Development and Ganga Rejuvenation.
   c. Committee on Government Assurances, Rajya Sabha, visited Jaisalmer and Jodhpur from 27th February to 2nd March, 2019 for the examination of assurance given in the Rajya Sabha in reply to SQ No. 199 dated 06.08.2018 regarding "Uranium contamination in ground water". CGWB has attended the meeting and answered the List of Point raised by the members of the committee. The outcome of the meeting isfurnishedto Ministry of Water Resources, River Development and Ganga Rejuvenation.
4. **Matter Related to Constitution Bill**
   CGWB has examined and submitted the comments on proposed 'The Water (Accessibility and Conservation) Bill', 2018 submitted by Hon'ble Member of Parliament Shri. Anurag Singh Thakur.
5. **Matter Related to Rule 377**
   CGWB has furnished suitable replies/material for framing the replies to matter raised under Rule 377 in Lok Sabha of Ministry of Water Resource, River Development and Ganga Rejuvenation.
6. **Matter Related to Special mention in Rajya Sabha**
   CGWB has furnished Suitable replies/material for framing the replies to Special Mention in Rajya Sabha by Hon'ble M.P. Shri. Husain Dalwai regarding "Need for urgent measures to deal with drought in Maharashtra"ofMinistry of Water Resource, River Development and Ganga Rejuvenation.

7. **Replies to Parliament Questions**
   CGWB has furnished suitable replies/material for framing the replies to Parliament Questions of Ministry of Water Resources, River Development and Ganga Rejuvenation, Ministry of Environment, Forests & Climate Change, Ministry of Health & Family Welfare, Ministry of Agriculture and Farmers Welfare, Ministry of Rural Development and Ministry of Urban Development and Ministry of Drinking Water Supply & Sanitation and a number of other ministries and State Legislative Assemblies of various states.
8. **VIP references/PMO references**
   CGWB has satisfactorily furnished replies to about 25 References received from PMO and 21 VIP references received through MoWR, RD & GR from various VIPs.

Annexure-1

LOCATION AND JURISDICTION OF REGIONAL AND OTHER OFFICES OF CENTRAL GROUND WATER BOARD

REGIONS	HEADQUARTERS	JURISDICTION
i) NORTH WESTERN HIMALAYAN REGION		
Regional Office	Jammu	Jammu &Kashmir
Division Office	Div.VIII, Jammu	
ii) NORTH HIMALAYAN REGION		
Regional Office	Dharamshala	Himachal Pradesh
Division Office	Div.XVII, Dharamshala	
iii) NORTH WESTERN REGION		
Regional Office	Chandigarh	Punjab, Haryana & UT of Chandigarh
Division Office	Div.II, Ambala	
iv) WESTERN REGION		
Regional Office	Jaipur	Rajasthan
State Unit Office	Jodhpur	Western Rajasthan
Division Office	Div.XI, Jodhpur	Rajasthan
v) WEST CENTRAL REGION		
Regional Office	Ahmedabad	Gujarat,UT of Daman &Diu
Division Office	Div.I, Ahmedabad	
vi) NORTH CENTRAL REGION		
Regional Office	Bhopal	Madhya Pradesh
Division Office	Div.XII, Bhopal	
vii) NORTH CENTRAL CHHATTISGARH REGION		
Regional Office	Raipur	Chhattisgarh
Division Office	Div.XIII,Raipur	
viii) CENTRAL REGION		
Regional Office	Nagpur	Maharashtra, UT of Dadra &Nagar Haveli
State Unit Office	Pune	West Maharashtra
Division Office	Div.VI, Nagpur	Maharashtra, UT of Dadra &Nagar Haveli
ix) NOTHERN REGION		
Regional Office	Lucknow	Uttar Pradesh
State Unit Office	AllahabadDiv.III,	
Division Office	Varanasi	
x) UTTARAKHAND REGION		
Regional Office	Dehradun	Uttarakhand
Division Office	Div.XVI,Bareilly	
xi) MID EASTERN REGION		
Regional Office	Patna	Bihar, Jharkhand
State Unit Office	Ranchi	Jharkhand
Division Office	Div.V, Ranchi	Bihar, Jharkhand
xii) EASTERN REGION		
Regional Office	Kolkata	West Bengal, Sikkim, UTof

REGIONS	HEADQUARTERS	JURISDICTION
Division Office	Div.XV, Kolkata	Andaman &Nicobar Islands
xiii) NORTH EASTERN REGION		
Regional Office	Guwahati	Assam, Arunachal Pradesh, Meghalaya, Manipur, Mizoram, Nagaland, Tripura
State Unit Office	Naharlugan	Arunachal Pradesh
	Shillong	Meghalaya
	Agartala	Tripura
Division Office	Div.VII, Guwahati	Assam, ArunachalPradesh, Meghalaya, Manipur, Mizoram, Nagaland, Tripura
xiv) SOUTH EASTERN REGION		
Regional Office	Bhubaneshwar	Orissa
Division Office	Div. X, Bhubaneshwar	
xv) SOUTHERN REGION		
Regional Office	Hyderabad	Andhra Pradesh & Telangana
State Unit Office	Vishakhapatanam	N- Coastal Andhra Pradesh
Division Office	Div. IX, Hyderabad	Andhra Pradesh & Telangana
xvi) SOUTH WESTERN REGION		
Regional Office	Bangalore	Karnataka &Goa
State Unit Office	Belgaum	NW. Karnataka &Goa
Division Office	Div.XIV, Bangalore	Karnataka &Goa
xvii) SOUTH EASTERN COASTAL REGION		
Regional Office	Chennai	Tamil Nadu,UT of Pondicherry
Division Office	Div.IV, Chennai	
xviii) KERALA REGION		
Regional Office	Trivendrum	Kerala & UT ofLakshadweep
Division Office	Div.IV, Chennai	Kerala & UT ofLakshadweep
State Unit Office	NCT, Delhi	NCT, Delhi