

## Executive Summary

### **Introduction and background**

Ground water is the water which exists below the surface in the zone of saturation and can be extracted through wells or any other means or emerges as springs and base flows in streams and rivers. Ground water accounts for nearly 62 *per cent* of the total requirement of water in irrigation, 85 *per cent* in rural water supply and 45 *per cent* in urban water supply. Therefore, sustainable development and efficient management of ground water poses a complex challenge for governance in India. India is also committed to achieving the targets under United Nations' Sustainable Development Goals by ensuring availability and sustainable management of water and sanitation for all.

Water being a State subject, the legislation for regulation and development of ground water is to be enacted by the State Governments/Union Territories (UTs). However, the regulation of Ground water utilisation is done both at Central and State levels. At the Apex level, the Department of Water Resources, River Development and Ganga Rejuvenation (DoWR,RD&GR) is allocated with overall planning and policy making for the development of ground water resources and establishment of utilisable resources. In pursuance of the orders of the Hon'ble Supreme Court (1996), the Central Ground Water Authority (CGWA) was constituted (January 1997) for the purpose of regulation and control of ground water management and development and to issue necessary directions for this purpose. In 13<sup>1</sup> States/UTs (as of March 2019), the regulation of ground water is done by the States themselves through State Ground Water Authority or Government orders.

The Central Ground Water Board (CGWB) is the national agency under DoWR,RD&GR for assessment, management and development of ground water resources in the country. Ground water resources are estimated assessment unit wise. As on 31<sup>st</sup> March 2017, out of 6,881 assessment units all over India, 1,186 have been categorised as Over-exploited, 313 as Critical, 972 as Semi-critical, and 4,310 units as Safe. There are 100 assessment units which are completely saline. The number of Over-exploited and Critical administrative units are significantly higher in Delhi, Haryana, Himachal Pradesh, Punjab and Rajasthan. In Punjab, 80 *per cent* of the assessment units are critical or over-exploited.

CGWA releases guidelines for ground water abstraction from time to time. Under the guidelines (November 2012/November 2015), which were in force at the time of audit, CGWA had notified 162 critical/ over-exploited areas for the purpose of regulation of

<sup>1</sup> Andhra Pradesh, Goa, Himachal Pradesh, Jammu & Kashmir, Karnataka, Kerala, NCT Delhi (through Government Orders), Tamil Nadu (through Government Orders), Telangana, West Bengal, Chandigarh (through bye-laws), Puducherry and Lakshadweep.

ground water development. In **notified areas**, abstraction of ground water was not permissible for any purpose other than drinking and domestic use. In the **non-notified areas**, CGWA could permit extraction of ground water for industrial/ infrastructural/ mining projects.

In pursuance of the directions of the Hon'ble National Green Tribunal, CGWA notified revised guidelines in September 2020. The new guidelines now have pan-India applicability and will prevail in case of any difference with the States' guidelines. Some of the earlier provisions such as notification of areas by CGWA have been dispensed with, while some new provisions, such as differential charges for extraction of ground water in different categories of areas (safe, critical, semi-critical and over-exploited) have been introduced.

A Central Sector Scheme on 'Ground Water Management and Regulation' was approved for implementation during XII Plan period (2012-17) with an estimated cost of ₹ 3,319 crore and an overall objective of proper assessment and management of ground water resources so as to ensure its sustainability. The scheme was continued during 2017-20 at an estimated cost of ₹ 992 crore. At the State level, State Governments implement their own schemes for water supply, controlled irrigation, ground water recharge, reducing dependence on ground water, reducing contamination of ground water, etc.

The ground water scenario in India is beset by challenges due to the competing needs of agriculture, industrialisation and the pressures of increasing population in the context of uncertain rainfall. Contamination and depletion of ground water also leads to vulnerability of livelihoods besides posing a serious health risk. Accordingly, we decided to take up a Performance Audit of Ground Water Management and Regulation with the objective of ascertaining the overall framework for ground water sector in India through a holistic perspective by examining whether:

- 1) the mechanism for management of ground water in India is adequate, efficient and effective;
- 2) ground water regulations are implemented efficiently and effectively;
- 3) the targets and objectives of the schemes on Ground Water Management and Regulation were achieved efficiently and effectively; and
- 4) appropriate steps have been taken to achieve the relevant targets under Sustainable Development Goal 6 relating to ground water.

## **Key Audit findings**

### **Chapter 2: Management of Ground Water**

The percentage of utilisation of ground water with respect to recharge, known as stage of extraction of ground water in the country was 63 *per cent*. In 13 States/UTs,

the stage of extraction was higher than the national stage of extraction. Four States/UTs (Delhi, Haryana, Punjab and Rajasthan) had a stage of extraction of more than 100 *per cent*, indicating that extraction of ground water has surpassed the recharge of ground water. At the district level, in 24 States/UTs, 267 districts had stage of extraction more than 63 *per cent* ranging from 64 *per cent* to 385 *per cent*. During the period 2004 to 2017, the stage of extraction of ground water has increased from 58 to 63 *per cent*. During the same period, the percentage of safe blocks has decreased while the percentage of blocks categorised as semi-critical, critical and over-exploited has steadily increased.

(Para 2.2)

The assessment of ground water resources was to be done every two years. During the audit period, CGWB conducted such assessments for 2013 and 2017 and published the Reports in June 2017 and July 2019 respectively. CGWB did not carry out this assessment for 2015 resulting in a gap of four years in assessment between 2013 and 2017.

(Para 2.3)

Against the proposed number of 50,000 observation wells (by the end of the XII Plan period i.e. 2012-17) to measure ground water level, a network of only 15,851 observation wells were being monitored as of 31 March 2019. CGWB also proposed to undertake Real time Ground Water Monitoring in various aquifers across the country through purpose built wells equipped with Digital Water Level Recorders (DWLRs) and Telemetry<sup>2</sup> in convergence with the ground water component under National Hydrology Project (NHP)<sup>3</sup>, which was still being planned as of March 2020.

(Para 2.4)

The number of observations wells having water depth more than 40 metres<sup>4</sup> was significant in Rajasthan (20 *per cent*), Delhi (10 *per cent*) and Haryana (five *per cent*). On the other hand, ground water depth was less than five meters in Meghalaya (100 *per cent*), Nagaland (100 *per cent*), Puducherry (100 *per cent*) and Andaman & Nicobar Islands (99 *per cent*). A comparison of depth to water level of post-monsoon 2018 with the decadal mean of post-monsoon (2008-17) relating to data available from 14,387 observation wells of CGWB indicated that in 5,115 (about 36 *per cent*)

<sup>2</sup> Telemetry is the collection of measurements or other data at remote or inaccessible points and their automatic transmission to receiving equipment for monitoring.

<sup>3</sup> National Hydrology Project was approved in April 2016 as a central sector scheme with a total outlay of ₹ 3,679.76 crore with the objective of improving the extent, quality, and accessibility of water resources information, decision support system for floods and basin level resource assessment/planning and strengthening the capacity of targeted water resources professionals and management institutions in India.

<sup>4</sup> Maximum range of depth categorized by CGWB.

wells there was a rise in water level. However, 9,260 (about 64 *per cent*) wells showed decline in water level. In 12 wells, there was no change in water level.

(Para 2.5.1)

As per the data for 2015 based on 15,165 locations in 32 States tested by CGWB, ground water had levels of contaminants higher than permissible limits of Arsenic (697 locations), Fluoride (637 locations), Nitrate (2,015 locations), Iron (1,389 locations) and Salinity (587 locations).

(Para 2.5.3)

To enable the States to enact Ground Water Legislation, DoWR, RD&GR circulated (2005) a Model Bill to all the States/UTs for regulation and development of ground water. However, the Model Bill was under review (December 2019) as per the suggestions of NITI Aayog. As of December 2019, 19 States/UTs had enacted legislation for management of ground water. In four of these States, the legislation was only partially implemented; in six other States, enactment of the ground water legislation was pending for various reasons. The remaining States/UTs had not taken action to enact legislation for ground water. The lack of clear guidelines from the Department impacted the legislations implemented by the States.

(Paras 2.6 & 2.7)

There was shortage of human resources in Scientific and Engineering categories in CGWB and its regional and divisional offices. As of March 2019, there was a vacancy of 37.51 *per cent*, 26.93 *per cent* and 26.60 *per cent* in the Scientific, Engineering and Ministerial categories respectively. In spite of shortage of technical workforce, some of the Regional Offices had also deputed their technical staff (Scientific and Engineering) for administrative work.

(Para 2.9)

There was a vacancy ranging between 12 and 82 *per cent* in the Departments/Agencies dealing with ground water at State/UT level. Shortage of human resources posed constraints in the effective discharge of functions of the State/UT agencies. Due to lack in infrastructure and facilities, some of the State agencies were not able to carry out requisite laboratory tests which affected the management of ground water in the State.

(Para 2.11.1 & 2.11.2)

### **Chapter 3: Ground Water Regulation**

Out of a sample of 328 cases in 18 States where the Consent to Operate (CTO) granted to a project proponent included a condition which required NOC for ground water extraction, 253 projects (77 *per cent*) were operating without NOCs.

(Para 3.3.1)

In 15 States for which data was made available to audit, 3,189 Bureau of Indian Standards (BIS) licenses were issued to packaged drinking water units since 2013, of which in 2,475 cases (78 per cent), the project proponents were operating without obtaining NOCs from CGWA.

(Para 3.3.2)

During 2013-19, CGWA accorded 3,517 fresh NOCs and renewed 320 NOCs for ground water withdrawal to various industry, mining and infrastructure projects. As on 31 March 2019, 10,758 applications for grant of NOC and 144 applications for renewal were pending. Thus, the quantum of pending NOCs was three times more than the fresh NOCs issued during last six years.

(Para 3.4)

In 474 cases, renewal of NOC was due during 2013-18 but the project proponents did not apply for renewal. CGWA did not take any action under section 15 of the Environment (Protection) Act, 1986 against these project proponents. Thus, even after expiry of the NOC, existing industries/projects continued to draw ground water without any regulation.

(Para 3.5)

There were numerous cases in which conditions stipulated in the NOCs were violated. Despite the widespread violations, CGWA issued (2013-18) show cause notices to only 99 project proponents.

(Para 3.10.1)

During joint field visits to the industries/project sites (other than individual households) for verification of compliance with conditions laid out in NOCs, widespread non-compliance of conditions mentioned in the NOC was noticed such as illegal extraction of ground water (Andhra Pradesh), non-installation of water flow meters (Gujarat, Odisha and West Bengal), improper maintenance of rainwater recharge structures (Gujarat and Haryana), absence of monitoring of water quality data (Odisha), wastage of water in a notified/over-exploited area (Karnataka) etc.

(Para 3.10.2)

#### **Chapter 4: Implementation of schemes on Ground Water Management and Regulation**

Against the Budget Estimate of ₹ 2,349.48 crore for 2012-19, the Actual Expenditure under the Scheme was ₹ 1,109.73 crore.

(Para 4.2)

Area of 24.8 lakh sq. km area was identified for Aquifer Mapping in the country. CGWB covered an area of 13 lakh sq. km. (52 per cent) as of September 2020. Further, Aquifer Mapping Reports for only 6.5 lakh sq. km. were finalised and ground water modelling for ~3 lakh sq. km. were completed as of September 2020.

(Para 4.3.1 & 4.3.3)

Though CGWB had published aquifer mapping reports, a web-based system for easy dissemination of the information on the aquifer mapping was not designed, as envisaged.

(Para 4.3.5)

Of the 201 reports included in the programme, Aquifer mapping reports of only 168 districts were shared with District Administration till November 2019. Many States did not take action on the recommendations made by CGWB in the aquifer mapping reports due to constraints such as map scale being too small to locate the areas, non-receipt of funds from CGWB or Central Government to implement the reports in the field, etc.

(Para 4.3.7)

Although an outlay of ₹ 575.38 crore was provided for the period 2013-17 under the component Participatory Ground Water Management (PGWM) in accordance with the National Water Policy 2012, no expenditure was incurred. The component was dropped from the subsequent EFC memo of 2017-20 and is now being taken up as a separate scheme on participatory ground water management through the Atal Bhujal Yojana (ABHY). However, unlike the PGWM, ABHY will be implemented only in few selected locations in seven States<sup>5</sup>, therefore, both in scale and size, the ABHY is not a replacement for PGWM which was dropped.

(Para 4.4)

No action was taken on four out of 12 recommendations made (December 2012) by an Expert Group constituted for benchmarking of various activities of CGWB with international best practices, on capacity building in CGWB.

(Para 4.5.2)

Deficiencies were observed in schemes of some States; such as delay in completion of schemes, ground water level data not analysed before recommending proposals for construction of tube wells (Bihar); delay in finalisation of project on Ground Water Recharge action plan (Delhi); shortfall in the activities of State Ground Water Conservation Mission, lag in achievement of targets for implementing the use of sprinkle irrigation (Uttar Pradesh), etc.

(Para 4.6)

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<sup>5</sup> Gujarat, Haryana, Karnataka, Madhya Pradesh, Maharashtra, Rajasthan and Uttar Pradesh

## Chapter 5: Sustainable Development Goals and Ground Water

Against the target value for percentage annual ground water withdrawal against net annual availability of 70 *per cent* under target 6.4, the national level was at 63 *per cent* however, there were eight States/UTs where this value was higher than the target of 70 *per cent*. Out of 534 districts in 22 States/UTs, 202 districts had stage of extraction ranging from 71 *per cent* to 385 *per cent*.

(Para 5.2.1)

Target 6.6 is related to protecting and restoring water-related ecosystems including mountains, forests, wetlands, rivers, aquifers and lakes. Under the component of Aquifer Mapping and Preparation of Aquifer Management Plan of GWMRS, against target of 11.85 lakh sq.km. to be mapped (2012-20), CGWB achieved 13 lakh sq. km. as of September 2020, however, Aquifer Mapping Reports in respect of nearly 6.5 lakh square km (i.e. 50 *per cent* of the area covered) only had been finalised.

(Para 5.2.2)

No action was taken in respect of Target 6 b related to supporting and strengthening the local communities in water management.

(Para 5.2.3)

## Recommendations

We recommend that

1. The Department may ensure that assessment of ground water resources, water level and quality is done at the prescribed intervals so as to maintain current data on the status of ground water in the country and to utilise such data for planning management strategies.
2. The Department may take action to increase the number of observation wells with Digital Water Level Recorders and Telemetry to monitor ground water in line with the targets committed under the Ground Water Management and Regulation Scheme/ National Hydrology Project.
3. The Department may take expeditious action to revise the Model Bill and also pursue with the remaining States for bringing comprehensive laws/regulations to deal with ground water management.
4. The Department should address the human resource constraints of CGWB/CGWA by also engaging with other experts and going for strategic partnerships to ensure smooth functions in processes of groundwater management and governance.

5. For effective implementation of Ground Water Regulation and Management, Department should address the human resource crunch reported by the State Governments and also encourage them to adopt latest technologies for assessment and monitoring of ground water.
6. Central Ground Water Authority and State agencies need to develop effective coordination with various other agencies granting consents to projects to ensure that the requisite permissions to extract ground water are also obtained.
7. Central Ground Water Authority and State agencies may develop a mechanism to ensure timely processing of requests for ground water extraction.
8. Central Ground Water Authority and State agencies need to establish a system for periodic inspections and review of the projects to ensure compliance to the conditions mentioned in the No Objection Certificates.
9. Central Ground Water Authority and State agencies need to enforce penal provisions strictly as per the Environment Protection Act/State Acts/Rules against the cases of violation of conditions mentioned in the No Objection Certificates for effective ground water regulation.
10. Given the targets of the Department and limited expenditure incurred vis a vis budget outlay, the Department may review its strategy for utilising the allocated funds and completing the planned activities under the Ground Water Management and Regulation Scheme. The Department may also consider putting in place a business continuity plan for the scheme.
11. The Department may develop a strategy for expeditious completion of aquifer mapping and modelling of the identified area within a reasonable time period.
12. Central Ground Water Board may take suitable action to develop the web-based system for easy dissemination of information regarding aquifer mapping on priority basis.
13. The Department may ensure proper coordination between Central Ground Water Board and State Governments for implementing the recommendations made in the National Aquifer Mapping project reports.
14. Participatory Ground Water Management, being one of the key activities for sustainable ground water management, may be executed in a time-bound manner through Atal Bhujal Yojana and this scheme may be considered for scaling up to the entire country, thus involving all the States.
15. Central Ground Water Board may take appropriate action to ensure that recommendations of the report of the Expert Group for augmenting its infrastructure, technological upgradation and for capacity building are implemented within a reasonable time frame.



16. The Department may impress upon the State Governments to review the performance of their ground water schemes and take measures to ensure that the envisaged results are achieved by adopting an integrated approach for recharge/augmentation of ground water.
17. The Department may review the mandate of CGWB and take steps to strengthen the organisation to achieve the commitments made by the country in the 2030 agenda for Sustainable Development Goals.
18. The Department may assess the progress made under each of the identified targets and take definite action to ensure that India is able to achieve the relevant Sustainable Development Goals as committed.

