



सत्यमेव जयते

Report of the
Comptroller and Auditor General of India
on

Ground Water Management and Regulation



लोकहितार्थं सत्यनिष्ठा
Dedicated to Truth in Public Interest

Union Government
Ministry of Jal Shakti
Department of Water Resources, River Development
and Ganga Rejuvenation
Report No. 9 of 2021
(Performance Audit)

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Preface

This Report for the year ended March 2018 has been prepared for submission to the President of India under Article 151 of the Constitution of India. This Report of the Comptroller and Auditor General of India contains the observations of Performance Audit of Ground Water Management and Regulation for the period 2013-18. The instances mentioned in this Report are those which came to notice in the course of test audit for the period 2013-18 as well as those which came to notice in earlier years but could not be reported in previous Audit Reports; matters relating to the period subsequent to 2017-18 have also been included, wherever necessary. Accordingly, facts have been updated till September 2020 wherever information was received from the Department.

The audit has been conducted in conformity with the Auditing Standards issued by the Comptroller and Auditor General of India.

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 13¹ 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 31st 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

¹ 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 Telemetry² in convergence with the ground water component under National Hydrology Project (NHP)³, which was still being planned as of March 2020.

(Para 2.4)

The number of observations wells having water depth more than 40 metres⁴ 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*)

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

³ 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.

⁴ 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 States⁵, 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)

⁵ 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.

1.1 Background

Water is essential for life, living and livelihood. Increasing population, growing urbanisation and rapid industrialisation combined with the need for raising agricultural production generates competing demands for water.

Ground Water is defined as 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 has steadily emerged as the backbone of India's agriculture and drinking water security. It 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, efficient management of ground water is significant for sustainable use of water.

A National Water Policy for the development and management of water resources and establishing a framework for creation of a system of laws, institutions and plan of action with a unified national perspective was adopted in September 1987, which was updated and revised in 2002 and 2012. The National Water Policy 2012 recognised that ground water was being exploited inequitably and without any consideration to its sustainability leading to its over-exploitation in several areas. The policy envisaged that there was a need to map the aquifers¹ to know the quantum and quality of ground water resources (replenishable as well as non-replenishable) in the country which may be periodically updated. This process should be fully participatory, involving local communities. Further, the National Policy emphasised that declining ground water levels in over-exploited areas needed to be arrested by introducing improved technologies in water use, incentivising efficient water use and encouraging community based management of aquifers. In addition, where necessary, projects for artificial recharge should be undertaken so that extraction is less than the recharge, thereby allowing aquifers to maintain ground water levels.

India is a signatory to the United Nations 2030 Agenda for Sustainable Development, which consists of 17 Sustainable Development Goals (SDGs) that are to be achieved by 31 December 2030. SDG-6 relating to clean water and sanitation, seeks to ensure availability and sustainable management of water and sanitation for all. The targets set under SDG-6 include increasing water-use efficiency across all sectors, ensuring sustainable withdrawals, supply of freshwater to address water scarcity and protection and restoration of water-related ecosystems including aquifers. India is committed to fulfilment of the 2030 agenda and the Department of Water Resources,

¹ Aquifers are geologic formations (i.e. sands and gravels) which permit appreciable quantity of water to move through them.

River Development and Ganga Rejuvenation (DoWR,RD&GR)² has been identified as the nodal Department for implementing schemes for management and regulation of ground water for achieving the targets set under SDG-6.

NITI Aayog has been entrusted with the role to co-ordinate the implementation of SDGs. NITI Aayog has identified 'percentage annual ground water withdrawal against net annual availability', known as stage of extraction, as one of the indicators for SDG-6. As per NITI Aayog, the national target value for this indicator for the year 2030 should be 70 per cent.

1.2 Institutional framework for Ground Water Management and Regulation

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.

1.2.1 Entities involved

Department of Water Resources, River Development and Ganga Rejuvenation

At the Apex level, DoWR,RD&GR is responsible for laying down policy guidelines and programmes for development and regulation of the country's water resources. The Department has been allocated with overall planning for the development of ground water resources, establishment of utilisable resources and formulation of policies for exploitation, overseeing of and providing support to State level activities in ground water development.

Central Ground Water Board

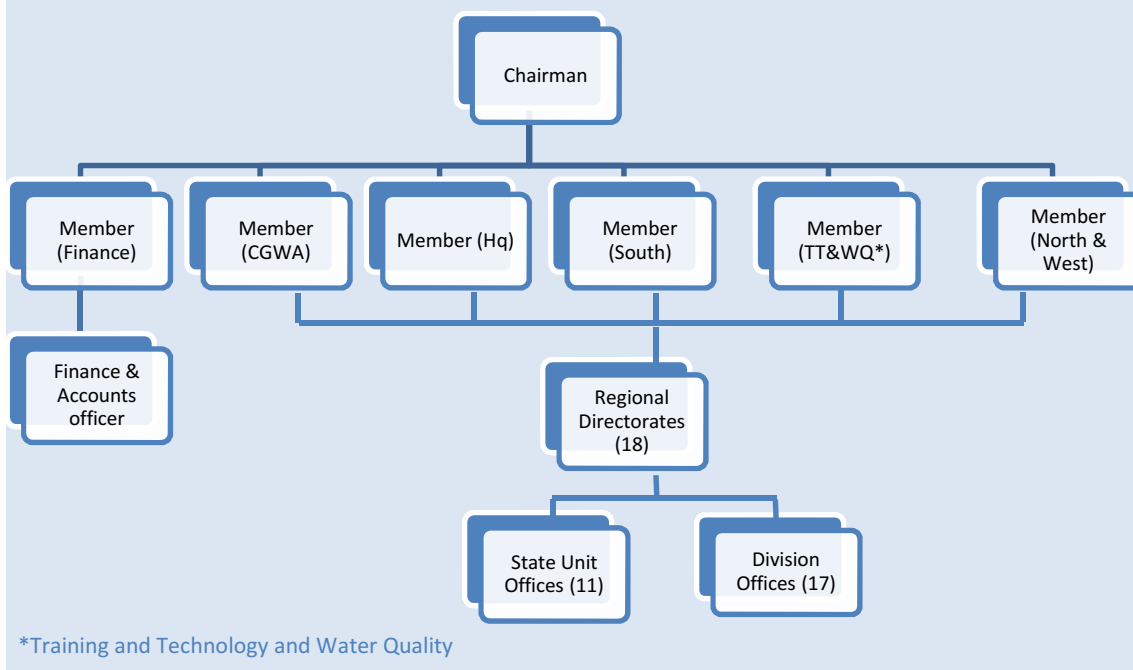
Central Ground Water Board (CGWB) is the National Apex Agency entrusted with the responsibilities of providing scientific inputs for management, exploration, monitoring, assessment, augmentation and regulation of ground water resources of the country.

CGWB is headed by a Chairman and has six Members³. The Board has established 18 Regional Offices/ Directorates (**Annexure 1.1**), each headed by a Regional Director, which are responsible for implementation of the Annual Action Plan of the Board pertaining to the Region. The post of the Regional Director is a key post for field functions in the Region, which comprises of one or more States. The Regional Director heads a multi-disciplinary team of scientists of the Region and controls the State Unit Offices and Engineering Divisions falling in that jurisdiction. The organisation setup of CGWB is depicted in Chart 1.1.

² Vide Government of India notification dated 14 June 2019, the erstwhile Ministry Water Resources, River Development and Ganga Rejuvenation has been converted into a Department under the newly created Ministry of Jal Shakti.

³ Finance, CGWA, Headquarters, South, Training and Technology & Water Quality (TT&WQ), North and West.

Chart 1.1: Organisational structure of CGWB



Central Ground Water Authority

The Hon'ble Supreme Court of India passed several orders in 1996⁴, issuing directions to the Government of India for setting up of a Central Ground Water Authority (CGWA) under the Environment (Protection) Act, 1986, declaring it as an authority and delegating powers under the said Act for the purposes of regulation and control of groundwater development. With a view to preserving and protecting the groundwater, the Hon'ble Court further directed that CGWA should regulate indiscriminate boring and withdrawal of groundwater in the country and issue necessary directions.

In pursuance of Supreme Court orders, and in exercise of the powers conferred by sub-section (3)⁵ of Section 3 of the Environment (Protection) Act, 1986, CGWA was constituted (January 1997) for the purposes of regulation and control of groundwater management and development. CGWA is responsible for regulation and control,

⁴ In the matter of M.C. Mehta vs. Union of India and others (I.A. No. 32 in W.P. (C) No. 4677 of 1985 decided on 10 December 1996.

⁵ *The Central Government may, if it considers it necessary or expedient so to do for the purposes of this Act, by order, published in the Official Gazette, constitute an authority or authorities by such name or names as may be specified in the order for the purpose of exercising and performing such of the powers and functions (including the power to issue directions under Section 5 of the Central Government under this Act and for taking measures with respect to such of the matters referred to in sub section (2) as may be mentioned in the order and subject to the supervision and control of the Central Government and the provisions of such order, such authority or authorities may exercise the powers or perform the functions or take the measures so mentioned in the order as if such authority or authorities had been empowered by this Act to exercise those powers or perform those functions or take such measures.*

management and development of ground water in the country and issuing necessary regulatory directions for this purpose, including grant of No Objection Certificates (NOC) for extraction of ground water. CGWA can also resort to penal provisions contained in the said Act. The jurisdiction of the Authority extends to the whole of India.

State agencies

At the State level also, there are various agencies/bodies/institutions involved in the ground water sector. As of March 2019, in 13⁶ States/UTs, regulation of ground water development and management was being done either through constitution of State Ground Water Authorities (SGWAs) or by Government orders.

1.3 Assessment of Ground Water resources

In the States having predominantly hard rocks, the assessment unit is the watershed⁷ whereas in the States covered predominantly with alluvium and/ or soft rocks, administrative blocks⁸ are chosen as assessment units. These assessment units are categorized for ground water development based on stage of ground water extraction. There are four categories, namely - 'Safe' areas which have ground water potential for development; 'Semi-critical' areas where cautious groundwater development is recommended; 'Critical' areas; and 'Over-exploited' areas, where there should be intensive monitoring and evaluation and future ground development be linked with water conservation measures. The criteria for categorisation of assessment units are listed in Table 1.1.

Table 1.1: Criteria for Categorisation of Assessment Units

Stage of Ground Water Extraction	Category
≤70%	Safe
>70% and ≤90%	Semi-Critical
>90% and ≤100%	Critical
> 100%	Over-Exploited

Source: *Dynamic Ground Water Resources of India 2017*

Apart from the four categories mentioned above, blocks where the entire assessment area is seen to have poor quality ground water are demarcated as 'Saline'.

1.4 Regulation of Ground Water development

To enable the States to enact Ground Water Legislation, a Model Bill to regulate and control development of ground water was circulated (2005) by DoWR, RD&GR to all

⁶ Andhra Pradesh, Chandigarh (through bye-laws), Delhi NCT (through Govt. Orders), Goa, Himachal Pradesh, Jammu & Kashmir, Karnataka, Kerala, Lakshadweep, Puducherry, Tamil Nadu (through Govt. Orders), Telangana and West Bengal.

⁷ Watersheds are natural hydrological entities that cover a specific aerial expanse of land surface from which the rainfall runoff flows to a defined drain, channel, stream or river at any particular point. The terms region, basin, catchment, watershed, etc. are widely used to denote hydrological units.

⁸ An administrative block is a unit of administration in state such as block/taluka/mandal/tehsil.

the States/UTs. The Department was in the process of re-drafting the Model Bill⁹ to suit the changing ground water scenario. As of December 2019, 19¹⁰ States/UTs had enacted legislation on ground water.

CGWA issues guidelines from time to time for the regulation of ground water. Under the guidelines (November 2015), CGWA had notified 162 critical/ over-exploited areas for the purpose of regulation of ground water development, under Environment (Protection) Act, 1986 by CGWA for regulation of ground water development and management. In **notified areas**, abstraction of ground water is not permissible for any purpose other than drinking and domestic use. The 162 notified areas are located in parts of Andhra Pradesh (five), Daman & Diu (one), Delhi (three), Gujarat (four), Haryana (17), Karnataka (22), Madhya Pradesh (seven), Puducherry (one), Punjab (45), Rajasthan (35), Tamil Nadu (18), Telangana (two), Uttar Pradesh (one) and West Bengal (one).

The Blocks /Talukas/Mandals/areas, other than those notified by CGWA for regulation of ground water development and management are **non-notified areas**. In these areas, CGWA issues NOC to industrial/ infrastructural / mining projects for ground water withdrawal.

As mentioned in para 1.2, there are 13 **self-regulated States** where regulation of ground water development and management was being done by the States themselves. These 13 States/UTs have their own mechanism for evaluation of proposal/request for NOC for ground water abstraction.

The authorities that can issue NoCs for extraction of ground water in various areas are shown in Figure 1.1.

Figure 1.1: Authorities for issue of NOC

Notified Areas	Non-Notified areas	13 self regulated States
<ul style="list-style-type: none"> •The District Administrative Heads in case of Administrative Block or Taluka, or the Head of the Municipality (in case of Municipal Area) 	<ul style="list-style-type: none"> •CGWA 	<ul style="list-style-type: none"> •The agencies to issue NOC vary from State to State.*

*For example, in Chandigarh, the permission to abstract ground water is granted by three Government agencies viz. Municipal Corporation, Chandigarh Administration and Land Acquisition Officer. In Jammu & Kashmir, under the JKWRRM Act 2010, the Chief Engineer/ In charge, PHED has been designated as competent authority to issue licenses in relation to drinking water supply and ground water.

⁹ Ground Water (Sustainable Management) Bill, 2017

¹⁰ Andhra Pradesh, Assam, Bihar, Chandigarh, Dadra and Nagar Haveli, Goa, Himachal Pradesh, Jammu and Kashmir, Karnataka, Kerala, Lakshadweep, Maharashtra, Odisha, Puducherry, Punjab, Telangana, Uttar Pradesh, Uttarakhand and West Bengal.

In pursuance of the directions of the Hon'ble National Green Tribunal (NGT), CGWA revised its guidelines for the regulation of ground water. These guidelines (September 2020) have been given pan-India applicability. Several significant changes have also been brought about, such as dispensing with the practice of notifying areas, revised guidelines for grant of NOC in different categories of assessment units, differential charges for extraction of ground water in these areas, etc.

1.5 Government initiatives for management and regulation of ground water

A Central Sector Scheme on 'Ground Water Management and Regulation' was approved (August 2013) for implementation during XII Plan period (2012-17) with an estimated cost of ₹ 3,319 crore and having an overall objective of proper assessment and management of ground water resources so as to ensure its sustainability. The scheme consists of continuing activities from the XI Plan viz. Technological upgradation, Ground Water Monitoring, Assessment, Regulation, Publication, Seminars, Awards, technical assistance to States and spill over work of the project of Artificial Recharge & Exploration. In addition, two new activities were introduced in the scheme for 2012-17, namely the National Project on Aquifer Management (NAQUIM) and Participatory Ground Water Management (PGWM). The broad objectives of the scheme are Aquifer mapping¹¹ at prescribed scales, formulation of Aquifer Management Plan to quantify water availability and water quality in various aquifers for facilitating sustainable management of ground water resources at regional and local level through participatory management approach, capacity building of functionaries of Panchayati Raj Institutions, local community and grass root workers, upgradation of technological capabilities and infrastructure of the CGWB and regulation and control of ground water development.

The scheme was approved (March 2018) for continuation during 2017-20 at an estimated cost of ₹ 992 crore. PGWM, which was one of the components of GWMR scheme during the XII Plan period, was dropped from the scheme.

Apart from the Central Scheme, State Governments implement their own schemes¹² for water supply, controlled irrigation, ground water recharge, reducing dependence on ground water, reducing contamination of ground water, etc.

1.6 Why we chose the topic

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

¹¹ Aquifer mapping is a scientific process wherein a combination of geologic, geophysical, hydrologic and chemical field and laboratory analyses are applied to characterise the quantity, quality and sustainability of Ground Water in aquifers.

¹² For example, Andhra Pradesh implemented (i) Neeru-chettu, (ii) NTR jalasiri and (iii) Neeru-pragathi schemes towards Ground Water conservation, crop cultivation and rainwater harvesting recharge measures

context of uncertain rainfall. Contamination and depletion of ground water also leads to vulnerability of livelihoods, besides posing a serious health risk.

It is against this background that we decided to take up a Performance Audit of Ground Water Management and Regulation.

1.7 Audit Objectives

Performance Audit of Ground Water Management and Regulation seeks to ascertain 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.

1.8 Audit sample

A. Sampling for the purpose of audit objective 1: Ground water Management

In each State/UT, three districts having the maximum number of unsafe blocks (Over-exploited, critical and semi-critical) were selected for examining the issues relating to water quantity. Similarly, for issues relating to water quality, one district with maximum number of blocks affected with arsenic excess and one district with maximum number of blocks affected with fluoride excess were selected.

B. Sampling for the purpose of audit objective 2: Ground water Regulation

Notified Areas: A sample of 60 NOCs was selected for each State wherever such NOCs have been issued. In case the number of NOCs was less than 60 in a State, all the NOCs were selected.

Non-Notified Areas: A sample of 40 NOCs were selected for each State/UT (20 NOCs for Industry and 10 NOCs each for Infrastructure and Mining). Wherever the number of total NOCs selected in all three categories was less than 40, additional number of NOCs were selected from Industries, Infrastructure and Mining in that order.

In case of renewal of NOCs, bifurcation into industry, infrastructure and mining was not available and hence 10 NOCs (in all) from each State were taken-up for audit.

States having their own regulatory mechanism: In the 13 States/UTs having their own regulatory mechanism i.e. regulated through State Ground Water Authority or Government Orders of concerned States/UTs, from the notified areas, a sample of 60

NOCs were selected for each State wherever such NOCs have been issued. If the number of NOCs were less than 60 in a State, all the NOCs were selected. For the non-notified areas, a sample of 40 NOCs were selected for each State/UT on random basis.

C. Sampling for the purpose of audit objective 3: Central Sector Scheme on Ground Water Management and Regulation

Out of 201 Aquifer Mapping (NAQUIM) Reports prepared under GWMRS for 29 States/UTs, 20 *per cent* reports, for each State and UT, subject to a minimum of three reports, totalling 70 reports were selected for Audit scrutiny at CGWB, its regional offices and State Government. In the case of technological upgradation, 100 *per cent* of the items procured were examined at CGWB and its regional/ divisional offices from the list of equipment/software/rigs to be procured during 2012-17. In addition, 20 *per cent* of the items not procured were examined to assess the reasons for delay and its impact on work of CGWB.

1.9 Audit scope and methodology

Performance Audit was conducted for the period 2013-14 to 2017-18. The scope of Audit included examination of the following areas/issues:

- (a) Status of ground water quantity and quality in 33¹³ out of 36 States/UTs;
- (b) Framework for ground water management in 33 States/UTs, implementation and monitoring;
- (c) Ground water regulation in States covered under CGWA guidelines and NOCs;
- (d) Framework and guidelines for issuing NOC in 13 States/ UTs regulated through State Ground Water Authority (SGWA) or Government Orders; and
- (e) Implementation of Ground Water Management and Regulation Scheme during 2013-14 to 2017-18, action taken by the State Governments on the Aquifer Maps and Management Plan Report prepared by CGWB in 33 States/UTs.

Records of the following entities were scrutinised for examining above issues:

- (i) DoWR, RD&GR for overall policy and direction;
- (ii) Ministry of Environment, Forest and Climate Change (MoEF&CC) for environment related matters with water quality;
- (iii) Central Ground Water Authority;
- (iv) Central Ground Water Board and its Regional Offices;
- (v) State Regulatory Agencies/ Authorized Offices;

¹³ Three States/UTs (A&N Islands, Mizoram and Sikkim) regulated by CGWA where CGWA has neither given any NOC, nor notified any area were exempted from the scope of Performance Audit.

- (vi) WAPCOS Ltd.; and
- (vii) Central Pollution Control Board.

Data relating to ground water from various departments/agencies of State/Central government like Power Utility/Commercial Tax/Bureau of Indian Standard/Food Safety and Standards Authority of India/Ministry of Agriculture was also examined. In addition, field visits to the industries/project sites/units where NOCs have been granted for ground water extraction were also undertaken.

We held an entry meeting with CGWB and DoWR, RD&GR on 10 April 2018 in which we explained the audit objectives, scope and methodology. Subsequently, revised objectives, scope and the criteria were communicated to DoWR, RD&GR on 10 January 2019. The draft Audit report was issued to the Department in August 2019 and their response was received in November 2019. An exit conference was held on 22 January 2020 with the Department to discuss the audit findings, conclusions and audit recommendations. The draft final Audit Report was issued to the Department in August 2020 and their response was received in September 2020. While DoWR, RD&GR in general acknowledged that the report was insightful and brought out many significant issues, their comments on the specific audit observations have been suitably incorporated in the Audit Report.

This Audit report includes audit findings from field audit conducted for the period 2013-18. The audit observations relating to Ground Water Regulation are based on the CGWA guidelines of November 2012/November 2015. In September 2020, CGWA has released revised guidelines, wherein several issues relating to ground water regulation highlighted by Audit have been dealt with. These revisions have also been suitably mentioned in this Audit Report.

1.10 Audit criteria

The following are sources of audit criteria:

- (a) Environment Protection Act, 1986
- (b) National Water Policy (2002 and 2012)
- (c) Water Policy of concerned States/UTs
- (d) Legislation, regulatory Frameworks and Government orders of concerned States/UTs
- (e) Expenditure Finance Committee (EFC) note of the scheme of Ground Water Management and Regulation
- (f) Note for Cabinet Committee on Economic Affairs (CCEA) and its approval
- (g) Manual on Aquifer Mapping

- (h) Memorandums of Understanding (MoUs) signed by CGWB with various agencies
- (i) General Financial Rules
- (j) National Green Tribunal (NGT) Judgment
- (k) Standards for assessment of water quality (IS:10500) issued by Bureau of Indian Standards
- (l) Studies/guidelines¹⁴ of World Health Organisation (WHO) highlighting linkages between ground water contaminants and related diseases

1.11 Structure of the Audit Report

The Audit Report comprises five Chapters including this introductory chapter. Chapter 2 discusses the mechanism for management of ground water in the country. Chapter 3 contains issues relating to regulation of ground water by CGWA and State Authorities. In Chapter 4 we have discussed implementation of schemes on Ground Water Management and Regulation whereas in Chapter 5 the extent of achievement of relevant targets under SDG 6 have been stated.

1.12 Acknowledgement

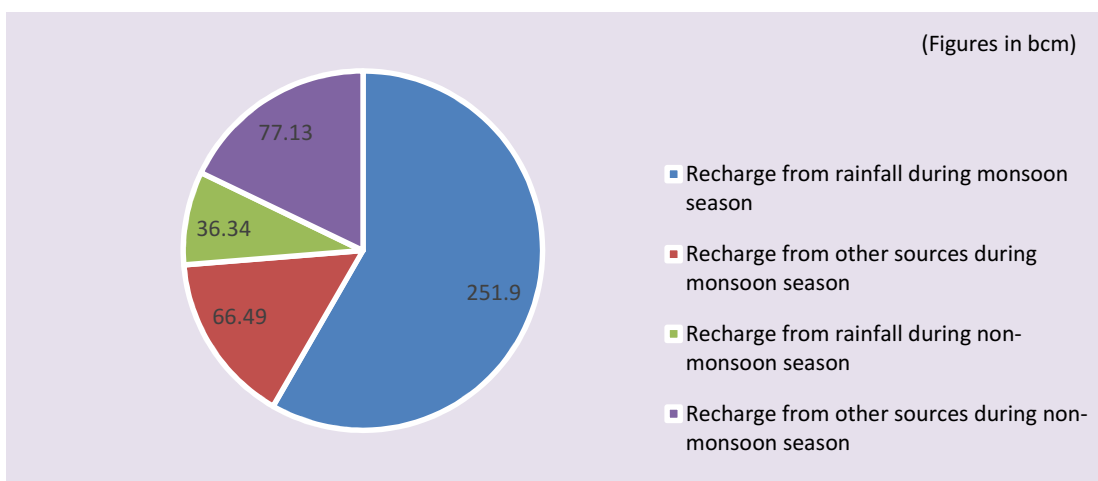
We acknowledge the cooperation extended by the DoWR, RD&GR, CGWB, State agencies, MoEF&CC and other audited entities during the course of the Performance Audit.

¹⁴ WHO Guidelines for Drinking Water Quality, 2004 and other related reports

2.1 Introduction

Ground water is an annually replenishable resource but its availability is non-uniform in space and time. Technically, dynamic ground water refers to the quantity of ground water available in the zone of water level fluctuation, which is replenished annually. As per Dynamic Ground Water Resources of India (as on 31st March 2017)¹⁵ published by CGWB in July 2019, annual replenishable ground water resource for the entire country has been assessed as 432 billion cubic meter (bcm). Keeping 39 bcm for natural discharge, the net annual ground water availability for the entire country is 393 bcm. The sources of ground water recharge are depicted in Chart 2.1.

Chart 2.1: Sources of Ground Water recharge

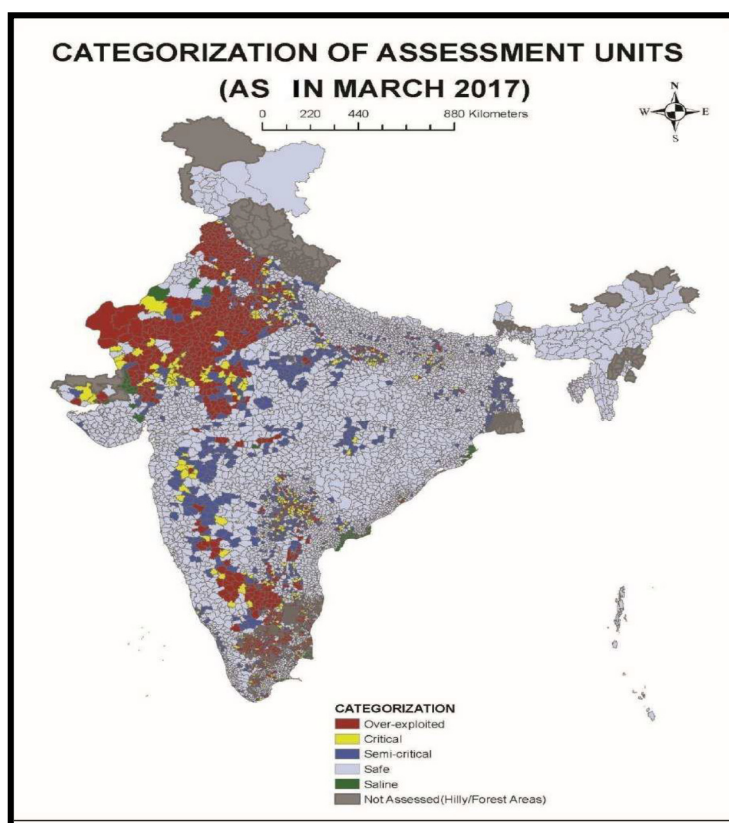


CGWB has categorised ground water assessment units based on the Stage of Extraction of ground water. As per Dynamic Ground Water Resources of India¹⁶ (as on 31st March 2017), out of 6,881 assessment units all over India, 1,186 have been categorised as Over-exploited, 313 as Critical, 972 as Semi-critical, and 4,310 units as Safe (Chart 2.2). There are 100 assessment units which are completely saline.

¹⁵ A report published by CGWB containing an assessment of the status of Ground Water resources, availability and utilisation in the country. The assessment is carried out jointly by CGWB and State Ground Water Departments at periodical intervals.

¹⁶ A report published by CGWB containing an assessment of the status of Ground Water resources, availability and utilisation in the country. The assessment is carried out jointly by CGWB and State Ground Water Departments at periodical intervals.

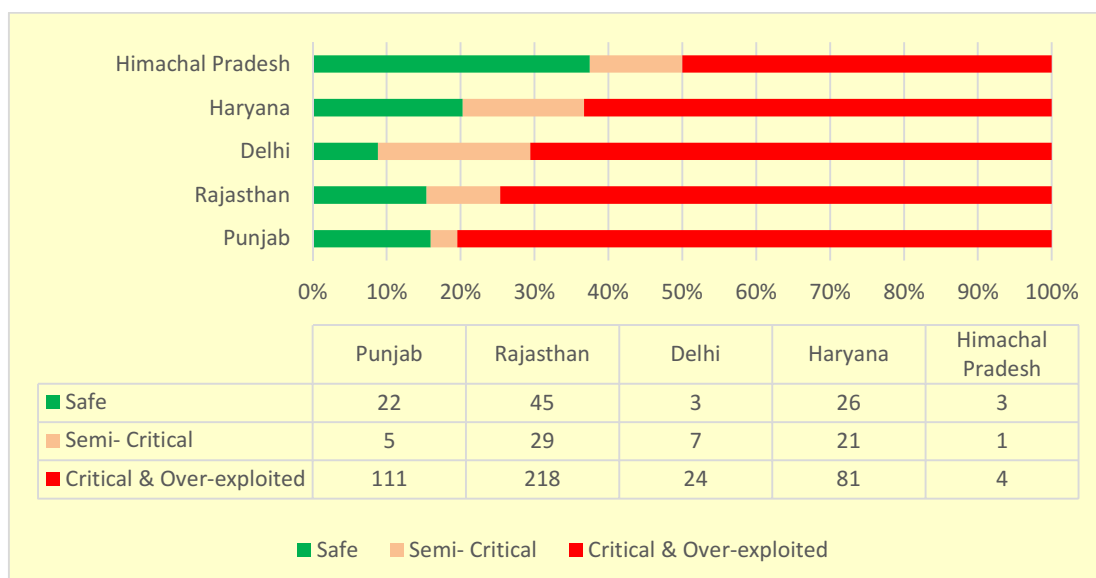
Chart 2.2: Categorisation of Assessment Units



Source: *Dynamic Ground Water Resources of India (31 March 2017)*

The top five States having the highest percentage of Over-exploited and Critical administrative units are Delhi, Haryana, Himachal Pradesh, Punjab and Rajasthan, as shown in Chart 2.3. The State-wise details are depicted in **Annexure 2.1**.

Chart 2.3: States having significant number of unsafe units



It can be seen from Chart 2.3 that Punjab has the highest percentage (80 per cent) of critical and over-exploited units. Out of 138 assessment units in Punjab, only 22 units

(16 per cent) are safe and five units (four per cent) are semi-critical. The remaining 111 units (80 per cent) are critical and over-exploited.

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). The Department of Water Resources, River Development and Ganga Rejuvenation (DoWR,RD&GR) is responsible for overall planning for the development of ground water resources, establishment of utilisable resources and formulation of policies for exploitation, overseeing of and providing support to State level activities in ground water development. The Central Ground Water Board (CGWB) has the mandate of developing and disseminating technologies and monitoring and implementing national policies for the scientific and sustainable development and management of India's ground water resources, including their exploration, assessment, conservation, augmentation, protection from pollution and distribution. Central Ground Water Authority (CGWA) deals with ground water regulation related issues.

This chapter discusses the mechanism for management of ground water in India. The chapter is divided into two sections. Section A covers issues in assessment of availability, utilisation and quality of ground water and mechanism for monitoring of ground water. Audit observations on functioning of regulatory bodies involved in management of ground water are discussed in Section B.

SECTION A: ASSESSMENT AND MONITORING OF GROUND WATER

2.2 Extraction of Ground Water

The Annual Ground Water Draft (i.e. extraction of ground water) of the entire country for the reference year 2017 has been estimated as 249 bcm, of which 221 bcm i.e. about 89 per cent is for used for irrigation. The remaining 11 per cent i.e. 28 bcm is used for domestic and industrial purposes. The status of ground water development in India during the period from 2004 to 2017 is given in Table 2.1.

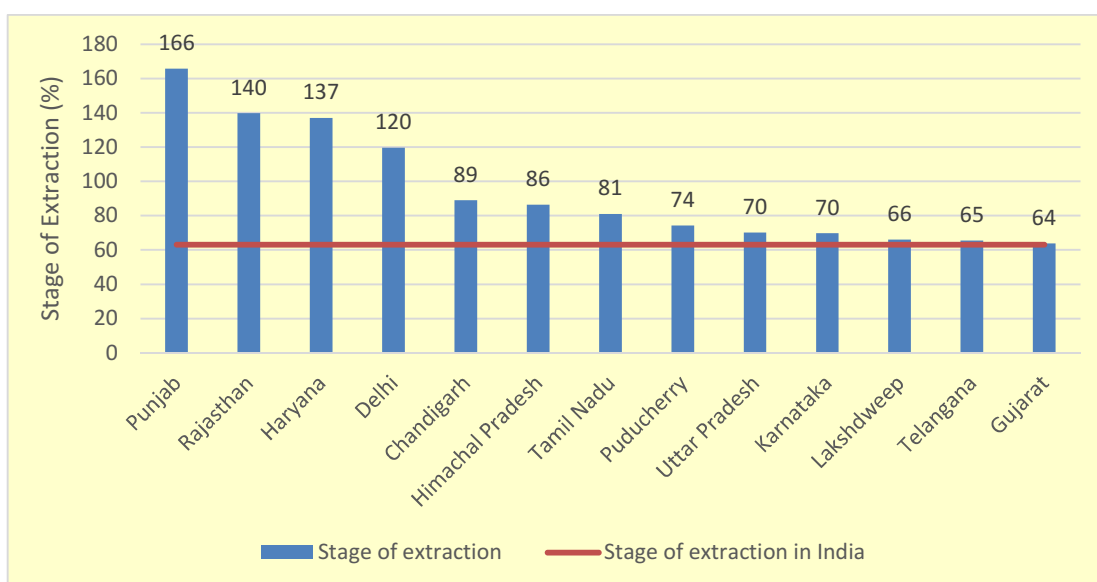
Table 2.1: Comparative status of ground water development

Categorisation	Percentage of blocks during year				
	2004	2009	2011	2013	2017
Safe	71	73	69	69	63
Semi-critical	10	9	11	10	14
Critical	4	3	3	4	5
Over-exploited	15	14	16	16	17
Saline	0	1	1	1	1

The above comparison shows that the percentage of safe blocks has decreased while the percentage of blocks categorised as semi-critical, critical and over-exploited has steadily increased over time.

The percentage of utilisation of ground water with respect to recharge is known as stage of extraction of ground water. The stage of extraction in the country has increased from 58 per cent in 2004 to 63 per cent in 2017¹⁷. State wise assessment of ground water resources availability, utilisation and stage of extraction showed that 13 States/UTs¹⁸ had a stage of extraction higher than the overall national stage of extraction, as shown in Chart 2.4.

Chart 2.4: States having stage of extraction of ground water higher than national average

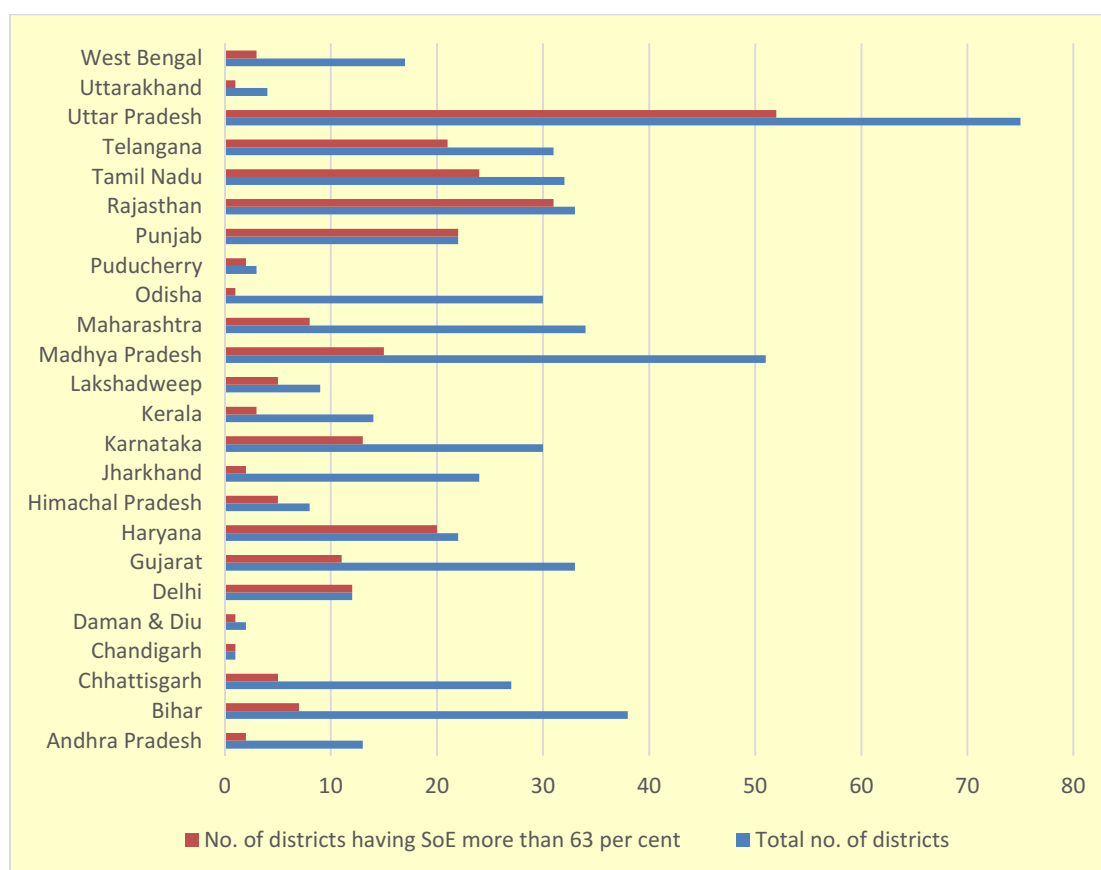


Four States/UTs (Delhi, Haryana, Punjab and Rajasthan) had a stage of extraction of more than 100 per cent. This indicated that extraction of ground water has surpassed the recharge of ground water. If unchecked, this may eventually exhaust the ground water resources completely in these States/UTs. The State wise position is shown in **Annexure 2.2**.

At the district level, it was seen that out of 565 districts in 24 States/UTs, 267 districts (47 per cent) had stage of extraction more than 63 per cent (Chart 2.5). The stage of extraction in these 267 districts ranged from 64 per cent to 385 per cent.

¹⁷ Source: Dynamic Assessment of Ground Water of the respective years

¹⁸ Chandigarh, Delhi, Gujarat, Haryana, Himachal Pradesh, Karnataka, Lakshadweep, Puducherry, Punjab, Rajasthan, Tamil Nadu, Telangana and Uttar Pradesh.

Chart 2.5: Districts having high stage of extraction of ground water

2.3 Assessment of Ground Water

As per the approved (August 2013) Expenditure Finance Committee (EFC) memorandum for 2012-17, the assessment of ground water resources in terms of ground water quantity, utilisation pattern, stage of extraction of ground water, categorisation of units, etc. was to be done every two years by CGWB. Based on this data, Dynamic Ground Water Assessment Report was to be compiled, to enable further planning and management of ground water by CGWB.

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.

DoWR, RD&GR stated (October 2019) that it had awarded the work related to automation of estimation of these resources to the Indian Institute of Technology, Hyderabad which is likely to reduce the time period substantially for this process. The Department added (January 2020) that the Department was considering undertaking such assessments through use of better technologies such as heli borne surveys which are expected to be more efficient and thereby help in reducing the time taken for such assessments.

Regular assessment is essential to take up timely interventions for management of ground water. Inability to do the same would hamper the regulation of ground water, as the scenario is dynamic in nature.

2.4 Ground Water Monitoring

CGWB assesses the water level in the country through its observation wells. In the approved Cabinet Note for the Ground Water Management & Regulation Scheme (GWMRS) for the XII Plan period (2012-17), CGWB proposed to increase monitoring of wells to measure ground water level from 15,653 wells to 50,000 wells (by March 2017) through an approved scheme called Ground Water Management & Regulation Scheme (GWMRS) for the XII Plan period (2012-17) having an outlay of ₹ 3,319 crore. 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 Telemetry¹⁹ in convergence with the ground water component under National Hydrology Project (NHP)²⁰. It was observed that as of March 2020, CGWB was still planning and was yet to undertake real time Ground Water monitoring through DWLRs and Telemetry which indicated that progress in this area was not as per targets of the GWMR Scheme.

As of 31 March 2019, a network of only 15,851 observation wells for monitoring water quality (as detailed in **Annexure 2.3**) were established. Thus, CGWB was falling behind its targets for establishing monitoring wells and for undertaking Real Time Ground Water monitoring, both of which are crucial for efficient management of ground water resources.

2.5 Assessment of Ground Water quantity and quality

2.5.1 Assessment of water levels

CGWB measures ground water levels four times a year during January, March/April/ May, August and November. Ground water samples are collected from these observation wells once a year during the month of March/April/ May to obtain background information of ground water quality changes on regional scale, which is used for planning ground water development and management programmes.

CGWB collected data relating to depth of water level of 15,165 wells in the post-monsoon period in 2018. As per this data, depth of the water level ranged from 0 to 130.20 meters in these wells. In States like Rajasthan, Haryana and Delhi, number of

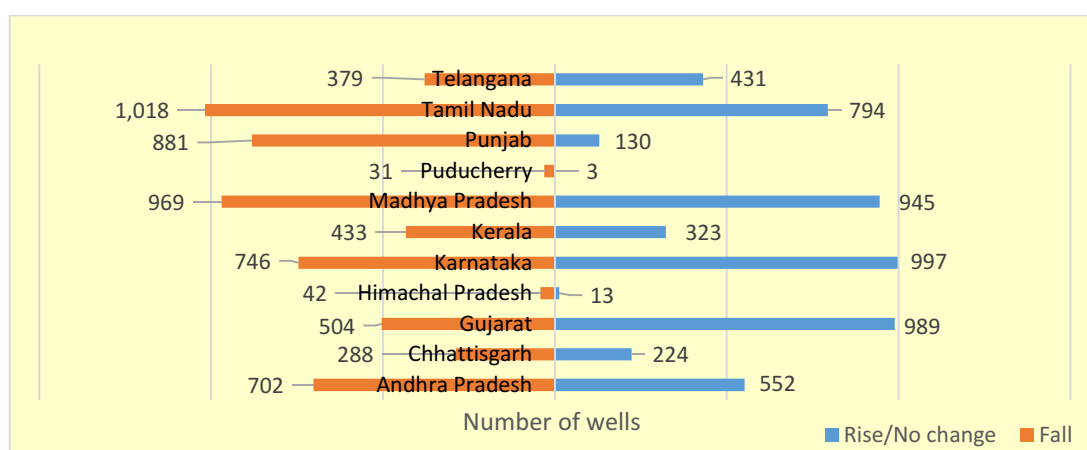
¹⁹ Telemetry is the collection of measurements or other data at remote or inaccessible points and their automatic transmission to receiving equipment for monitoring.

²⁰ 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.

wells having water depth more than 40 metres²¹ was significant (Rajasthan – 20 per cent, Delhi – 10 per cent and Haryana – five per cent). On the other hand, in states like Meghalaya, Nagaland, Puducherry and Andaman & Nicobar Islands, ground water depth was less than five meters (Meghalaya-100 per cent, Nagaland-100 per cent, Puducherry-100 per cent and Andaman & Nicobar Islands-99 per cent). The State wise details are indicated in the **Annexure 2.4**. 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 wells indicated that in 5,115 (about 36 per cent) of 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. The State wise details are given in the **Annexure 2.5**.

In addition to CGWB, 11 States also have their own monitoring wells. The position of rise and fall of water level in the wells monitored by the State agencies is shown in Chart 2.6.

Chart 2.6: Decadal water level fluctuation in State monitored wells



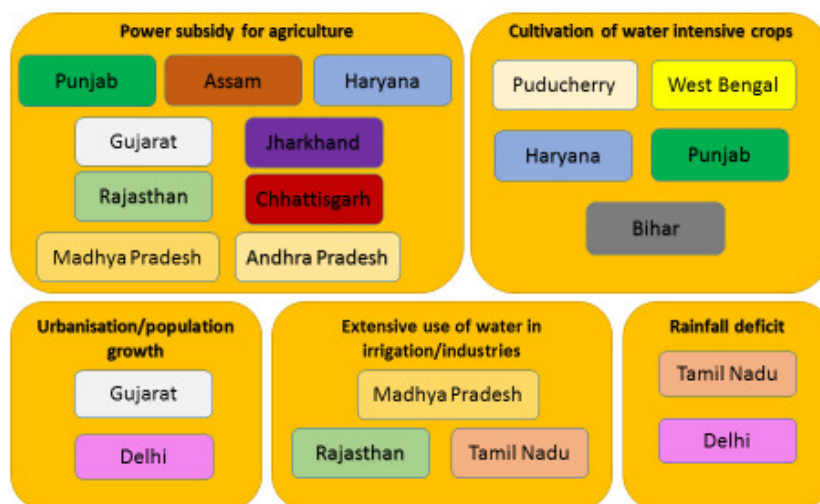
Of the total 11,394 wells monitored by State Government agencies in the 11 States, 5,993 wells (53 per cent) indicated fall in water level compared to the decadal water level, while 5,401 wells (47 per cent) showed rise or no change in water level. The data presented above indicates a predominant trend of decline in ground water levels as assessed by both CGWB and the States, which is a cause for concern.

2.5.2 Factors affecting Ground Water Quantity

Factors affecting ground water quantity were available in respect of 14 States/UTs. In these States/UTs, power subsidy for agriculture, cultivation of water intensive crops, rainfall deficit and urbanisation/population growth and extensive use of water in irrigation/industries were identified by the States/UTs as the major reasons affecting the quantity of ground water, as shown in Figure 2.1.

²¹ Maximum range of depth categorized by CGWB.

Figure 2.1: Factors affecting ground water quantity



For the States/UTs in which this assessment was not conducted, the specific factors affecting ground water quantity were not identified, which could pose a constraint in development of effective strategies for management of ground water.

2.5.3 Assessment of Ground Water Quality

CGWB is required to monitor the water quality every year during the pre-monsoon season. Samples are collected in bottles (one litre) after thoroughly rinsing the bottle with the samples to be collected and the bottles are sealed at the site. Collected ground water samples are analysed for major parameters like Calcium, Magnesium, Potassium, Arsenic, Carbonates, Chlorides, Nitrates, Sulphates, Iron, Fluorides, Electrical Conductivity, pH etc. Sample analysis is carried out as per standard procedures outlined in American Public Health Association (APHA) manual.

CGWB had water quality data as of 2015 only. As per the water quality data for 2015, the number of States and districts (based on 15,165 locations in 32 States tested by CGWB) having contaminants higher than permissible limit (as per BIS standards²²) are shown in Table 2.2.

Table 2.2: CGWB data on contamination of ground water in excess of limits

Contaminant	Number of States affected	Number of districts affected	Number of locations exceeding limit
Arsenic	19	99	697
Fluoride	23	188	637
Nitrate	20	335	2,015
Iron	25	282	1,389
Salinity	17	167	587

²² Bureau of Indian Standards (BIS) has prescribed Drinking Water Specifications (last revised in 2012).

Excess levels of contaminants in ground water pose a serious health hazard. For instance, Audit noticed that 305 of the 697 locations (i.e. 44 per cent) where ground water was found to be contaminated with high levels of Arsenic were in West Bengal alone. Similarly, ground water in Punjab was found to be contaminated with higher than permissible levels of Arsenic (13 locations), Fluoride (18 locations) and Salinity (nine locations). The lack of up to date data on water quality also adversely affects development of a timely and focussed approach for appropriate ground water management strategies besides preventing assessment of progress made through implementation of such strategies.

Apart from CGWB, nine²³ States/UTs were also monitoring ground water quality. The number of locations exceeding limits prescribed by BIS as per quality data of monitoring wells of States/UTs is shown in Table 2.3.

Table 2.3: Contamination of ground water in excess of limits in State monitored wells

State/UT	Number of locations exceeding limit					
	Arsenic	Fluoride	Nitrate	Iron	Salinity	Chloride
Andhra Pradesh	-	755	3,828	-	-	439
Gujarat	-	187	20	-	628	471
Himachal Pradesh	Test not conducted	0	0	0	0	0
Karnataka	-	135	467	158	65	14
Odisha	-	34	138	627	27	265
Puducherry	-	-	26	8	10	13
Punjab	-	1	0	9	0	0
Tamil Nadu	Test not conducted	76	126	Test not conducted	404	106
Telangana	-	150	416	-	31	9

Note: Blank fields indicate that data was not provided by the concerned State agency

As per CGWB data (Table 2.2) there were a total of 637 locations having excess Fluoride content. However, the data available with Andhra Pradesh (Table 2.3) showed 755 locations having excess Fluoride content in the ground water in that State alone. Similarly, CGWB's data for nitrate showed that 2,015 locations had nitrate beyond the permissible limit; whereas the data available with Andhra Pradesh showed that 3,828 locations had excess nitrate. This indicated that the number of observation wells maintained by CGWB were inadequate to comprehensively monitor the ground water. This also indicates the need to integrate the findings of CGWB and States so as to provide more reliable indicators in respect of the ground water scenario in the country.

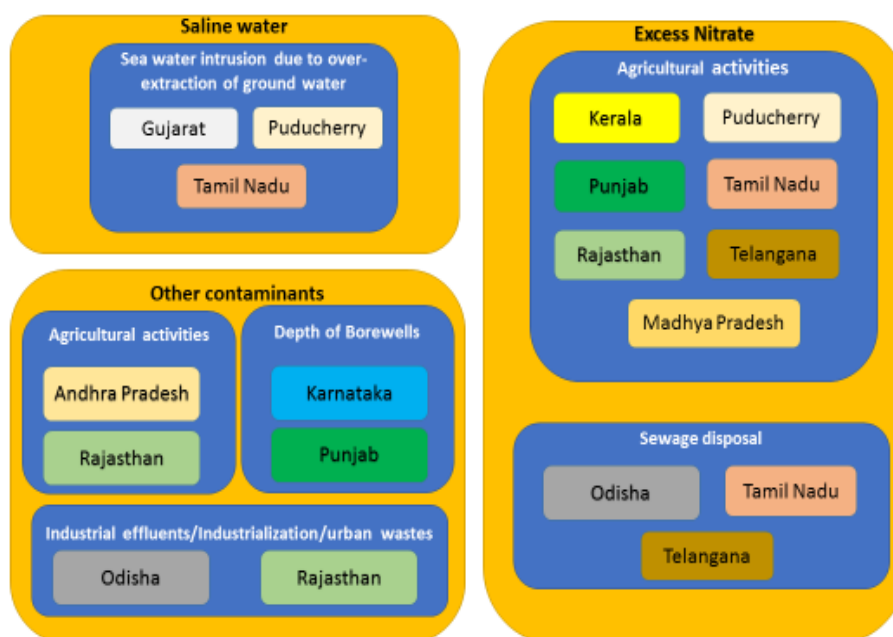
²³ These nine states include six states i.e. Andhra Pradesh, Himachal Pradesh, Karnataka, Tamil Nadu, Telangana and Puducherry which have their own regulation for Ground Water.

DoWR, RD&GR stated (September 2020) that monitoring of ground water quality was done every year and the data shared through the India WRIS portal. Audit however, noticed (October 2020) that the WRIS portal contained data as of 2015-16 only.

2.5.4 Factors affecting Ground Water Quality

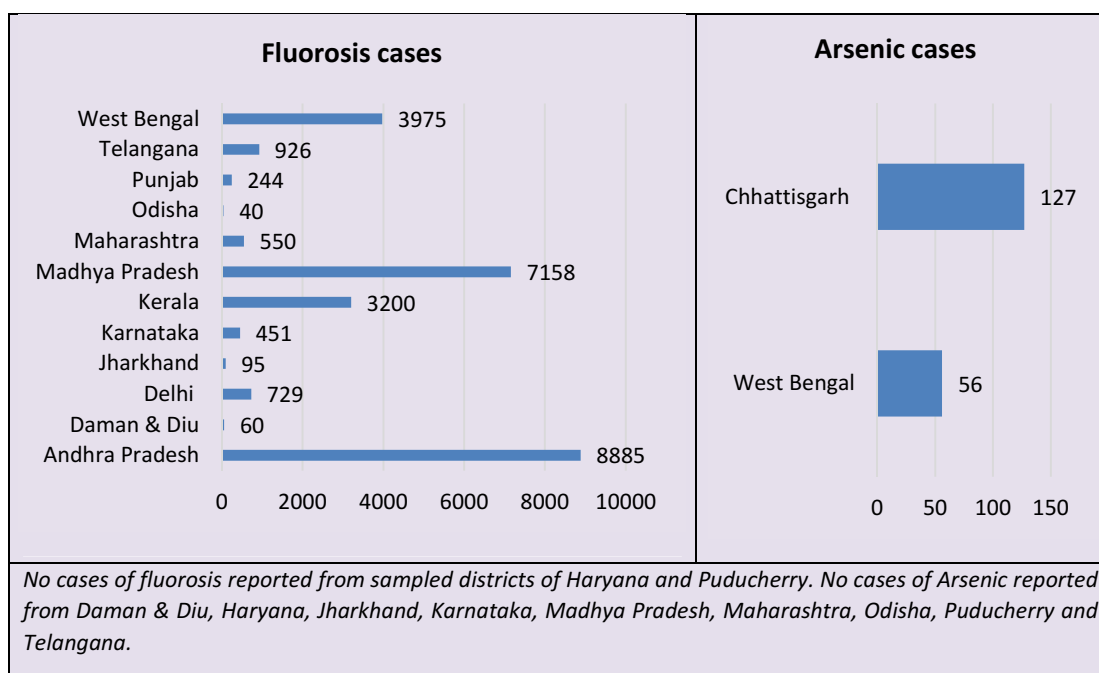
Broadly, the quality of ground water is affected by Anthropogenic (generated by human activity) and Geogenic (generated by geological process) activities. The factors affecting ground water quality were available in respect of 11 States/UTs (Figure 2.2).

Figure 2.2: Factors affecting ground water quality



Most of the States/UTs that conducted assessment of change in quality of ground water reported excessive use of fertilizers and pesticides, disposal of industrial and municipal waste and sea water intrusion as factors for deterioration of ground water quality. This also poses serious health issues for the general populace. Information on cases of fluorosis and arsenic poisoning were provided by 15 States²⁴ (Chart 2.7).

²⁴ Data was available for the period 2013-18 (Andhra Pradesh, Delhi, Haryana, Kerala, Puducherry, West Bengal – Bankura District for Fluorosis and Nadia District for Arsenic), 2013-19 (Madhya Pradesh), 2017-18 (Daman & Diu, Karnataka-Vijayapura District, Punjab and Telangana) and 2017-19 for Maharashtra. For three states i.e. Chattisgarh, Odisha and Jharkhand, information regarding period was not available.

Chart 2.7: Cases of Fluoride and Arsenic poisoning

The number of cases of fluorosis was significant in Andhra Pradesh, West Bengal and Madhya Pradesh. West Bengal was also affected by the problem of Arsenic poisoning. In the absence of any such assessment by the remaining States/UTs, the threats due to contamination of ground water could not be ascertained in these States/UTs, which might, in turn, affect planning and development of appropriate strategies for management of ground water.

SECTION B: FUNCTIONING OF REGULATORY BODIES

2.6 Model Bill on Ground Water

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. In view of the changing ground water scenario, the Department constituted a committee for re-drafting the Model Bill viz. Ground Water (Sustainable Management) Bill, 2017. As of December 2019, the Model Bill was under review as per the suggestions of NITI Aayog.

2.7 Legislative framework in States/UTs

The Table 2.4 shows the position of ground water legislation as of December 2019 in the 33 States/UTs.

Table 2.4: Implementation of legislation on ground water

States in which legislation has been fully implemented	States in which legislation has been partially implemented	States in which legislation has not been implemented
Assam Chandigarh Dadra and Nagar Haveli Goa Himachal Pradesh Jammu and Kashmir Punjab Karnataka Kerala Lakshadweep Puducherry West Bengal Telangana Uttar Pradesh Odisha	Andhra Pradesh Bihar Maharashtra Uttarakhand	Arunachal Pradesh Chhattisgarh Daman & Diu Delhi Gujarat Haryana Jharkhand Madhya Pradesh Manipur Meghalaya Nagaland Rajasthan Tamil Nadu Tripura

Out of 33 States/UTs, 19 States/UTs had enacted legislation. In four States, Audit found that legislation was only partially implemented. The details in these four States are given in Table 2.5.

Table 2.5: Incomplete implementation of legislation on ground water

Sl. No.	State	Audit observation
1.	Andhra Pradesh	The Andhra Pradesh Water Land & Trees Act was enacted in 2002 and the Andhra Pradesh Water, Land and Trees Authority (APWALTA) was constituted (2002) under this Act. APWALTA was to be re-constituted every two years for members nominated under sub-section (k) and every three years for members nominated under sub-section (l) and (m) of section 3 of this act. APWALTA was constituted in 2002 and it was reconstituted in 2004. Further reconstitution of APWALTA has not taken place after the bifurcation of the State in June 2014. In addition to APWALTA, Water, Land and Trees Authority (WALTA) were also to be constituted at district and mandal levels. District level WALTA was constituted in all the 13 districts in 2002-03. However, in three selected districts viz. Anantapuramu, Chittoor and YSR Kadapa, reconstitution of the district level WALTA authorities was not found on record. As per the WALTA Rules, 2004, dedicated staff was to be provided to carry out WALTA functions. This was, however, not done and multiple departments were dealing with ground water. Government of Andhra Pradesh stated (July 2019) that necessary steps would be initiated in this regard.
2.	Bihar	The Bihar Ground Water (Regulation and Control of Development and Management) Act 2006 was passed (January 2007). Though the Act enabled the State Government to make rules for the purpose of the Act, rules/regulations to implement the Act were not framed even after a lapse of 12 years. Further, as per this Act, State Ground Water Authority (SGWA) was to be constituted which was not constituted as of March 2019.
3.	Maharashtra	The State Legislative Assembly passed the Maharashtra Groundwater (Development and Management) Act, 2009 which was notified and made effective from 01 June 2014 to facilitate and ensure sustainable, equitable and adequate supply of groundwater. However, Rules for implementation of the Act were not finalised (October 2019). In the absence of Rules, important

Sl. No.	State	Audit observation
		provisions in the Act such as notifying area for regulating use of groundwater, preparation of Integrated Watershed Development and Management plan, registration of owners of wells, registration of drilling rig owners and operators were not implemented.
4.	Uttarakhand	The Uttarakhand Water Management and Regulatory Act was passed in 2013 to provide for the establishment of the Uttarakhand Water Management and Regulatory Authority for regulating water resources. As the matter relating to appointment of Chairperson and Members was pending in court, the Water Management and Regulatory Authority could not be established. As such the Act could not be made functional and rules were not framed.

In six other States, enactment of the ground water legislation was pending for various reasons, which are briefly mentioned in Table 2.6.

Table 2.6: Ground Water legislations under process in States/UTs

Sl. No.	State	Reason for not implementing Ground Water legislation
1.	Chhattisgarh	The draft bill for regulation of ground water was pending at the State Government level since 2012. In the meantime, the regulation of ground water was being done by CGWA.
2.	Delhi	The Delhi Jal Board (DJB) was established under sub-section 3 of Section 1 of Delhi Water Board Act, 1998 (Delhi Act 4 of 1998). The Act provided that DJB may plan, regulate and manage the extraction of ground water in Delhi in consultation with CGWA as one of the functions of the Board. In January 2011, Delhi Water Board (Amendment) Bill, 2011 was proposed by DJB, which enlarged the scope to include therein the regulation, control and development of ground water. The proposed amendment was meant to provide 'Planning for regulation, control and development' of ground water as one of the functions of the board instead of only 'extraction and management' of ground water. However, the amendment bill was yet to be enacted by the Legislative Assembly despite lapse of more than seven years.
3.	Jharkhand	A draft bill for Jharkhand Ground Water Development and Management (Regulation and Control) Act was prepared (2006) by the Directorate of Ground Water, which was yet to be passed as of March 2019. The regulation of ground water was being done by CGWA.
4.	Madhya Pradesh	A draft bill to regulate and control the development of ground water resources was prepared on the basis of the model bill circulated by DoWR, RD&GR, which was yet to be approved as of March 2019.
5.	Rajasthan	During 2006 to 2017, Ground Water Department and the State Water Resources Planning Department prepared five draft bills ²⁵ . However, none of these bills was enacted (January 2019).
6.	Tamil Nadu	The Tamil Nadu Ground Water (Development and Management) Act, 2003 was repealed in September 2013 to enact a comprehensive law to develop and manage ground water. However, the new Act was yet to be enacted as of March 2019. A draft model bill was circulated (May 2016)

²⁵ (i) The Rajasthan Regulation and Control of Development and Management of Ground Water Bill 2006 (ii) The Rajasthan Regulation and Control of Development and Management of Ground Water Bill 2011. (iii) The Rajasthan Ground Water (Regulation of Drinking Water Purpose) Bill 2012 (iv) Water Resources Management Bill 2012 (passed in Rajasthan legislation but not converted into act) and (v) Rajasthan Ground Water Regulation, Conservation and Management Bill 2016, 2017.

Sl. No.	State	Reason for not implementing Ground Water legislation
		by the Government of India for comments from the stakeholders, which was pending finalisation. The State Government stated (March 2019) that a comprehensive Act would be enacted after receipt of the final draft bill from the Government of India.

The remaining States/UTs had not taken action to enact legislation for ground water.

2.8 Meetings of CGWB and CGWA

CGWB

As per the order issued by DoWR, RD&GR (June 2000) reconstituting the Board, members of CGWB were required to meet at least once in three months. Audit observed that against the requirement of 28 meetings²⁶ during 2012-2019, only two meetings of CGWB were held (July 2013 and April 2015). No further meetings of CGWB were held after April 2015. Considering its role as the national body for providing inputs for management of ground water, the infrequent meetings of CGWB indicate the limited extent of its involvement in the proper guidance and monitoring for sustainable development and management of ground water resources of the country.

Department accepted (September 2020) the observation and assured that meetings of CGWB would be conducted periodically.

CGWA

CGWA is chaired by the Chairman of CGWB and has 15 members including five Special Invitees from different Ministries/ Departments. Audit noticed that there was no prescribed frequency of meetings of the CGWA. During the period 2013-18, only 11 meetings of CGWA were held. These meetings were held at irregular intervals ranging from four to 12 months. As the apex body for regulation and management of ground water in the country, infrequent meetings of CGWA may affect the discharge of functions of the Authority.

2.9 Human Resource constraints faced by Central agencies managing Ground Water

CGWB carries out its activities through 18 Regional Offices, 17 Divisional offices and 11 State unit offices located in States/UTs. CGWB had a sanctioned strength (March 2019) of 4,012 personnel, out of which 2,745 i.e. 68 *per cent* belonged to Scientific and Engineering category, who carry out most of the important functions of CGWB relating to data collection, compilation and monitoring issues relating to ground water. The remaining 32 *per cent* belong to Ministerial categories.

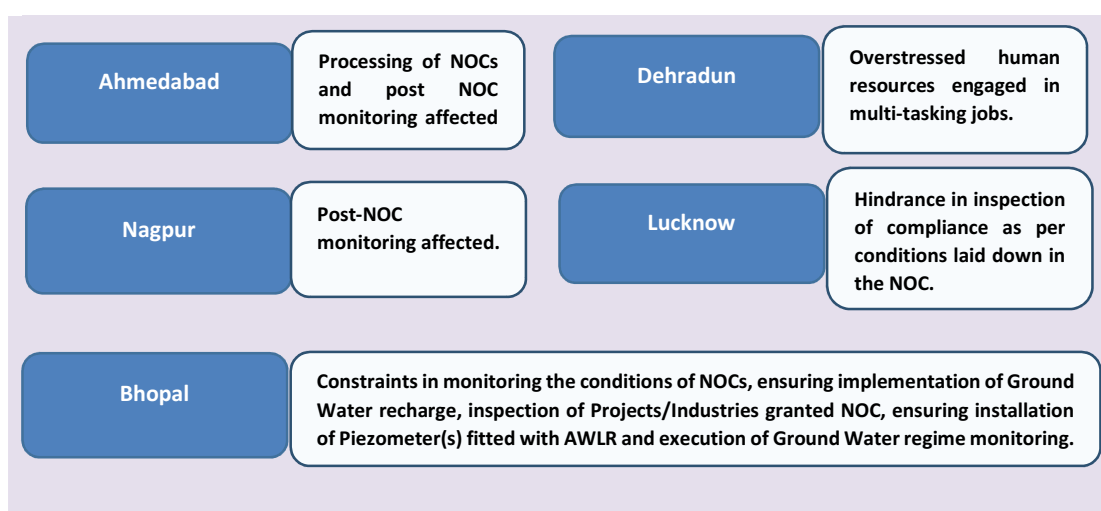
²⁶ Four meetings in a year for seven years (2012-19).

There was shortage of human resources in every category including Scientific and Engineering categories in CGWB and its regional and divisional offices. Over the period 2014 to 2019, vacancies remained highest in the scientific category ranging from 33.48 *per cent* (2015) to 37.51 (March 2019). Vacancies in engineering category ranged from 24.14 *per cent* (2014) to 27.41 *per cent* (2018) while in the Ministerial category, the vacancies ranged from 25.47 *per cent* (2014) to 30.51 *per cent* (2015). As of March 2019, there was a vacancy of 26.93 *per cent* and 26.60 *per cent* in the engineering and Ministerial categories respectively.

Audit observed that CGWB was unable to fill up the vacancies as their revised Recruitment Rules (RRs) were not approved by the Department. CGWB sent amended draft RRs for various posts to DoWR, RD&GR during 2016 to 2017. For 13 posts (including that of Chairman, CGWB), as detailed in **Annexure 2.6**, amended draft RRs were sent to the Department as early as April 2016. However, these were not finalised by the Department as of November 2019.

Audit also observed that there was delay in completing the administrative procedures for filling up posts. As of June 2018, the Departmental Promotion Committee (DPC)²⁷ was under process for filling up 394 posts (96 Scientific, 168 Engineering and 130 Ministerial posts). It was observed that out of 394 posts, only 84 posts could be filled up (13 Scientific, 31 Engineering and 40 Ministerial posts) by April 2019. Thus, 310 posts were yet to be filled up as of April 2019 which indicated the slow progress in filling up posts. Some of the Regional Offices of CGWB reported to Audit that shortage of human resources was affecting their working (Figure 2.3).

Figure 2.3: Human Resource constraints in Regional offices of CGWB



²⁷ As per the old RRs

In spite of shortage of technical workforce, some of the Regional Offices had also deputed their technical staff (Scientific and Engineering) for administrative work as detailed in Table 2.7.

Table 2.7: Technical staff deputed for administrative work

Sl. No.	Regional Office	Details
1.	North Himalayan Region, Dharamshala	5 Scientific/Technical staff were deployed for administrative work such as Drawing and Disbursement Officer (DDO), Establishment Section, Accounts Section, Store Section, Legal work, etc.
2.	Western Region, Jaipur	6 Scientists were deployed to discharge duties as DDO, Vigilance Officer, Rajbhasha Officer, etc.
3.	Uttaranchal Region, Dehradun	3 Scientists were deployed to discharge duties as DDO, Public Information Officer (PIO), Hindi Officer etc.
4.	North West Himalayan Region, Jammu	4 Scientific/Technical staff were deployed for administrative work such as DDO, Officer in Charge(Store and vehicle), Hindi Officer, etc.
5.	South Eastern Coastal Region, Chennai	9 Scientists (Scientist D/Assistant Hydro-geologist) were deployed to function as "Persons in-charge of Stores and Stock".
6.	Southern Region, Hyderabad	3 Scientists were deployed to discharge duties as DDO.
7.	North Western Region, Chandigarh	5 Scientists discharged duties as DDO

DoWR,RD&GR stated (January 2020) that the process of augmenting the human resources takes time due to the involvement of various recruitment agencies and other related formalities; however the Department was taking action such as outsourcing some of the work so that the existing technical personnel of CGWB could be appropriately utilised.

2.10 Institutional framework for Ground Water management in States/UTs

As of March 2019, out of 33 states, only 14 states²⁸ had dedicated departments/agencies dealing with ground water related issues.

Absence of a dedicated department for dealing with ground water related issues may result in lack of coordination among the multiple agencies as well as gaps in the mechanisms for management of groundwater, as observed in the case of Telangana, mentioned in Box 2.1.

Box 2.1: Coordination issues in management of ground water in Telangana

In Telangana, coordination among the departments involved with issues related to management of ground water was inadequate, as-

- Telangana State Pollution Control Board while giving 'Consent to Establish' to industries did not incorporate any conditions to obtain permission/NOC from State Ground Water Department (SGWD) for ground water abstraction.

²⁸ Andhra Pradesh, Haryana, Himachal Pradesh, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Odisha, Punjab, Puducherry, Rajasthan, Tamil Nadu, Uttar Pradesh and West Bengal.

- ii) While rejecting the application (for permission/NOC) of Industry, the State Ground Water Department (SGWD) conveyed to the concerned WALTA authority to seize the existing borewells (if any) available in the premises of the Industry. However, the details of action taken by the authorities were not communicated to SGWD.
- iii) Based on the proposals from various departments for conducting survey and investigation to identify sites for establishing Artificial Recharge Structures (ARS), the GWD recommended various sites for such ARS. However, the SGWD had no information, whether the ARS recommended by them were established or not.
- iv) On implementation of Act in the State, all the wells were to be registered with the authority. However, the Administrator of the State WALTA Authority (Commissioner, Rural Development Department) did not have the details regarding the number of wells registered after implementation of the Act.
- v) As per section 4 of WALTA, the authority shall meet at least once in three months as such place and time as the Chairman may decide. However, no meeting was conducted during the period 2013-14 to 2017-18.

2.11 Constraints faced by States/UTs

2.11.1 Human Resource constraints

In the 14 States having a dedicated department/agency for management of ground water, Audit observed shortage of personnel (as of March 2018) in agencies of 11 such States/UTs dealing with ground water, as shown in Table 2.8.

Table 2.8: Shortage of human resources in States/UTs

Sl. No	State/UT	SS	PIP	Vacancy	Vacancy %
1.	Andhra Pradesh	661	337	324	49
2.	Himachal Pradesh	9	2	7	78
3.	Jharkhand	58	27	31	53
4.	Karnataka	369	68	301	82
5.	Kerala	499	418	81	16
6.	Madhya Pradesh	451	281	170	38
7.	Odisha	325	170	155	48
8.	Puducherry	190	69	121	64
9.	Punjab	67	59	8	12
10.	Tamil Nadu	609	342	267	44
11.	Uttar Pradesh	692	456	236	34
	Total	3,930	2,229	1,701	43

SS: Sanctioned Strength; PIP: Persons in Position

Thus, there was a vacancy ranging between 12 and 82 *per cent* in the Departments/Agencies dealing with ground water at State/UT level. Such vacancies posed constraints in the effective discharge of functions by the State/UT agencies. In Odisha, Atomic Absorption Spectrophotometer, to be used for determination of Arsenic in ground water, was not utilised during 2008-18 due to absence of staff and therefore, Arsenic was not tested in ground water. In Tamil Nadu, exploration and drilling work, random check and monitoring of NOCs issued and collection and testing of water samples were affected due to shortage of staff.

2.11.2 Infrastructure constraints

Audit observed that due to lack of 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 (Figure 2.4).

Figure 2.4: Infrastructure constraints in States

Andhra Pradesh	<ul style="list-style-type: none"> • Four regional labs (level II) at Vishakhapatnam, Rajamahendravaram, Kurnool and Kadapa were established. All the four labs were functioning. • After bifurcation (June 2014), the existing centralized laboratory at Hyderabad was allotted to Telangana State but new laboratory was not established in Andhra Pradesh. • In the Water Quality Laboratory, Dowleswaram, East Godavari district, water quality data for both pre and post monsoon (2010 to 2015) and for pre-monsoon (2017) were not analysed as the instruments were not in working condition. Further, this lab could not analyse the Arsenic level in ground water samples as it did not have the necessary equipment.
Bihar	<ul style="list-style-type: none"> • There was no infrastructure with State agency associated with Ground water management and regulation. State government had not taken any action in this regard. Thus, there was no testing of ground water and consequent management by the State agency.
Kerala	<ul style="list-style-type: none"> • Due to unavailability of vehicles, proper inspections, enquiries and studies were not carried out. • All the machinery and equipment were many years old and required replacement. • Though pumping tests were to be done for all 14 districts, there were only four pumping test units available for scientific aquifer management. • All three labs in Thiruvananthapuram, Kozikode and Ernakulam are functional, but at Thiruvananthapuram, the 'Atomic Absorption Spectrophotometer was under repair and Arsenic analysis could not be conducted. The Kozhikode Lab faced serious space constraint; LPG cylinder was kept in a room with minimum ventilation along with chemicals and acids. Supporting staff posts viz. Chemical Assistant, Laboratory Attender and Office Assistant were vacant. Vacancy issues were prevalent at Ernakulam also.
Madhya Pradesh	<ul style="list-style-type: none"> • There were seven labs to test the quality of ground water located at Bhopal, Jabalpur, Ujjain, Gwalior, Sagar, Satna and Balaghat. All seven labs were working. • It was reported by the Water Resources Department (December 2018) that up-gradation of laboratory and data centre equipment, software and hardware were required. A demand for ₹ 40 lakh was raised and approval of the same has been sought. In the absence of upgraded infrastructure, testing of samples was constrained.
Maharashtra	<ul style="list-style-type: none"> • Though the Maharashtra Groundwater (Development and Management) Act, 2009 was passed with effect from 01 June 2014, rules for implementation of the Act were not finalised. Pending notification of Rules, detailed needs analysis for assessing the infrastructure requirement was not done by the Government. • In the absence of assessment, the requirement and adequacy of testing could not be ascertained in audit.
Odisha	<ul style="list-style-type: none"> • In Directorate of Ground Water Development, there are five Water Quality Laboratories, eight Divisional Data Processing Centres and

Tamil Nadu

- one State Level Ground Water Data Processing Centre. However, up-gradation of hardware and software, database of software and water quality laboratories was required.
- Audit observed that no proposal regarding up-gradation of hardware and software, database of software was sent to the higher authority by Directorate of Ground Water development.
 - Only 30 of the required 388 geophysical resistivity meters were available in nine divisions; of the 53 old geophysical instruments, 23 were not in working condition and obsolete. There was also shortage of chemical equipment which affected testing processes.
 - Though there was a requirement of 1,190 piezometers, new piezometers were not drilled and no logger was available in good condition to carry out exploration and geophysical logging; the server and plotter were non-functional and obsolete.
 - Water samples were not tested for presence of iron due to limited number of laboratories. Out of 9,032 water samples to be collected and tested, only 3,870 were collected and tested (2017).
 - Purchases of various equipment amounting to ₹ 24.92 crore approved by DoWR, RD&GR (August 2018) were yet to be made as of January 2019.

2.12 Conclusion

Over the period from 2004 to 2017, there has been a decline in the percentage of assessment units categorised as safe, whereas the percentage of blocks categorised as semi-critical, critical and over-exploited has steadily increased. The overall stage of extraction of ground water has increased from 58 *per cent* in 2004 to 63 *per cent* in 2017. There are 13 States/UTs that have a higher stage of extraction ranging from 64 *per cent* (Gujarat) to 166 *per cent* (Punjab). This indicates that timely interventions are required to check the depletion of ground water levels.

The ground water samples in a number of States were found to be contaminated by high levels of Arsenic, Nitrate, Fluoride and Iron. Significant shortcomings were noticed in the mechanism for assessing the quality of ground water. The Central Ground Water Board (CGWB) conducted assessment of ground water resources after a gap of four years against the prescribed frequency of two years. Although it is required to monitor the water quality every year, CGWB possesses data on water quality only as of 2015. The absence of up to date data affects timely and focussed intervention to prevent further deterioration and deprives the CGWB of the means for assessing the effectiveness of such interventions in maintaining envisaged ground water levels and quality.

CGWB could establish a network of only 15,851 observation wells for monitoring water quality, against the target of 50,000 wells planned during the XII Plan period (2012-17). The Real Time Ground Water Monitoring through wells equipped with Digital Water Level Recorders (DWLRs) and Telemetry, envisaged to be done during the XII Plan period by CGWB was still in the planning stage as of March 2020.

Although water is a State subject, only 19 States (as of December 2019) had laws regulating ground water and only 14 States/UTs had dedicated agencies to deal with issues relating to ground water.

Both CGWB and State agencies dealing with ground water faced shortage of staff, which adversely affected discharge of their duties such as monitoring of No Objection Certificates issued, testing of water samples, etc. Many States/UTs did not have the required infrastructure for carrying out tests for ground water. The State agencies were unable to carry out requisite laboratory tests, which affected the management of ground water.

2.13 Recommendations

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.

3.1 Introduction

Although Water is a State subject, the regulation of ground water abstraction is being done at both Central and State levels.

At the central level, Central Ground Water Authority (CGWA) constituted in January 1997 under sub-section (3) of Section 3 of the Environment Protection Act, 1986 as per direction of Hon'ble Supreme Court of India, has been vested with responsibility for regulation and control of groundwater development and management. CGWA has been granted the powers to, amongst others, regulate and control, manage and develop ground water in the entire country and to issue necessary directions for this purpose.

CGWA has issued Guidelines from time to time for evaluation of proposals/requests for ground water abstraction with the objective of ensuring sustainability of ground water both in terms of quantity and quality, looking into the variations in availability of water in different climatic regions and diverse hydro-geological conditions in various States of the country. CGWA regulates ground water development and management by issuing 'No Objection Certificates' (NOC) for ground water extraction to industries or infrastructure projects or Mining Projects etc. Necessary conditions for implementation by the proponent are laid down in the NOC issued by CGWA.

Under the Guidelines (November 2015), CGWA notified 162 critical/ over-exploited areas for the purpose of regulation of ground water development. In the notified areas, permission (NOC) to abstract ground water was not accorded for any purpose other than drinking water. In the notified areas, the District Administrative Heads in case of Administrative Block or Taluka, or the Head of the Municipality (in case of Municipal Area) were designated as the authorities for issuing NOCs for extraction of ground water.

In non-notified areas, ground water withdrawal could be considered for Industries/ Infrastructure/ Mining projects also.

With effect from September 2020, CGWA has issued revised guidelines, in which the system of notifying areas by CGWA has been dispensed with. NOCs are now to be issued by CGWA on the basis of the assessment units viz. safe, semi-critical, critical and over-exploited.

At the State level, as of March 2019, 13²⁹ States/UTs have constituted State Ground Water Authority (SGWA) or issued Government Orders. In these States, NOCs for ground water withdrawal are granted by the respective SGWAs or designated authority. The mechanism of regulation in these States/UTs is outlined in **Annexure 3.1**.

The findings in respect of regulation of ground water usage are discussed in this chapter.

3.2 Uniformity in guidelines between CGWA and self-regulated States/ UTs

The directions of Hon'ble NGT (August 2018) mention that the guidelines of CGWA must have pan-India applicability. CGWA informed (June 2019) Audit that States/ UTs where regulation was being done through State Government orders, more or less follow CGWA guidelines. In 13 States/UTs, SGWAs have been established under appropriate legislation and have their own mechanism for evaluation of proposal/request for NOC for ground water abstraction. However, Audit observed that in seven of these States, there were variations between the CGWA and the State level guidelines. These included differences between the areas notified by CGWA and SGWA, difference in categorisation of areas (as Safe, Critical, Over-exploited), etc. The variations are listed in the Table 3.1.

Table 3.1: Variations between State and CGWA guidelines

Sl. No.	Name of the State	Variation
1.	Chandigarh	Three government agencies, instead of one (in CGWA guidelines) issue permission letter/NOC in respect of withdrawal of ground water and these agencies had different conditions in the permission letters.
2.	Delhi	In Notified Areas, NOCs were also issued for other than drinking purpose, which is contrary to CGWA guidelines. Advisory Committee/ Competent Authority did not incorporate some of the provisions of CGWA guidelines in the terms and conditions of NOC/ permission issued by them.
3.	Goa	Before issue of NOC, detailed report of ground water status in the aquifers, recycling of water etc. was not obtained from the project proponent, as prescribed in CGWA guidelines.
4.	Himachal Pradesh	Provision for artificial recharge to ground water through rain water harvesting structure in the premises was not incorporated, as done in the CGWA guidelines.
5.	Karnataka	Permit/NOCs are issued only in the notified area and not for non-notified areas. As such, Karnataka Ground Water Authority (KGWA) is not issuing NOCs in non-notified area.
6.	Tamil Nadu	Individual households are exempted from obtaining NOC, whereas this is not so in CGWA guidelines. No specific mention of mandatory recycle/reuse (for various purposes except recharge to ground water) for all the NOCs and quantum of ground

²⁹ 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.

Sl. No.	Name of the State	Variation
		water recharge to be established by the firms have been made in the guidelines, which is included in CGWA guidelines.
7.	West Bengal	No separate provisions have been made for notified and non-notified areas whereas this distinction is made in CGWA guidelines.
		No provision has been made for artificial recharge structure for ground water recharge, as required in CGWA guidelines.
		No provision has been made for renewal of permits, which is included in CGWA guidelines.

The divergent guidelines of the States also resulted in certain specific issues in regulation of ground water in the States, that are cited subsequently in this chapter and discussed more specifically in para 3.8.

Based on the directions of the Hon'ble NGT, CGWA revised (September 2020) the guidelines, according it pan-India applicability and mandating that wherever States/ UTs have their own ground water abstraction guidelines which are inconsistent with the CGWA guidelines, the provisions of CGWA guidelines will prevail. In case the guidelines followed by States/ UTs contain more stringent provisions than CGWA guidelines, such provisions may also be given effect to.

Audit observed some good practices being followed in a few of these States though not included in the CGWA guidelines, as given in Box 3.1.

Box 3.1: Good practices included in the guidelines of States/UTs having their own regulation

Himachal Pradesh: The condition of payment of royalty on extraction of ground water through energised means had been included in the NOC issued. Further, drilling of tube well/bore had to be got done from a firm registered with SGWA.

Karnataka: The guidelines state that spacing of 500 metres should be maintained from the existing public source of drinking water as per Section 3 of Karnataka Ground Water Act, 1999.

Tamil Nadu: The National and State Water Policies envisage assessment of water in smaller hydrological units. For the purpose of effective regulation and implementation of assessment, the State Ground & Surface Water Resources Data Centre (SG&SWRDC) has decided (2011 onwards) to take the firka as the assessment Unit, since a firka is smaller than a block in extent. This was expected to help to identify the ground water potential pockets within the over exploited and critical blocks and thereby prohibit a part of an over exploited block from further ground water extraction, whereas allow other parts of the block for ground water extraction.

3.3 Project proponents extracting Ground Water without obtaining NOC

As per the CGWA guidelines of the year 2012, only new units and industries (Industry, Infrastructure and mining projects) seeking expansion fell under the purview of the guidelines. In the revised guidelines of November 2015, all existing industries/projects which were drawing ground water and had not obtained NOC from CGWA, either due to its coming into existence prior to formation of CGWA or due to exemption from

obtaining NOC as per earlier guidelines, were also required to apply to CGWA with immediate effect for NOC for ground water withdrawal.

Audit observed that CGWA did not have any estimate of the number of industries/infrastructure/mining projects that were extracting ground water without proper NOC. CGWA extended the deadline for submission of application for existing industries five times³⁰ (latest up to 30 September 2019). The revised Guidelines (November 2015) also stipulated that no application for NOC should be entertained without referral letters from the statutory authority (Central and State Government Departments and Agencies³¹). CGWA received copies of environmental clearances/Terms of Reference from MoEF&CC and State Environment Impact Assessment Authorities where ground water abstraction was envisaged in the project. However, CGWA had no mechanism to ensure that such project proponent applies to CGWA for NOC before commencing its operations.

Without information on the number of existing project proponents that were extracting ground water without NOC; and in the absence of a mechanism to ensure that new project proponents receiving conditional clearances from other statutory authorities applied for NOC, CGWA was unable to effectively control unauthorised extraction of ground water. During the course of Audit, records from State Pollution Control Boards (SPCBs)/ Pollution Control Committees (PCCs), Bureau of Indian Standards (BIS), Food Safety and Standards Authority of India (FSSAI), etc. were examined and it was observed that most of the projects granted Consent to Operate, licenses, were withdrawing ground water without any NOC from CGWA/ SGWAs. The findings in this regard are discussed in the succeeding paragraphs.

The Department stated (October 2019) that extensions of deadlines for submitting application for renewal of NOCs had been granted to existing industries in view of the large number of such units in the country which are required to obtain NOC and the limited human resources available with CGWA.

The Department further stated (October 2019) that the mandatory requirement of referral letter while applying for NOC has become redundant after the directions of the Hon'ble NGT requiring all users of ground water to obtain NOC from CGWA.

Given its mandate to regulate the use of ground water in the country, CGWA was required to ensure that all project proponents obtain NOC before extracting ground water, in accordance with the extant guidelines.

³⁰ Up to 31.12.2017 vide public notice dated 04.10.2017, up to 30.06.2018 vide public notice dated 01.01.2018, up to 30.09.2018 vide public notice dated 29.06.2018, up to 31.03.2019 vide public notice dated 14.11.2018, up to 30.09.2019 vide public notice dated 09.04.2019.

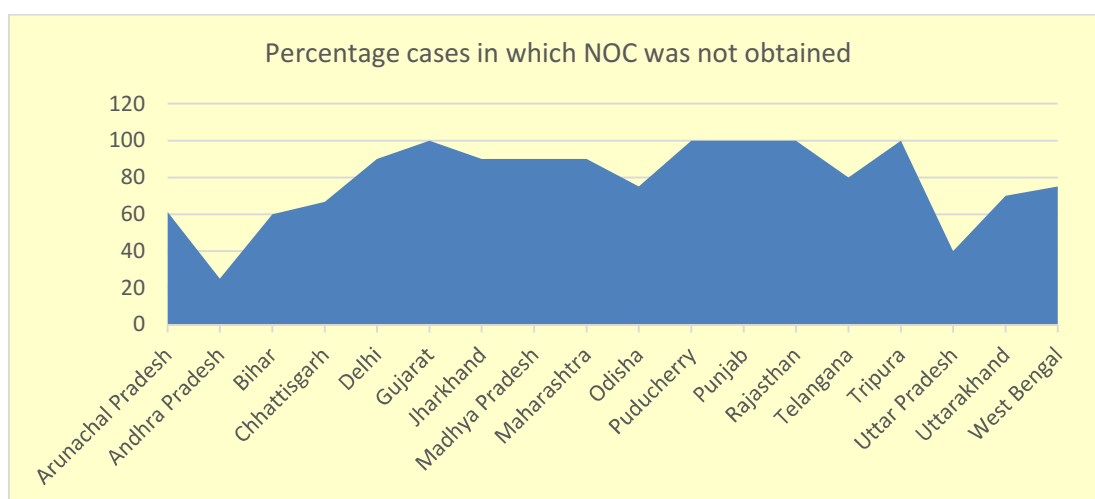
³¹ MoEF&CC or State Pollution Control Board (SPCB) or State Level Expert Appraisal Committee (SEAC) or State Level Environment Impact Assessment Authority (SLEIAA) or Bureau of Indian Standards (BIS) or Food Safety and Standards Authority of India (FSSAI) or Department of Industries or any other authority mandated by Central or State Government.

3.3.1 Projects granted Consent to Operate by SPCBs/ PCCs

As per the provisions of Water (Prevention and Control of Pollution) Act, 1974, no industry, operation or process can be established without obtaining prior consent from the concerned State Board. The SPCBs/PCCs are responsible for prescribing consent application form and consent fees. Most of the SPCBs/ PCCs issue Consent to Establish (CTE) followed by Consent to Operate (CTO).

Audit examined a sample of 328 cases³² in 18 States where the CTO granted to a project proponent included a condition which required NOC for ground water extraction, and found that only 75 projects in 13 States/ UTs had obtained the requisite NOCs. Thus, 253 projects (77 per cent) were operating without NOCs (State wise position in Chart 3.1).

Chart 3.1: Projects operating without NOC



In the CTOs granted by nine³³ States (other than the 18 States mentioned above), the condition to obtain NOC for ground water extraction was not included, while in one UT (Lakshadweep) no CTOs were granted during the audit period. No information was available in respect of two States (Assam and Nagaland). In one State (Tamil Nadu), CTOs are granted only after NOCs have been obtained, which has been highlighted as a good practice in Box 3.3.

The huge number of defaulters indicates that a lack of mandatory linkage between the SPCBs/PCCs and CGWA has led to unchecked extraction of ground water.

The Department stated (October 2019) that the CTOs are granted by SPCB for industries using both surface water and ground water and proponents abstracting ground water only shall approach CGWA/ SGWAs for obtaining NOC. Further, the concerned DMs/DCs have been authorised by the CGWA to initiate suitable action

³² The list of CTOs was obtained from SPCB/PCC and the list was cross-checked with NOC issued by CGWA/ State Ground Water authorities.

³³ Chandigarh, Daman & Diu, Dadra & Nagar Haveli, Goa, Himachal Pradesh, Karnataka, Manipur, Meghalaya and Kerala

against illegal boring wherever noticed. DoWR, RD&GR added (January 2020) that in respect of CTOs granted by SPCB, it was learnt that SPCBs were not renewing CTOs of those project proponents who had failed to obtain NOC for ground water abstraction.

It is noteworthy that the cases highlighted by Audit were those in which CTOs granted included a condition for obtaining of NOC from CGWA/SGWA, since the project involved extraction of ground water. Further, the reply was silent about the action taken by CGWA/DMs/DCs against the defaulting project proponents.

Some significant findings on operation of facilities without obtaining NOC for Ground Water

A few specific instances of operation of facilities without obtaining NOCs, are mentioned in Table 3.2.

Table 3.2: Operation of facilities without obtaining NOC for ground water

Sl. No.	State	Audit Observation
1.	Gujarat	Gujarat Pollution Control Board (GPCB) provided details of 3,589 ³⁴ various water intensive units. Of these, NOCs had been granted by the Regional Director office, CGWA to only eight units and 613 applications were pending with CGWA, Ahmedabad for granting NOC. It was observed that 2,968 units had not applied for NOC. Thus, 3,581 units were withdrawing ground water and using as raw material without NOCs.
2.	Haryana	Haryana State Pollution Control Board (HSPCB) had issued CTO/CTE to 5,069 industrial projects in four regions (Faridabad, Sonapat, Dharuhera and Panchkula) between April 2013 and December 2018, of which 3,643 units were using ground water for their activities. It was seen that only 840 units had applied for NOC of which 48 NOCs were granted during the period 2013-18. Thus, 3,595 units in the State were extracting ground water without NOCs.
3.	Jammu & Kashmir	Out of 22,474 industrial units registered during 2013-18 with Jammu and Kashmir State Pollution Control Board (JKSPCB), 75 units were water intensive. However, while granting CTO to these 75 units, JKSPCB did not impose any condition for obtaining NOC for ground water abstraction. Audit noticed that 73 out of these 75 water intensive units had not obtained NOC from the competent authority and were extracting ground water without any authorisation. JKSPCB stated (July 2018) that it would initiate the process to incorporate a condition in the CTO for obtaining NOC from concerned authorities.

Further, in West Bengal, during a project site visit, Audit found exploitation of ground water by an RBI bank note production company, which is discussed in Box 3.2.

Box 3.2: Exploitation of ground water by project proponent in West Bengal

Bharatiya Reserve Bank Note Mudran (P). Ltd, Salboni, West Bengal:

The proponent constructed nine tube wells between 1993 and 2018 for domestic, industrial and horticultural use. During joint site visit (September 2018) by the Audit team with the officers of the West Bengal Pollution Control Board (WBPCB), it was noticed that the firm was abstracting ground water through seven tube wells for which they had not taken any permit from the State Ground

³⁴ Mineralized water-71, Dairy-102, Fertilizer-64, Pulp & Paper-125, Sugar-23, Tanneries-3 and Textile-3,201

Water Authority, State Water Investigation Directorate (SWID), which was required as per terms and conditions of the CTO received from WBPCB.



Tube wells at Bharatiya Reserve Bank Note Mudran (P). Ltd, Salboni

Audit also noticed good practices seen in two States, which are highlighted in the Box 3.3.

Box 3.3: Good practices in grant of NOCs for projects

In two States, it was observed that a system was established whereby consent for operation could only be granted after NOC for ground water extraction was obtained.

1. **Tamil Nadu:** According to the regulation for management of ground water and issue of NOC for extraction of ground water, the Tamil Nadu Pollution Control Board and BIS should issue the permission only after obtaining the NOC from the State. Further, no schemes can be formulated in over-exploited and critical firkas and all the schemes should be formulated through the State Ground and Surface Water Resources Data Centre, Chennai.
2. **Maharashtra:** From 2012 onwards, CTO is granted to project proponent by Maharashtra Pollution Control Board (MPCB) only after the proponent obtains the NOC from CGWA. As per the guidelines of CGWA, from November 2015, NOC for ground water withdrawal was made mandatory for all industries/projects in the State using ground water irrespective of its date of coming into existence. Accordingly, MPCB have issued notices to the industry/projects directing them to apply for necessary NOC from CGWA for ground water use. CTO is issued only after the industry/projects submit copy of the application submitted to CGWA for issue of NOC to use ground water.

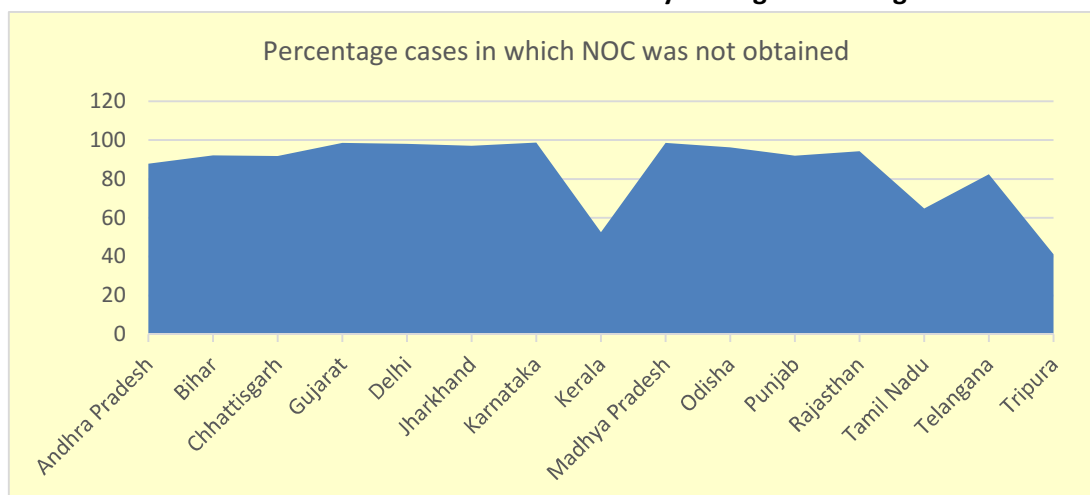
3.3.2 Projects granted license by Bureau of Indian Standards

License to use the Standard Mark on a product is accorded by the Bureau of Indian Standards (BIS) only after BIS has ensured the capability of the manufacturer to manufacture the product continuously in accordance with the relevant Indian Standard. There is no provision in the Rules and Regulations of BIS for imposing the condition of obtaining NOC from CGWA before grant of license to Packaged Drinking Water units.

Audit observed that in 15 States for which data was made available to audit, BIS licenses were issued to 3,189 packaged drinking water units since 2013. Of these, only 642 proponents obtained NOC from CGWA/State authorities for ground water extraction. Thus, in 2,475 of 3,189 cases i.e. in 78 per cent of the licenses granted by

BIS, the project proponents were operating without obtaining NOCs from CGWA (Chart 3.2).

Chart 3.2: Cases in which NOC was not obtained by Packaged Drinking Water units



In the absence of a mandatory linkage between licenses granted by BIS and the obtaining of NOC from CGWA, the instances of project proponents not obtaining NOC may persist.

The Department accepted (October 2019) that there was a gap in the number of NOCs obtained by Packaged Drinking Water units and the licenses granted by BIS. DoWR, RD&GR further stated (September 2020) that CGWA had held meetings with FSSAI, wherein it was agreed that FSSAI would not issue license to industries that do not have NOC for ground water extraction.

3.3.3 Projects granted license by other agencies

Audit observed cases of licenses issued by other Central and State agencies in 13 States, in which NOCs for ground water extraction was not obtained. The findings in respect of 12 States are mentioned in Table 3.3. The findings in respect of Jammu & Kashmir are discussed separately in the next paragraph.

Table 3.3: NOC for ground water not obtained in licenses granted by other Central/State agencies

Sl. No.	State	Audit observation
1.	Andhra Pradesh	Audit noticed from the data of the Andhra Pradesh State Tax (GST) department pertaining to water intensive units for 2013-19 that out of 351 units, only 55 units had obtained permission from ground water and Water Audit Departments (GW&WAD). Thus, 296 water intensive units were drawing ground water without any authorisation. Administrator, APWALTA confirmed (July 2019) that only three units had approached for NOC, of which one case was under process and two had been denied permission.
2.	Bihar	The Food Safety and Standards Authority of India (FSSAI) had issued licenses to 57 water intensive industries in the State. Audit noticed that out of these industries, only four industries had obtained NOC from the CGWA for abstraction of ground water. The remaining 53 units were operating without NOCs.

Sl. No.	State	Audit observation
3.	Goa	Out of 86 water intensive industries that were granted licenses by the Food and Drug Administration, we scrutinised 45 records and observed that in 18 cases ground water abstraction structures (well/bore-well) were available in the premises of the manufacturers but were not registered with the Ground Water Authority. The department stated (April 2019) that the Ground Water Officers had been notified to take immediate action in this regard.
4.	Karnataka	(i) FSSAI had issued 409 licenses during the period 2013-18 to water intensive industries such as packaged drinking water, beverages, etc. and the source of water was stated to be bore well/ground water. Out of 409 licenses issued by FSSAI, 72 industries were located in Notified Areas and 337 industries were located in Non-Notified areas. Project proponents of the 72 licenses granted in Notified Areas ³⁵ did not apply or obtain NOC from KGWA and were operating without NOC. This was irregular, as the guidelines of KGWA do not permit issue of NOCs for these type of industries. (ii) Regional Transport Office (RTO) which is the authority for registration of lorries/tankers, had registered/issued license to 1,106 tankers (including water tankers) during the period 2014-19. Bruhat Bengaluru Mahanagara Palike (BBMP) which is the authority for issuing trade license to tankers, had issued/renewed 758 trade licenses for water supply during 2014-18. These licenses were issued without ensuring the source of water and without obtaining NOC from KGWA. Thus, regulation of ground water viz., identification of source of water extracted, if ground water is to be extracted, then the extent of ground water to be extracted, actual quantity extracted, quality of ground water which is being supplied, etc. were not ensured before grant of licenses.
5.	Odisha	As per the records of Chief Engineer, Water Service, Government of Odisha, out of 452 firms/projects abstracting ground water in the State, 268 firms/projects were withdrawing ground water without obtaining NOC from CGWA.
6.	Punjab	FSSAI had issued 75 licenses to water intensive Food Business Operators in Punjab. We observed that only three units were issued NOCs for ground water abstraction by the CGWA.
7.	Rajasthan	NOC is required for registration of distilleries and breweries from the office of the Excise Commissioner, Udaipur. It was seen that 10 distilleries and nine breweries were registered in their office of which NOCs were issued to only four distilleries and seven breweries. Out of remaining six distilleries, NOCs for five were under process and one unit did not apply. Similarly, of the two remaining breweries, NOC for one was under process and one unit did not apply.
8.	Tamil Nadu	Out of total 1,259 licenses issued by FSSAI (Central and State) up to April 2018, only 414 obtained NOC for drawing of ground water from SG&SWRDC.
9.	Telangana	(i) Under the WALTA Act 2002, all bore wells were to be registered with the concerned authority and any unauthorised bore wells were to be seized/closed. Applications of 12 Industries in Nizamabad District were rejected by SGWD during the period 2016-18. It was seen that three firms (out of 12 rejected cases) already had existing bore wells in their premises. SGWD stated that the concerned authority was informed about the unauthorised bore wells. However, no action was taken to seize/close these bore wells. Audit team visited the three industries in October 2018 and found that these were still withdrawing ground water from unauthorised bore wells. (ii) The SGWD, Nizamabad identified (March 2017) 46 Packaged Water Plants that were abstracting ground water without obtaining NOC. The Audit team along with the staff of GWD Nizamabad visited three of these plants during October 2018 and found that these plants continued to withdraw ground water

³⁵ In Karnataka (self-regulated State), NOCs/permits are issued only in Notified areas.

Sl. No.	State	Audit observation
		from unauthorised bore wells. Similarly, 283 such water plants were also identified in Hyderabad district. Though penal provisions ³⁶ are prescribed under WALTA Act, no action in this regard was taken in both the above cases.
10.	Tripura	Scrutiny revealed that out of 17 functional packaged drinking water industries, 14 had applied for NOC. Of these, NOCs were issued to 12 industries by the CGWA though all the 17 industries had been granted licenses by BIS and FSSAI. Application of one industry was under process and one application was returned due to lack of documents.
11.	Uttar Pradesh	Guidelines of CGWA (November 2015) stipulate that NOC must also be obtained for infrastructure projects including Metro/Railway station for withdrawal of ground water. Audit observed that the North Central Railway (NCR) was abstracting ground water at the rate of 8,096.922 ³⁷ cubic meter per day for washing, cleaning, etc. and 38,702.99 ³⁸ cubic meter per day through tube wells for drinking purposes, without obtaining NOC contrary to the provisions of above said guidelines. Railway authorities were also unaware of the provision of obtaining NOC as per CGWA guidelines. NCR stated (October 2018) that water supply arrangements were old and there were no guidelines for taking NOC from CGWA. However, the reply was not tenable as in the revised guidelines of November 2015, all existing industries/projects which were drawing ground water and had not obtained NOC from CGWA, either due to its coming into existence prior to formation of CGWA or due to exemption from obtaining NOC as per earlier guidelines, were also required to apply to CGWA with immediate effect for NOC for ground water withdrawal.
12.	West Bengal	During 2013-18, the General Manager, District Industrial Centre and Ex- officio Environment Officer (Hooghly district), issued CTE to 31 packaged drinking water projects. Out of these 31 projects, only 16 projects had applied to SWID for necessary permit to abstract ground water. Of these 16, only seven projects had taken necessary permit from SWID to abstract ground water till July 2018. The application of seven projects had been rejected and two applications were under process.

3.3.3.1 Jammu and Kashmir

(i) Illegal extraction/exploitation of Ground Water by industrial units

As per provisions of the Jammu and Kashmir Water Resources (Regulation and Management) Act (JKWRRM) 2010, the licensing authority can exercise powers to take all steps necessary for the prevention of illegal use of water, including the power to break open the door of any premises where sinking of well or extraction of ground water may be going on³⁹.

Audit noticed from the information provided by the State Excise and Industries Departments that 78⁴⁰ industrial units had installed 92 bore/ tube wells for extracting

³⁶ As per section 35 of WALTA act, whoever contravene the provision of the act or violates any rules made under the act should be punished with fine not less than ₹ 1,000 extended up to ₹ 5,000.

³⁷ For Agra and Jhansi division only

³⁸ For Allahabad, Agra and Jhansi division only

³⁹ Provided that the owner or any other person in occupation of the premises, if present therein refuses to open the door on being called to do so.

⁴⁰ Jammu: 47; Kashmir :31

ground water without obtaining licenses. The Public Health Engineering Department (PHED), however, did not initiate any action to identify the commercial establishments involved in illegal extraction of ground water and enforce the provisions of the Act. Consequently, there was continued illegal extraction of ground water and non-recovery of license fee of ₹ 92 lakh⁴¹ as well as water charges in these cases. A joint verification by Audit and representatives of Excise Department (September 2018) conducted in respect of nine industrial units (Breweries/ Liquor bottling plants) confirmed that ground water was being extracted by eight such units through 10 bore/ tube wells without license. One industrial unit had ceased to operate.



Oakland Bottlers



Basantar Bottlers



Kashmir Bottlers



Trikuta Bottlers



Dewan Modern Breweries



New India Breweries



Dewan Modern Breweries



Basantar Breweries



Srhgam Bottlers

⁴¹ 92 bore wells/ tube wells at the rate of ₹ one lakh each

PHED stated (July 2018) that the respective authorities have been directed to regularise the extraction of ground water by these units and assess/ recover the usage charges, along with arrears.

(ii) Permission granted for Ground Water extraction without ensuring NOCs from the designated authority

Under the JKWRRM Act 2010, the Chief Engineer/Incharge, PHED has been designated as competent authority to issue licenses in relation to drinking water supply and ground water.

Audit noticed that State Industrial Development Corporation (SIDCO) Samba and Bari Brahmana, Jammu granted permission to 128 industrial units to install 138 bore wells within their premises. Of the 128 industrial units, only five units had obtained NOC from the authority designated under the JKWRRM Act 2010 for installation of six bore wells. The remaining 123 units were operating 132 bore wells without valid NOCs.

PHED, Jammu informed (January 2019) SIDCO that the permissions granted by SIDCO would be treated as illegal and cancelled and asked SIDCO to direct the concerned industrial units to obtain NOCs from the PHE Department.

3.4 Delay in processing of applications by CGWA for grant/renewal of NOC in non-notified areas

In non-notified areas, CGWA issues NOC to industrial/infrastructural/mining projects for ground water withdrawal as per the guidelines/criteria for evaluation of proposals/requests for ground water abstraction. NOC is accorded in non-notified areas for a period of two years initially and is renewed for a period of three years thereafter. Subsequently, NOCs can be renewed every five years subject to compliance of conditions mentioned in the renewed NOC. Applications for issuance/renewal of NOC can be made online through NOCAP⁴². The permitted timeline for issuance of NOC by CGWA is 60 days after verification of the completeness of the application with respect to fulfilment of conditions.

During 2013-19, CGWA accorded 3,517 fresh NOCs and renewed 320 NOCs for ground water withdrawal to various industry, mining and infrastructure projects (both Online and Offline). Audit observed that 10,758 applications for grant of NOC and 144 applications for renewal were pending as on 31 March 2019. Thus, the quantum of pending NOCs was thrice the number of fresh NOCs issued during last six years.

The period wise delay in processing of applications is given in Table 3.4. The State-wise details of NOC pending and renewal are given in **Annexure 3.2**.

⁴² Online application for Issue of NOC to abstract Ground Water.

Table 3.4: Delay in processing applications for grant/renewal of NOC

Delay in days	Number of pending NOC for fresh applications	Number of pending applications for renewal of NOC
Less than 30 days	0	11
31-90	0	24
91 to 180 days	2,183	25
181 to 365 days	4,755	25
More than one year to three years	3,820	56
More than three years	0	3
TOTAL	10,758	144⁴³

The Department stated (October 2019) that pendency of applications was due to shortage of human resources⁴⁴ in the Regional Offices and CGWA and delays in receipt of stipulated documents as per the guidelines from the proponents. DoWR, RD&GR further stated that as per the directions of Hon'ble NGT (OA no. 59/2012 dated 03.01.2019) all applications for grant of NOC as well as renewal from Over-exploited, Critical and Semi-critical areas have been put on hold pending final directions of the Hon'ble NGT, increasing the number of pending applications.

The reply was not tenable as there were 8,575 applications pending for grant of NOC for more than 181 days even before the issue of such orders by NGT. Further, in pursuance of the directions of the Hon'ble NGT, CGWA has issued (September 2020) revised guidelines and therefore, needs to expedite the processing of pending applications.

3.5 Non-receipt of applications for renewal on expiry of NOC

As mentioned in para 3.4, NOC initially granted for two years can be renewed for three years and then every five years. Audit observed that 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 15⁴⁵ 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.

The Department stated (October 2019) that show cause notices had been issued by Regional Offices to defaulting firms. DoWR, RD&GR further stated that in many States

⁴³ Information in respect of seven out of 23 States was received from CGWA.

⁴⁴ DoWR, RD&GR stated (September 2020) that only 10 posts had been created for Secretariat of CGWA at Headquarters. No posts had been created for CGWA work in Regional Offices. In Regional Offices, officers who had been deployed for Authority work was also performing their routine scientific duties.

⁴⁵ Whoever fails to comply with or contravenes any of the provisions of this Act, or the rules made or orders or directions issued thereunder, shall, in respect of each such failure or contravention, be punishable with imprisonment for a term which may extend to five years or with fine which may extend to one lakh rupees, or with both, and in case the failure or contravention continues, with additional fine which may extend to five thousand rupees for every day during which such failure or contravention continues after the conviction for the first such failure or contravention

the CTO issued by the respective SPCBs was not considered for renewal if the project proponent did not have the NOC for ground water abstraction from CGWA/ SGWAs.

However, the Department did not provide actual number of show cause notices issued against the above mentioned 474 cases.

3.6 Installation of piezometers

Guidelines for ground water abstraction (November 2015), *inter alia* stipulated that piezometer for monitoring the ground water level is to be installed/constructed by the project proponent at a minimum distance of 50m from the pumping well through which ground water is being drawn. Ground water levels should be measured monthly. The details regarding coordinates, reduced level (with respect to mean level), depth, zone tapped and assembly lowered should be provided for bringing the piezometer into the National Hydrograph Monitoring System⁴⁶ of CGWB and for its validation.

Audit observed that no details regarding installation of piezometers, data on water level, change in water level, etc. were received from the project proponents. Consequently, piezometers were neither brought into the National Hydrograph monitoring system of CGWB, nor validated. In the absence of above mentioned data from these piezometers, the data relating to ground water situation in the country was not complete to that extent. CGWA did not take action⁴⁷ against project proponents for not complying with this requirement.

Department stated (October 2019) that water level data of Piezometers was being received from the proponents on annual basis. Efforts were on to ensure that this data was appropriately integrated into the database of CGWB and to develop suitable protocols to enable CGWA/CGWB to assess the impact of withdrawal of ground water by industries/Infrastructure Units/ Mining Projects on the ambient ground water regime. The reply indicates that CGWB had not assessed the impact of ground water extraction by the project proponents so far. The reply was also silent about the extent of compliance by the proponents and the timelines for integration of data into database of CGWB.

3.7 Regulation of Ground Water Extraction in Notified areas

CGWA has notified 162 assessment units/areas in 14⁴⁸ States/ UTs for the purpose of regulation of ground water development. These areas were notified based on over-exploitation, contamination, sustainability of ground water resources or the need for protecting limited available fresh water resources for drinking and domestic uses.

⁴⁶ The National Hydrograph Network stations set up is a system of spatially distributed observation point at which periodic monitoring of Ground Water and regime behaviour are done.

⁴⁷ Non-compliance of conditions mentioned in the NOC may be taken as sufficient reason for cancellation of NOC accorded/ non-renewal of NOC.

⁴⁸ Out of these, seven States have their own regulation

Regulation of ground water development in Notified areas is to be done through district administrative heads who have been declared as Authorised Officers under the provisions of section 4 of the Environment Protection Act, 1986. All issues pertaining to granting of NOCs for ground water withdrawal, checking violations, sealing of tube wells, launching of prosecution against offenders, etc. are to be addressed by the Authorised Officers. For more effective regulation of ground water development and management, constitution of Technical Advisory Committees under the Chairmanship of District Collector/Deputy Commissioners had been proposed. Such Committees also render advice to the District Collectors/Deputy Commissioners in matters pertaining to regulation of ground water development and management.

Recognising that notification of assessment units/blocks was done as per existing priorities and knowledge base and that no uniform standards/criteria were adopted for such notification, DoWR, RD&GR constituted a committee (October 2017) to review the criteria for notification and to suggest standard criteria for notification of assessment units.

The Report of the committee was placed (September 2018) before the members of the CGWA and it was unanimously agreed to do away with the practice of notification of assessment units for ground water.

Accordingly, CGWA issued revised guidelines (September 2020) stipulating conditions for grant of NOCs for units in areas based on their categorisation as Safe, semi-critical, critical and over-exploited. Under the revised guidelines, in over exploited areas, NOCs can now be granted to new industries falling in the category of Micro, Small and Medium Enterprises (MSME).

Audit noticed that 155 of the 162 areas notified earlier fell in the category of 'over-exploited'. As per the previous guidelines, no extraction of ground water for other than drinking water purposes was permitted in such areas, by virtue of their having been notified. With the latest revision of Guidelines, NOC to MSME units, in such areas will now be permissible even though they are categorised as over-exploited.

Significant observations in respect of regulation of ground water in Notified Areas are given in the paragraphs below.

3.7.1 Constitution of and meetings of Advisory Committee

In Notified Areas, permission to abstract ground water through any energised means is not accorded for any purpose other than drinking water. The permission would be granted by the Authorised Officer in consultation with the Advisory Committee constituted for this purpose. The constitution of Advisory Committee was under the supervision of the concerned District Magistrate. The Advisory Committees were supposed to meet once in a month for evaluating the proposals received for NOC by the respective DC/DM in the notified area.

Audit observed that there was no provision for constitution of Advisory Committee in one State (West Bengal). No Advisory Committee was constituted in one State (Andhra Pradesh), and in five States/UTs, the meetings of Advisory Committee were not held at regular intervals, as mentioned in Table 3.5. No information was available in respect of the remaining States/UTs.

Table 3.5: Non-constitution of Advisory Committees

Sl. No.	State	Audit observation
1.	Diu & Daman	Advisory Committee was constituted in 2004 for Diu Notified Area and extension was also given to the Committee till April 2019. However, no meeting of the Advisory Committee was held in Diu district till February 2019 i.e. for nearly 15 years since constitution of the Committee.
2.	Gujarat	Advisory Committees for all three notified talukas of Gandhinagar district (notified in September 2000/November 2012) and for Mehsana Taluka of Mehsana district (notified in November 2012) were constituted in February 2014 and February 2018 respectively after a delay of more than 13 years and five years respectively. Further, only four Advisory Committee meetings were held in Gandhinagar district and no meeting was held in Mehsana district. Further, in both Gandhinagar and Mehsana districts, as per order (December 2012) of CGWA, New Delhi, the Advisory Committee was to be constituted under Chairmanship of District Collector with five members of different organisations. However, the Authorised officer cum District Magistrate, Gandhinagar while constituting the committee, did not include representatives of the Non-Government Organizations for all the three talukas in Gandhinagar district. Similarly, the Authorised Officer in Mehsana did not include representative from the Regional Director, CGWA Ahmedabad which is one of key members of the Advisory Committee. While accepting the audit observation, the Collector, Gandhinagar and Collector, Mehsana stated (September 2018 and October 2018) that representative of NGO and Regional Director, CGWA, Ahmedabad respectively would be added.
3.	Haryana	Out of 11 notified districts in Haryana, District Level Advisory Committees had been constituted in 10 districts (except Kaithal district). There was no prescribed frequency of meeting of the district level Advisory Committees. The meetings of the committees were held only for issuance of NOCs for extraction of ground water during the period year 2013-18. Meetings were not held for monitoring purpose. 29 meetings were held in five test-checked districts during 2013-18.
4.	Madhya Pradesh	Out of the seven notified areas in the State, Advisory Committee was constituted for only one notified area in Indore district. In Indore, 36 meetings were held during 2013-19.
5.	Rajasthan	Advisory Committee was constituted in nine of the twelve notified areas. Advisory Committee was not constituted in Karauli district and no information was provided in respect of Ajmer and Barmer district.

The concept of Advisory Committees was introduced in notified areas in order to have effective regulation of ground water extraction. However, absence of Advisory Committee or infrequent meetings defeated the very purpose for which the committee was intended. However, in the revised guidelines (September 2020), the process of notifying of areas by CGWA has been dispensed with.

3.7.2 Non submission of drilling information by ‘other than Individual households’

As per Guidelines for ground water abstraction in respect of ‘other than Individual households’ in notified area, installation of water meters in the abstraction structure was mandatory and confirmation of such installation should be given to the Authorised Officer under intimation to the concerned Regional office of CGWB immediately after construction. All details of the drilling, such as location of well⁴⁹, formations encountered, depth and diameter of the constructed ground water abstraction structures, type of pipes used, yield of bore well/tube well, fracture zones encountered/zones tapped and ground water quality, etc., were to be furnished to the nodal agency authorised and to CGWB Regional Office within 15 days of the completion of the construction.

Audit observed that CGWA/ Regional Offices of CGWB did not ensure that such information was received from ‘other than Individual households’ that had been granted NOCs in the notified area. Thus, CGWA had no data on the parameters prescribed in the guidelines in respect of the authorised bore wells drilled in the notified areas.

3.8 Regulation of Ground Water by States having their own regulation

Thirteen⁵⁰ States/ UTs have constituted State Ground Water Authority (SGWA) or issued Government Orders for the purpose of ground water regulation. In these States, regulation for ground water is carried out by the SGWAs or the designated authorities. Audit observed deficiencies in regulation of ground water in six States/UTs. The audit findings are mentioned in Table 3.6.

Table 3.6: Regulation of ground water in self-regulated States

Sl. No.	State	Audit Observation
1.	Andhra Pradesh	In addition to the notified areas declared by CGWA, the SGWA also notifies areas separately based on periodical Ground Water Estimation Committee (GEC) assessments ⁵¹ under APWALTA Act 2002. The SGWA notified 1,227 villages in 168 blocks/mandals of nine districts of Andhra Pradesh as over-exploited during January 2018 based on GEC 2012-13 Report. CGWA had notified five mandals ⁵² consisting of 97 villages. The difference was due to the fact that the CGWA considers mandal as the unit for notifying areas while the State Regulatory authority considers the village as the unit for notifying areas. This resulted in a situation where some villages in a mandal notified by the

⁴⁹ Latitude and Longitude

⁵⁰ 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.

⁵¹ In Andhra Pradesh, periodical assessment of Ground Water level village level was made by the GEC and GEC reports were sent to CGWB. After approval of CGWB, the State WALTA issued notification contains a list of OE villages where ban is imposed on Ground Water extraction except for drinking purposes. GEC reports were prepared in 2007-08, 2008-09, 2010-11, 2012-13 (2016-17 approved by CGWB and due for notification).

⁵² Chilamatur, Giddaluru, Narpala, Tirupathi rural and Vempalli

Sl. No.	State	Audit Observation																																									
		<p>CGWA may not be considered as over-exploited in the notified list of the State as shown in Table 3.6.1.</p> <p>Table 3.6.1: Difference in villages notified by CGWA and SGWA</p> <table border="1"> <thead> <tr> <th>Sl. No.</th> <th>District</th> <th>Mandal notified by CGWA</th> <th>Number of villages in the mandal notified by CGWA</th> <th>Number of Villages notified as over-exploited by APWALTA</th> <th>Number of villages not notified by APWALTA</th> </tr> </thead> <tbody> <tr> <td>1</td> <td rowspan="2">Ananthapuramu</td> <td>Chilamatur</td> <td>21</td> <td>6</td> <td>15</td> </tr> <tr> <td>2</td> <td>Narpala</td> <td>12</td> <td>3</td> <td>9</td> </tr> <tr> <td>3</td> <td>Chittoor</td> <td>Tirupathi Rural</td> <td>29</td> <td>10</td> <td>19</td> </tr> <tr> <td>4</td> <td>Prakasam</td> <td>Giddaluru</td> <td>20</td> <td>11</td> <td>9</td> </tr> <tr> <td>5</td> <td>YSR Kadapa</td> <td>Vempalli</td> <td>15</td> <td>4</td> <td>11</td> </tr> <tr> <td></td> <td>Total</td> <td></td> <td>97</td> <td>34</td> <td>63</td> </tr> </tbody> </table> <p>Thus, 63 villages which are in the mandals notified as over-exploited by the CGWA do not have a ban on permissions (NOCs) as they are not notified as over-exploited villages by the State. Due to non-imposition of restrictions on use of ground water for commercial/ industrial use in non-notified villages in the CGWB notified Mandal, remaining villages slip into over exploited category from semi-critical/critical villages within in a short period.</p> <p>Water Resources Department (WRD) stated (July 2019) that the Government of Andhra Pradesh was notifying certain villages as over exploited and imposing ban on construction of new wells for all purposes, except for drinking water. Further, Andhra Pradesh is the only State in India which assesses the ground water potential at village level; therefore notification was also implemented at village level.</p> <p>The fact however, remained that the difference in categorisation of over-exploited areas resulted in lack of regulation in some of the areas that were excluded by the State Department.</p>	Sl. No.	District	Mandal notified by CGWA	Number of villages in the mandal notified by CGWA	Number of Villages notified as over-exploited by APWALTA	Number of villages not notified by APWALTA	1	Ananthapuramu	Chilamatur	21	6	15	2	Narpala	12	3	9	3	Chittoor	Tirupathi Rural	29	10	19	4	Prakasam	Giddaluru	20	11	9	5	YSR Kadapa	Vempalli	15	4	11		Total		97	34	63
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4	Prakasam	Giddaluru	20	11	9																																						
5	YSR Kadapa	Vempalli	15	4	11																																						
	Total		97	34	63																																						
2.	Delhi	<p>In July 2010 Government of National Capital Territory of Delhi (GNCTD) declared all the districts of National Capital Territory of Delhi as notified areas. Audit observed that NOCs were issued by the competent authority for purposes other than drinking water. The Competent Authority issued 407 NOCs to infrastructure projects and 169 NOCs in irrigation and agricultural projects during the period 2013-18 in the five districts selected for audit. Further, these projects/cases were required to follow the terms and conditions mentioned in the NOC. Audit observed that State regulatory authorities had not laid down any mechanism to monitor the compliance of the terms and conditions mentioned in the NOC. No guidelines were framed for inspection of the site by Authorised Officer/Competent Authority to verify the compliance of conditions for ground water withdrawal mentioned in the NOC. As a result, the Competent Authority/ Authorized Officers did not conduct any inspection of the site and were therefore unaware of the extent to which the project proponents were complying with the terms and conditions of the NOC. As per notification (July 2010) of Government of National Capital Territory of Delhi (GNCTD), the Advisory Committee was required to convene at least 60 meetings (12 per year) during the period</p>																																									

Sl. No.	State	Audit Observation
		2013-18. Audit however noticed that only four to 31 meetings ⁵³ were held in the five districts during the period.
3.	Karnataka	<p>CGWA has notified 22 areas in Karnataka whereas the SGWA has notified 43 areas as per its discretionary powers. Out of the 22 notified areas of CGWA, 21 areas are also appearing in the SGWA's list of notified areas.</p> <p>Audit observed that applications for NOCs in Bangalore Rural (106), Bangalore Urban Districts (578) and BBMP areas (10,971) were pending from 2013-14 onwards. The reasons for pendency were attributed to difficulty in inspecting sites, as there were only two Geologists working under the District Office to cover all 198 BBMP wards and four taluks in their Districts, applications pending for want of information/inspection from District offices, etc. It was also stated that the office was not able to correspond with the applicant due to lack of contact address.</p> <p>In Karnataka, the power to grant permit for withdrawal of ground water for agricultural purpose is delegated to the District Ground Water Committee. NOCs for agricultural purpose were issued in Belagavi, Bagalkote and Chikamagalur Districts. NOC conditions stipulated that low water yield crops were to be grown. However, the application format for NOC did not have a declaration of the nature/type of crop to be grown by the applicant. There was also no system of obtaining completion report from the applicants. In the absence of information on the type of crop grown, violation if any, of the conditions could not be detected, as the Department had also not conducted any inspection.⁵⁴</p>
4.	Kerala	In Kerala, SGWA has notified 5 blocks whereas CGWA has not notified any blocks.
5.	Puducherry	<p>As per CGWA, only Puducherry Region⁵⁵ has been included as a Notified Area. However, the Government of Puducherry declared Puducherry (categorised as over-exploited region) and Karaikal (categorised as a safe region) regions as Notified Areas with effect from February 2005.</p> <p>Pondicherry Ground Water Authority (PGWA) issues permits for extraction of water for drinking, agricultural, industrial and infrastructure projects. A Regional Committee was constituted (July 2010) for evaluation of applications for ground water clearance for industrial and infrastructure purposes.</p> <p>The total number of applications received was not available as separate records were not maintained to monitor the receipt and clearance of applications for renewal of registration. However, as on 31 March 2018, 11 applications for renewal of registration were pending to be processed by PGWA. The period of delay ranged from 341 to 365 days and PGWA attributed the delay to shortage of human resources.</p>
6.	West Bengal	As per guidelines of CGWA, NOC can be issued in a notified area only for drinking water and only if there was no public water supply in the area. CGWA declared one notified area namely Haldia Industrial Complex in August 2000. There was no separate or special provision in the State Ground Water Act for management and regulation of ground water in the notified area, however, State Level Authority (SLA) decided (June 2009) to maintain the status of

⁵³ West District-4, South District-14, North West District-10, South West District – 31 and East District – 17 Meetings

⁵⁴ Karnataka Ground Water (Regulation and Control of Development and Management) Act 2011 and rules 2012 does not provide any specific condition or prescribed frequency to carry out any inspection. However, section 17 of the Act empowers the department to inspect the wells.

⁵⁵ The UT of Puducherry has four regions. Out of these four regions, Government of Puducherry declared Puducherry and Karaikal regions as notified areas. Yanam and Mahe regions are non-notified areas.

Sl. No.	State	Audit Observation
		<p>Haldia as a notified area with necessary guidelines of CGWA for management and regulation of ground water. SLA had also proposed (June 2009) for amendment of the State Ground Water Act to maintain the status of the notified area but no amendment was made as of February 2019.</p> <p>Audit observed that during 2013-18, 17 permits were issued to 10 industry and infrastructure projects in Purba Midnapore in the notified area of Haldia for abstraction of ground water although public water supply was available in the area. Thus, the CGWA guidelines were not followed.</p> <p>It was further noticed that there was delay in issue of six permits in Purba Midnapore for periods ranging from 34 to 90 days due to non-conduct of meetings by the District Level Authority in time.</p>

The revised guidelines (September 2020) stipulate that wherever States/ UTs have come out with their own ground water abstraction guidelines, which are inconsistent with the CGWA guidelines, the provisions of CGWA guidelines will prevail. Further, the process of grant of NOC has been made online through a web based application system.

3.9 Submission of quarterly progress reports by SGWA

As per the guidelines (2015) for ground water abstraction, SGWAs were required to send quarterly progress reports to CGWA for records. Audit observed that no such reports were obtained by CGWA. CGWA sought such (October 2018) reports from its regional offices at the instance of audit. However, CGWA stated (June 2019) that in spite of repeated requests and follow up, the said progress reports were received from only three States/UTs, namely Himachal Pradesh, Tamil Nadu and Puducherry. The remaining 10 States/UTs had not responded and no progress could be obtained from these States. In absence of these reports, CGWA was unaware of the status of regulation in these States.

DoWR, RD&GR stated (October 2019) that to address this problem of non-reporting by States, CGWA had proposed to develop a common platform for every State/ UT with a simple online system and that once a final decision on policy/guidelines for regulation of ground water was taken by the Hon'ble NGT, appropriate action to develop the common application system would be initiated.

The revised guidelines issued by CGWA (September 2020) stipulate that self-compliance of conditions laid down in the NOC shall be reported by the users online in the web portal of CGWA/SGWA. CGWA needs to ensure that project proponents duly submit their self-compliance on its portal.

3.10 Post NOC monitoring by CGWA and Authorised officers

3.10.1 Violation of conditions mentioned in NOCs

As per Section 15 of the Environment (Protection) Act, 1986, CGWA has been conferred with the powers to resort to penal provisions to those who failed to comply

with or contravened any of the provisions of this Act. CGWA appointed (October 2017) the District Magistrate/ Deputy Commissioner of each revenue area in 23⁵⁶ States/UTs as the 'Authorised Officer' for the purpose of enforcement of directions of CGWA and conditions laid down in the NOCs issued by the Authority for ground water withdrawal.

Audit conducted joint field visits along with CGWA, State Authorities and Authorised officers in Notified and Non-Notified Areas to the industries/project sites (other than individual households) in selected cases⁵⁷ for verification of compliance with conditions laid out in NOCs granted by CGWA and the Authorised officers. Audit observed that there was widespread non-compliance of conditions mentioned in the NOC, as discussed in the following paragraphs.

(i) General conditions of NOC that were violated

The conditions of NOC that were violated and the extent of violations is shown in Table 3.7. The State-wise findings are given in **Annexure 3.3**.

Table 3.7: Cases in which conditions in NOCs were violated

Sl. No.	Category	No. of projects in which condition was mentioned in NOC	No. of cases in which condition mentioned in NOC was violated	Percentage of cases in which condition mentioned in NOC was violated
1.	Number of Tube Wells Tube wells, bore wells and Dug wells are ground water abstraction structures. As per the conditions of NOC, the project proponent has to construct prescribed number of tube wells/bore wells as specified in NOC.	1,238	104	8
2.	Installation of Water Meter A water flow meter is an instrument capable of measuring the amount of water passing through a pipe. While issuing the NOC to various projects, there was a condition that water meter should be fitted with bore well/tube well by the firm at its own cost and ground water abstraction was to be monitored.	967	378	39
3.	Installation of Piezometer Piezometer is a bore well/tube well used only for measuring the water level by lowering the tape/sounder or automatic water level measuring	709	351	50

⁵⁶ Arunachal Pradesh, Assam, Bihar, Chhattisgarh, Gujrat, Haryana, Jharkhand, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Mizoram, Nagaland, Odisha, Punjab, Rajasthan, Tripura, Uttar Pradesh, Uttarakhand, Andaman & Nicobar, Dadra & Nagar Haveli, Daman & Diu and Lakshadweep Islands. The remaining States/UTs have their own mechanism for regulation of Ground Water.

⁵⁷ Non-notified Areas -595, Notified Areas – 221, Self-Regulated - 472

Sl. No.	Category	No. of projects in which condition was mentioned in NOC	No. of cases in which condition mentioned in NOC was violated	Percentage of cases in which condition mentioned in NOC was violated
	equipment. As per condition of NOCs, Piezometers were required to be installed in consultation with CGWB.			
4.	Installation of Automatic Water Level Recorder As per NOC condition, the piezometers installed were to be fitted with Automatic Water Level Recorder (AWLR) for real time monitoring of ground water level.	342	210	61
5.	Monitoring of Pre and Post Monsoon ground water Quality As per NOC condition, each water extraction unit had to monitor ground water quality twice in a year during pre-monsoon (in the month of May/June) and post-monsoon (in the month of October/November) periods.	659	285	43
6.	Monitoring of water level data of wells As per NOC condition, the firms had to install piezometer in the premises and monitoring ground water level data through it.	688	334	49
7.	Construction of Rain Water Harvesting Structures Units granted permission for extraction of ground water have to adopt artificial recharge of ground water by constructing rain water harvesting/recharge structures. The recharge should be implemented within the premises and/or same water shed/assessment unit.	987	429	43
8.	Maintenance of rain water recharge structures Artificial recharge efforts are aimed at augmentation of natural movement of surface water into ground reservoir through suitable civil construction techniques. These have to be properly maintained and desilting should be done periodically.	558	220	39
9.	Submission of Compliance Reports Compliance in respect of conditions specified in NOC was to be submitted to Regional Office of CGWA/ Regulatory agency.	776	438	56
10.	Withdrawal of yearly ground water in excess of prescribed limit NOC issued by CGWA prescribes the quantum of yearly ground water that can be withdrawn by a project proponent.	787	61	8
11.	Installation of Sewage/Effluent Treatment Plants The firm granted with NOC had to ensure proper recycling and reuse of waste water after adequate treatment. DoWR, RD&GR stated (October 2019) that functioning of Sewage/Effluent Treatment Plants	673	237	35

Sl. No.	Category	No. of projects in which condition was mentioned in NOC	No. of cases in which condition mentioned in NOC was violated	Percentage of cases in which condition mentioned in NOC was violated
	was under the purview of Pollution Control Boards. The reply is not acceptable as being one the conditions in the NOC, compliance to the same was to be monitored by CGWA also.			

(ii) Conditions specific to Notified areas

There are some conditions in the NOC granted to project proponents that are specific to notified areas. The authorised officers in consultation with the Advisory Committee would decide on standards for the area/ district under their jurisdiction. Such specific conditions that were violated by proponents are discussed below and the extent of violations is shown in Table 3.8. The State wise findings are given in **Annexure 3.4**.

Table 3.8: Specific conditions violated in notified areas

Condition	Number of Sampled project	Number of Sampled Projects where condition was specified	Out of projects where such condition was specified, number of projects in which			Percentage of projects in which the condition was violated
			condition was complied with	compliance could not be ascertained in Audit	condition was violated	
Diameter of Tube well/Bore well The maximum diameter of ground water abstraction structures is restricted to 150 mm by CGWA. In case of Government water supply agencies, housing societies, the specifications (size, diameter) of the tube well can be higher depending on the ground water availability and requirement.	281	152	102	10	40	26
Capacity of pump The maximum capacity of the pump for ground water abstraction structures is restricted to five HP by CGWA. In case of Government water supply agencies, housing societies, tube well, this can be higher depending on the ground water availability and requirement.	221	130	57	16	57	44
Formation encountered to be sent to CGWB As per CGWA guidelines, details of the drilling done by	279	85	3	7	75	88

Condition	Number of Sampled project	Number of Sampled Projects where condition was specified	Out of projects where such condition was specified, number of projects in which			Percentage of projects in which the condition was violated
			condition was complied with	compliance could not be ascertained in Audit	condition was violated	
the proponent had to be furnished to the nodal agency authorised and to CGWB, Regional office within 15 days of the completion of the construction.						

Significant percentage of cases in which conditions stipulated in the NOCs were violated defeated the purpose of imposing such regulation of monitoring the quantity and quality of ground water and ensuring water conservation measures. Further, despite the widespread violations, CGWA issued (2013-18) show cause notices to only 99 project proponents. This indicated that CGWA was unable to strictly and effectively impose the conditions subject to which NOCs were granted.

DoWR, RD&GR stated (September 2020) that CGWA had initiated taking action with effect from November 2019 to impose penalty on the proponents who failed to comply with the conditions specified in the NOC.

3.10.2 Specific cases observed by Audit

A few specific cases are discussed below.

3.10.2.1 Andhra Pradesh

The Ground Water and Water Audit Department rejected (February 2016) the application of Sai Ganga Water Care R.O. Plant, Guntur for permission to extract ground water on the ground that the proposed plant was located in a residential area and that ground water extraction for sale was not permitted. However, during field visit, Audit observed that the unit was operating and extracting ground water illegally in violation of APWALTA Rules. This is due to lack of an effective mechanism to detect such activities.

Andhra Pradesh Ground Water and Water Department stated that this violation was to be regulated by Tahasildar of concerned Mandal.

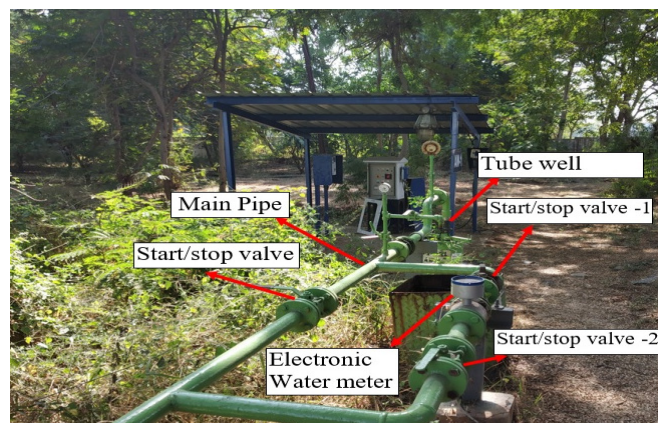


Illegal extraction of ground water by Sai Ganga Water Care R.O. Plant, Guntur

3.10.2.2 Gujarat

(i) Violation of multiple conditions of NOC by water intensive unit

NOC was granted (October 2016) to M/s Huntsman International (I) Pvt. Ltd., a manufacturer of dyes (water intensive unit) situated in Vadodara district for abstracting ground water of 2,000 cubic meter/day (and not exceeding 7,30,000 cubic meter/year) through seven shallow tube wells (in depth range of 40 to 70 m). Two existing tube wells were to be converted to piezometers for deeper ground water aquifer monitoring. In all, the firm was to install four to five piezometers to measure ground water levels on monthly basis.



Operation of Tube well by-passing water flow meter

During joint site visit (December 2018) Audit observed that the unit had constructed seven tube wells within the factory premises in such a way that ground water was being extracted without metering. Further, the firm did not convert the two existing tube wells into piezometers for deeper ground water aquifer monitoring, as required in the conditions of the NOC but was instead extracting ground water from them without installing water flow meter. Also, the firm had installed only three piezometers within the factory premises against the required four to five piezometers and did not monitor ground water level data on monthly basis.

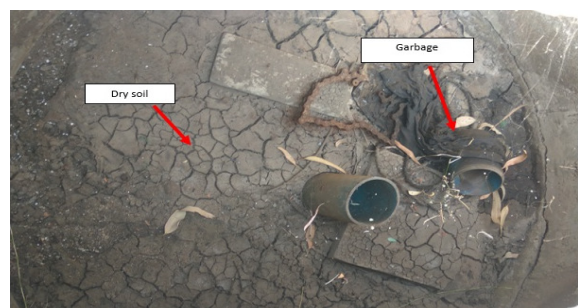


Tube wells being operated without installing water flow meter

The firm was also required to construct water recharge structures and adopt two to three villages for Water Security Plan in Vadodara District as mandated in the NOC. The firm neither took initiatives for implementing Water Security Plan nor constructed water recharge structures. The firm had constructed only one rain water harvesting structure in the premises of a primary school in one village in July 2018. Thus, the firm violated most of the conditions stipulated in the NOC.

(ii) Non maintenance of rain water recharge structures

NOC was granted (November 2014) by CGWA to M/s Rohan Dyes & Intermediates Ltd., a manufacturer of chemical products situated in Anand district for extraction of ground water of 666 cubic meter/day (and not exceeding 2,29,770 cubic meter/year). The unit was required to implement rain water harvesting and ground water recharge measures of 1,18,057 cubic meter/year.



Water Recharge pit

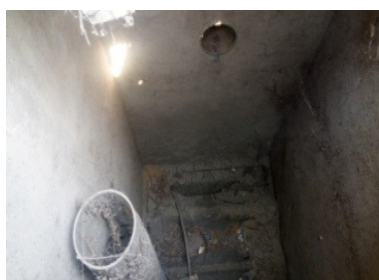
The unit had proposed to install four recharge tube wells of 100 meter depth in its premises for recharging by rain water. As per design of recharge structure, the upper layer of recharge pit would be covered with coarse sand layer and the second layer would be gravel pack filter.

During joint visit (January 2019) of the unit premises, Audit found that the firm had constructed only two number of recharge tube wells. The recharge pits were also not being maintained properly as vegetation, dry soil, garbage and mud layer was seen on the upper layer instead of coarse sand layer.

Due to non-maintenance of proper recharge structures the extent of fresh water recharge, if any, and compliance with the condition in the NOC could not be ascertained.

3.10.2.3 Haryana

As per terms and conditions of NOC, units were required to undertake artificial recharge of ground water through Roof Water Harvesting System (RWHS) in the premises within 45 days of issuance of NOCs and confirm the construction of RWHS to the Authorised Officer for verification. During physical verification of the sites of 10 units, Audit found that these units had not constructed RWHS as required. In another six units inspected during February to May 2018, RWHS were found to be not maintained properly.



Muddy structure at R.C. Sood and Co. Private Limited, Faridabad



Water logged structure at RPS Infrastructure, Faridabad



Bushes/grass at M/s Continental Devices, Faridabad



Leaves and mud in RWH structure at Food Corporation of India, Faridabad



Muddy and water logged RWH structure at Apparel Export Promotion Council, Faridabad



Bushes at BKN Government Polytechnic, Mahendergarh

3.10.2.4 Karnataka

The District Ground Water Authority granted permission (October 2017) to M/s Embassy One Developers Private Limited, Bengaluru for drilling 10 bore wells. The firm had constructed two 30 storey towers on a 6.5 acre plot in Bengaluru. The bottom of the lower basement under both the blocks was below ground water level due to which the lower basement floor was subjected to water pressure and subsequent seepage.

As per the Consultant report⁵⁸ (January 2017), total ground water desired to be pumped out per day was stated to be 1,213 cubic metre per day. Water accumulated around the building structure was collected at the collection sumps and 500 cubic metre per day was being dewatered through the process of comprehensive sub-soil drain system.

It was specified in the NOC that the water coming out of de-watering should be put to productive/effective use. However, joint inspection by Audit revealed that the collected water was pumped and lifted to the water storage tanks and after the tanks were filled, the water from the collection sumps overflowed to the drain. This was contrary to the condition specified in the NOC and resulted in improper utilisation and wastage of water in a notified/over-exploited area.



Water over-flowing from storage tanks

3.10.2.5 Madhya Pradesh

In 10 sampled infrastructure projects, Audit observed that four of these infrastructure projects had not obtained CTO from Madhya Pradesh Pollution Control Board (MPPCB).

After being pointed out by Audit, MPPCB stated (December 2018) that court cases had been filed against three project proponents and in one case pertaining to M/s Sukhsagar Medical College and Hospital Jabalpur, the Regional Officer, Jabalpur had been directed to initiate court proceedings for operating the projects without obtaining CTO from MPPCB.

3.10.2.6 Odisha

CGWA accorded (July 2017) NOC to M/s Jai Laxmi Agro Foods Pvt. Ltd, Cuttack, a proposed Agro Based Food Products manufacturing unit, for abstraction of ground water. As per condition in the NOC, the firm was permitted to extract ground water of 90 cubic metre per day and 28,300 cubic metre per year through two bore wells. No

⁵⁸ The bottom of the lower basement was below Ground Water level. Because of this it was subjected to water pressure and hence seepage. Therefore, the Company had engaged consultant to undertake studies and to derive a comprehensive dewatering system so as to keep the Ground Water level below the lower basement system.

additional ground water abstraction structures were to be constructed for this purpose without prior approval of CGWA.

During site inspection by the Audit Team (February 2019) it was found that the firm had also constructed one dug well for which approval of CGWA was not taken. The bore wells and dug well were not fitted with water meter and log books were also not maintained. As



Dug well constructed without permission of CGWA

such, quantity of ground water extracted by the unit could not be ascertained. The firm had also not installed any piezometer and also not been monitoring quality data both for pre-monsoon and post-monsoon periods as per condition of the NOC. Action taken report in respect of implementation of NOC conditions was to be submitted to CGWA within one year but the firm had not submitted any action taken report to CGWA. In its proposal for NOC, the firm had proposed for construction of one infiltration basin (pond) for rain water harvesting and to use it for plant work. However, the firm did not construct such infiltration pond for rain water harvesting. Further, the project also did not adopt any nearby villages for implementation of water conservation measures.



Bore wells without piezometer and water meter in Odisha

Regional Director, Bhubaneshwar stated that appropriate action as per the existing guidelines would be initiated at the earliest.

3.10.2.7 West Bengal

The State Ground Water Authority (SWID) issued four permits (April 2017) to M/s Haldia Petrochemicals situated in a notified area in Purba Midnapore district to install four tube wells for abstraction of groundwater at the rate of 100 cubic meter per day per tube well. Ground water abstraction was permitted only for the period from 15th March to 15th July every year. There were conditions for installation of water meter, implementation of rooftop rain water harvesting structure, submission of water quality reports to SWID annually. However, there was no provision for installation of Piezometer, AWLR, water quality



Tube well at Haldia Petrochemicals

monitoring of pre monsoon and post monsoon, renewal of permits, installation of Sewage/Effluent Treatment Plants, submission of drilling details to SWID, etc.

During the joint site visit (June 2018), it was noticed that the firm had constructed four tube wells but had not installed water meters and also did not maintain log books. As such, the quantity of ground water abstracted by the firm per day and the period when extracted could not be ascertained. The firm did not submit any water quality report to SWID. No rain water harvesting structure was implemented; rooftop rain water was being stored in an existing reservoir. In absence of Piezometer, season-wise fluctuation of ground water level also could not be ascertained.

DoWR, RD&GR stated (October 2019) that human resource constraints had affected CGWA from putting in place a mechanism for monitoring of NOC conditions by proponents in general, except in cases for renewal, where site inspections were being carried out.

Audit also noticed good practices being followed by some of the project proponents, which are highlighted in Box 3.4.

Box 3.4: Good practices by project proponents

Andhra Pradesh

During physical verification in mining unit M/s RBSSD & FN Das, it was found that the unit had maintained a green belt in the form of plantation of trees covering an area of 40,000 sq. m and planted about 4.50 lakh grass seeds. In addition, the unit also maintained 1,250 m of garland drains and 1,375 m of retaining wall to prevent soil erosion from over-burdened dump.

Assam

During physical verification of M/s Ajanta Pharma Limited, which was granted NOC by CGWA in November 2016, it was seen that the industry had complied with all the conditions specified in the NOC viz., abstraction of ground water as per the NOC, maintenance of log book indicating abstraction of ground water, fitting of water meter with tube well, installation of piezometers for water level

monitoring, construction of rain water harvesting structure, STP/ETP treatment plant for reuse of waste water. Besides, the industry also submitted compliance report to the Regional Director, CGWB, NER as per the NOC.



ETP at M/s Ajanta Pharma Limited



Rainwater harvesting structure

Madhya Pradesh

During joint site inspection of M/s Udaypur Beverages, Ltd, Jabalpur, a water-intensive industry, the unit was found to comply with all the conditions mentioned in the NOC. The plant is equipped with ETP and STP facility and is reusing and recycling the treated effluent water for in-house gardening, irrigation, cleaning and for use in utilities like boiler, cooling towers and washers. All the wells were found to be fitted with water meters and piezometers with ALWR to ensure monitoring of ground water abstraction. The unit had also implemented ground water recharge measures. Sixteen rainwater harvesting structures were found to have been constructed and properly maintained with zero discharge of water outside the premises. The project proponent had carried out de-silting and rejuvenation of Bilpura Pond located in the vicinity of the Project, resulting in augmentation of ground water resources of the area. The project proponent had taken environmental initiatives by planting more than four thousand plants and trees in the surrounding area of the project and maintained the green belt. Result-oriented efforts of the industry to preserve sustainable development and promote water conservation measures have been duly recognised by Government of Madhya Pradesh through award of *Paryavaran Puruskar* for the year 2014-15 and various appreciation awards.



Well maintained structures at M/s Udaypur Beverages, Ltd, Jabalpur

3.11 Other issues -Registration of drilling rigs and bore wells

10 States/UTs⁵⁹ had established a mechanism for registration of drilling rigs and boring wells used for extraction of ground water. This is a good practice, as it serves to keep a record of the number of drilling rigs or boring wells deployed and the extent of drilling activities undertaken in the State. Audit however, observed deficiencies in five States/UTs in implementation of this mechanism as mentioned in Table 3.9 below.

Table 3.9: Deficiencies in mechanism for registration of drilling rigs

Sl. No.	State	Remarks
1.	Chandigarh	As per Guidelines issued by the Hon'ble Supreme Court in August 2010, registration of all drilling agencies with the District Administration/Statutory Authority was mandatory. However, the UT Administration had not registered any drilling agency.
2.	Delhi	The National Capital Territory (NCT) of Delhi regulates ground water through notification of July 2010, issued by the Environment Department with the approval of the Honourable Lt. Governor, which was amended in January 2014. The terms and conditions of the amended notification of January 2014 provided for mandatory registration of all the drilling machines/rigs utilised for boring purposes with the office of Divisional Commissioner/ Deputy Commissioner (Revenue). Amended notification further provided that the movement of drilling machines/rigs should be allowed for specified purpose/ place and duration by the concerned Deputy Commissioner (Revenue) offices. However, no drilling agency was registered with Deputy Commissioner's offices and there was no check on the movement of drilling machines as required under the notification of January 2014.
3.	Karnataka	As per Rule 10 (2) of Ground Water Rules 2012 of the State, the drilling agencies are required to furnish monthly information regarding location, date and number of bore wells drilled with depth, casing and yield of each bore well. However, only 55 out of 131 drilling agencies had submitted this information.
4.	Maharashtra	Maharashtra Ground Water (Development and Management) Act, 2009, stipulated registration of drilling rig owners and operators in the State. However, in the absence of rules, these provisions in the Act were not implemented.
5.	Telangana	The rig owners/operators were instructed to submit monthly progress reports containing details of drilling works taken-up, to the Ground Water Department. However, all the 153 registered rig operators in test checked districts (i.e. Rangareddy, Warangal (Urban), Gadwal and Nizamabad) did not submit these reports.

In the above States/UTs, due to lack of registration of the drilling agencies and non-receipt of periodic reports on drilling activities, the extent of drilling work undertaken for abstraction of ground water could not be ascertained which defeated the purpose of establishing such mechanism to regulate drilling activities.

⁵⁹ Chandigarh, Delhi, Goa, Himachal Pradesh, Karnataka, Kerala, Maharashtra, Puducherry, Rajasthan and Telangana.

In 12 States/UTs⁶⁰, there was no mechanism for registration of drilling rigs⁶¹ or boring wells used for extraction of ground water. In the absence of such mechanism, there was scope for unregulated extraction of ground water. No information was available in respect of the remaining 11 States/UTs.

In the revised guidelines (September 2020), CGWA has introduced a provision whereby State/UT Governments shall be responsible for registering drilling rigs operating within their jurisdiction and for maintaining the database of wells drilled by them.

3.12 Conclusion

CGWA has been granted the powers to regulate and control ground water in the country but consents for operation of various projects are granted by multiple agencies such as Pollution Control Boards, Bureau of Indian Standards, Food Standard and Safety Assessment of India, etc. A linkage between the consents granted by these agencies and CGWA for those projects requiring ground water abstraction was missing, due to which many of the units granted consents by these other agencies were operating without obtaining NOC from CGWA.

There were delays in issuing of new NOCs and renewal of existing NOCs by CGWA. A total of 10,758 applications for grant of NOC were pending for periods ranging between 90 days to three years. Similarly, 144 applications for renewal of NOCs were pending with CGWA for periods exceeding three years.

Though CGWA has issued comprehensive guidelines for evaluation of proposals for grant of No Objection Certificate (NOC) for abstraction of ground water, prescribed conditions to be followed by the project proponents after receipt of NOC, sustainable utilisation of ground water, recharge measures, etc., these guidelines were not implemented effectively.

CGWA has also been conferred with the powers to resort to penal provisions to those who failed to comply with its directions. However, this was not implemented strictly, as widespread violations of the conditions mentioned in the NOCs were found during site inspection of the project proponents, such as illegal extraction of ground water, non-installation of water flow meters, improper maintenance of rainwater recharge structures, absence of monitoring of water quality data, etc. During 2013-18, CGWA had issued show cause notices to only 99 project proponents.

⁶⁰ Assam, Bihar, Chhattisgarh, Gujarat, Jharkhand, Lakshadweep, Madhya Pradesh, Manipur, Meghalaya, Punjab, Tamil Nadu and Tripura.

⁶¹ Drilling rigs are structures housing equipment used to drill water wells, oil wells, or natural gas extraction wells.

3.13 Recommendations

1. 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.
2. Central Ground Water Authority and State agencies may develop a mechanism to ensure timely processing of requests for ground water extraction.
3. 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.
4. 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.

4.1 Introduction

According to the National Water Policy (2012), there is a need to evolve a National Framework Law as an umbrella statement of general principles governing the exercise of legislative and/or executive (or devolved) powers by the Centre, the States and the local governing bodies. This should lead the way for essential legislation on water governance in every State of the Union and devolution of necessary authority to the lower tiers of government to deal with the local water situation. There is also a need to map the aquifers to know the quantum and quality of ground water resources (replenishable as well as non-replenishable) in the country. This process should be fully participatory involving local communities and may be periodically updated. There should be concurrent mechanism involving users for monitoring if the water use pattern is causing problems like unacceptable depletion or building up of ground water, salinity, alkalinity or similar quality problems, etc., with a view to planning appropriate interventions.

As per the Cabinet Committee on Economic Affairs (CCEA) note (June 2013), the scheme “Ground Water Management and Regulation” (GWMR) had been proposed for aquifer mapping and effective management of ground water with focus on vulnerable areas. GWMR scheme was a Central Sector Scheme of DoWR, RD&GR during the XII plan (2012-17) with an estimated cost of ₹ 3,319 crore to be implemented by Central Ground Water Board (CGWB). The Scheme had four components: (a) National Project on Aquifer Management (NAQUIM), (b) Participatory Ground Water Management (PGWM), (c) Technological up-gradation and (d) Ground Water Monitoring, Assessment, Regulation, Publication, Seminars, Awards, technical assistance to States and spill over work of the project of Artificial Recharge & Exploration. The scheme was recommended by the Expenditure and Finance Committee (EFC) in May 2013 and approved (August 2013) by the CCEA.

The scheme envisaged Aquifer mapping for an accurate and comprehensive micro-level picture of ground water in different hydro-geological settings of India by using modern techniques like heli borne geophysical surveys, Geographic Information System (GIS) based thematic maps, ground water modelling and real time digital water level monitoring. The scheme also sought for PGWM through collaborative approach, involving Central and State organisations, research institutes, Panchayati Raj Institutions (PRIs), Non-Governmental Organisations (NGOs) and local community to enable the community and stake holders to monitor and manage ground water themselves.

The broad objectives of the GWMR scheme (2012-17) were as under:

1. Aquifer mapping for delineation of aquifer disposition in three dimension along with their characterisation on 1:50,000 scale in 8.89 lakh sq.km and further detailing up to 1:10,000 scale in some of the vulnerable (Over-exploited, Critical, Semi-critical) areas. Prior to this, the mapping had been done (before May 2013) at a scale of 1:250,000 and in two dimension scale.
2. Formulation of Aquifer Management Plan to quantify water availability and water quality in various aquifers for facilitating sustainable management of ground water resources at regional and local level through participatory management approach.
3. Capacity building of functionaries of PRIs, local community and grass root workers.
4. Up-gradation of technological capabilities and infrastructure of the CGWB to align with proposed aquifer mapping and participatory management of ground water approach.
5. Regulate and control ground water development.

The EFC approved (March 2018) continuation of the scheme for 2017-20 at an estimated cost of ₹ 992 crore. However, PGWM⁶², which was one of the components of GWMR scheme during the XII Plan Period was dropped from the scheme. Activities to be carried out during 2017-2020 under GWMR scheme were (a) National Aquifer Mapping and Management Programme; (b) Ground Water Monitoring, Resource Assessment, Regulation, Information Dissemination, etc. including Workshops, Seminars, Technical assistance to State and Central Organisations, etc.; and (c) Strengthening of infrastructure for technological up-gradation (Machinery & Equipment) through procurement of Hydro-geological, Geophysical and Chemical equipment, Scientific Software, Computers, Drilling machines, Motor Vehicles and ancillary equipment.

Audit observations on the implementation of GWMR scheme are discussed in this chapter.

4.2 Financial performance of GWMRS

The approved outlay, Budget Estimate (BE), Revised Estimate (RE) and Actual Expenditure under each component of the Scheme during 2012-19 are shown in Table 4.1.

⁶² The activities of PGWM were stated to be included under a proposed new scheme titled Atal Bhujal Yojana (ABHY). Thus, no activities were undertaken towards Participatory Ground Water Management.

Table 4.1: Financial information of GWMR Scheme*(Amount in ₹ crore)*

Component	Approved outlays (2012-19)	Budget Estimate (2012-19)	Revised Estimate (2012-19)	Actual Expenditure (2012-19)
Aquifer Mapping	2,585.58	1,934.91	1,115.19	1,006.53
Ground Water Regime Monitoring, Assessment, Regulation, Publication, Seminars, Awards, etc.	543.73			
Technological Up-gradation	346.35	414.57	176.58	103.2
Participatory Ground Water Management	575	0	0	0
TOTAL	4,050.66	2,349.48	1,291.77	1,109.73

(Source: Figures provided by CGWB)

It is seen from Table 4.1 that against approved outlay of ₹ 4,050.66 crore, the actual expenditure under GWMR during 2012-19 was ₹ 1,109.73 crore which was only 27 per cent of the approved outlay. The limited expenditure and inability to meet the financial targets envisaged under the scheme indicates deficient performance. The achievement of physical targets set during the period 2012-19 is discussed in the subsequent paragraphs.

4.3 Aquifer Mapping

Aquifer mapping is a scientific process wherein a combination of geologic, geophysical, hydrologic and chemical field and laboratory analyses are applied to characterise the quantity, quality and sustainability of ground water in aquifers. An accurate and comprehensive micro-level picture of ground water in India through aquifer mapping in different hydrogeological settings would enable robust ground water management plans at the appropriate scale to be devised and implemented. This would help in achieving drinking water security, improved irrigation facility and sustainability in water resources development. CGWB had also published (2013) "Manual on Aquifer Mapping" which attempted to evolve uniform protocols for various activities such as collection and compilation of available information on aquifer systems, demarcation of their extents and their characterisation, analysis of data gaps, generation of additional data for filling the identified data gaps and preparation of aquifer maps at the desired scale. CGWB had identified an area of 24.8 lakh sq. km. for Aquifer mapping.

4.3.1 Targets of aquifer mapping and achievements

(i) One of the key objectives of NAQUIM (2012-17) was delineation of aquifer disposition in three dimensions along with their characterisation on 1:50,000 scale in 8.89 lakh sq. km. and further detailing up to 1:10,000 scale in 0.67 lakh sq. km. of the vulnerable (Over-exploited, Critical, Semi-critical) areas. During the 4th meeting of National Inter-Departmental Steering Committee (NISC) held in September 2016, the

target areas for NAQUIM were revised and reduced from 8.89 lakh sq.km. to 5.25 lakh sq. km. to be covered by March 2017. Against this, CGWB covered an area of 6.31 lakh sq.km. during the XII Plan period.

During 2017-2020, CGWB targeted aquifer mapping and formulation of Management Plans on 1:50,000 scale for 6.60 lakh sq. km. The balance area of 11.90 lakh sq. km⁶³ was to be covered in subsequent years. The scheme aimed to cover the entire country with special focus on challenges confronting the ground water sector such as ground water depletion, water quality issues related to geogenic and anthropogenic factors, water stress areas in terms of volumetric availability, and other issues such as sustainability of springs particularly in the hilly areas, etc. As of September 2020, CGWB had covered an area of 13 lakh sq. km.

Audit observed that CGWB took eight years to cover 52 *per cent* of the total identified area of 24.8 lakh sq. km. Considering the time still required to complete aquifer mapping of the remaining 11.8 lakh sq. km, the Department needs to develop a strategy for completing the work within a reasonable time period.

DoWR,RD&GR stated (September 2020) that the remaining area of 11.8 lakh sq. km. was targeted to be covered by 2023.

(ii) CGWB had finalised Aquifer Mapping Reports in respect of only 6.5 lakh sq. km. (i.e. 50 *per cent* of the area of 13 lakh sq.km. covered) for 29 States/ UTs as of September 2020. The detailed mapping in 1:10,000 scale for 0.67 lakh sq. km. of the vulnerable (Over-exploited, Critical, Semi-critical) areas was not done at all. Audit also noticed that this scale of mapping was not included in the scheme for the period 2017-20.

(iii) It was also proposed to prepare micro level plans to facilitate implementation of various supply and demand side interventions to ensure long-term sustainability of local ground water resources. In the first phase, it was proposed to have detailed Aquifer Management Plans for 1,000 such representative Panchayats during 2018-20⁶⁴. The selection of the Panchayats was to be made on the basis of the stage of ground water development, ground water contamination profile and ground water development prospects including requests of the State agencies to address any specific ground water related problems.

As of September 2020, only 329 micro level management plans had been prepared. Thus, the target to prepare micro level plans to empower 1,000 representative Panchayats for sustainable management of ground water resources during 2018-20 remained unachieved.

⁶³ 24.8 lakh sq. km. minus area of 6.31 lakh sq. km. covered during XII Plan period and 6.60 lakh sq. km. targeted during 2017-20.

⁶⁴ 350 Panchayats during 2018-19 and 650 during 2019-20.

The Department stated (October 2019) that CGWB was trying to achieve the targets in spite of significant shortage of human resources. The Department had recently hired M/s WAPCOS Ltd.⁶⁵ as Project Monitoring Consultant to undertake some of the activities such as tendering/supervision, etc. in a time-bound manner, which was likely to help CGWB to concentrate more on R&D activities.

The issue of shortage of human resources has already been discussed in Chapter 2. As recommended by Audit at the end of Chapter 2, the Department needs to address these constraints by also engaging with other experts and going for strategic partnerships to ensure smooth functions in processes of ground water management and governance.

4.3.2 Incomplete aquifer mapping reports

The systematic mapping of an aquifer encompasses a host of activities such as collection and compilation of available information on aquifer systems, demarcation of their extents and their characterisation, analysis of data gaps, generation of additional data for filling the identified data gaps and finally, preparation of aquifer maps at the desired scale. As per the EFC (2012-17), the scientific work⁶⁶ had to be executed using available in-house resources and also be outsourced.

The GWMR scheme envisaged that CGWB (through its Regional Offices) would identify data gaps for 8.89 lakh sq. km. by 31 March 2015. Further, as per the Manual on Aquifer Mapping of CGWB, once the collection, compilation, data gap analysis and additional data generation to fill the identified data gaps are completed, the final and most important step was the preparation of the aquifer map, which brings together various aspects of the aquifers and their ground water resources in the form of a map, which can then be used by the stakeholders to plan their sustainable development and management.

Out of 18 Regional Offices of CGWB, only five had submitted the data gaps in time. The work to be executed through outsourcing was initiated only in April 2016 and was therefore badly delayed (discussed in detail in para 4.2.3). Consequently, though mapping reports for 6.3 lakh sq. km. were finalised, additional data⁶⁷ to fill the identified data gaps was not generated. As such, all these aquifer mapping reports were incomplete and their utility to the stakeholders to plan their sustainable development and management was limited. Moreover, CGWB did not furnish the details of the amount of data⁶⁸ required, data available and the data gaps in these aquifer mapping reports. Further, Audit noticed that the parameters as well as

⁶⁵ A Public Sector Enterprise under DoWR, RD&GR

⁶⁶ Geologic, geophysical, hydrologic and chemical field and laboratory analyses

⁶⁷ The data gaps indicate the data which is not available to prepare comprehensive aquifer mapping reports. The additional data is the data required to fill up such data gaps.

⁶⁸ Pertaining to number of wells, VES, Soil Infiltration Studies, Aquifer Parameters, Recharge Parameters etc.

number of monitoring stations were inadequate as illustrated in one case in Box 4.1 below.

Box 4.1: Illustration from Report on Aquifer Mapping and Ground Water Management of Jodhpur, Rajasthan

Para 1.4 of the Report on Aquifer Mapping and Ground Water Management of Jodhpur, Rajasthan prepared by CGWB documents that validation and geo-referencing of the location coordinates, lithologs and hydrogeological data is needed and State GWD data is lacking in aquifer parameters. It was also recorded that available data was limited largely to State Highways and main roads only. The report mentioned that in order to get a clear 3D hydrogeological geometry of the aquifer system and water level behaviour, there was a need to generate more data by Groundwater exploration, Vertical Electrical Sounding (VES) and to establish more numbers of monitoring stations for better understanding of the ground water regime behaviour in terms of quantity and quality.

DoWR, RD&GR stated (September 2020) that aquifer maps and management plans for the areas covered during 2012-17 were prepared using existing data and new data generated through in-house activities. Only the part of data generation envisaged through outsourced drilling was delayed due to various reasons. Thus, the maps and management plans were prepared with most of the relevant data like exploratory wells, water level, water quality, pumping tests etc. In view of above, though there was scope for further improvement, the reports can be considered complete. As regards generation of additional data through exploratory drilling, total data requirements in respect of number of exploratory boreholes for covering the entire country had been rationalised to nearly 18,000, of which about 15,000 had already been constructed or are at various stages of construction. Process for outsourcing of construction of the remaining approximately 3,000 wells had already been initiated.

The reply of the Department illustrates that there was scope for further improvement in the aquifer maps and management plans based on the generation of the additional data. However, the reply is silent about the timelines for revision of reports with additional data.

4.3.3 Non preparation of Ground Water models

Ground water models provide a tool to estimate ground water availability for various water use strategies and to determine the cumulative effects of increased water use and drought conditions. A ground water model is a numerical representation of the aquifer system capable of simulating historical and predicting future aquifer conditions. The purpose of the NAQUIM program was to provide an Aquifer Response Model that can be used to develop reliable and timely information on ground water availability for the region to ensure adequate supplies or recognise inadequate supplies over a 15 year planning period. As mentioned in para 4.2.1, CGWB had carried out aquifer mapping of an area of 13 lakh sq.km. as of September 2020. However, 3D modelling was completed only for an area of about three lakh sq. km. only.

CGWB had entered into a Memorandum of Agreement (MoA) with Indian Institute of Technology, Kanpur (IIT) and Indian Institute of Science, Bangalore (IISc) for

Development of Ground Water Flow Models and Preparation of Aquifer Management Plans as shown in Table 4.2 below.

Table 4.2: Ground water modelling work undertaken

Institution	Date of MoA	Sanctioned cost (₹ lakh)	Targeted date of completion	Areas to be covered
IIT	August 2017	93.22	September 2018	81,120 sq.km in Punjab and Haryana and 66,193 sq.km in Bundelkhand region in parts of Uttar Pradesh and Madhya Pradesh
IISc	September 2017	34.10	October 2018	48,294 sq.km in Karnataka

As per the MoA, IIT and IISc were to submit Inception Reports containing detailed work plan and timelines specific to the study area keeping in view the objectives, scope, methodology, timeline and deliverables outlined in the agreement, by November 2017 and December 2017 respectively. Further, Monitoring Committees were to be constituted by drawing officers from CGWB and the two institutions but the timelines for their constitution were not specified in the MoA. The committees would monitor the progress of the work, provide guidance in execution of the study and resolve all technical and administrative issues regarding implementation of the study. However, frequency of monitoring was not prescribed. The Monitoring Committees were constituted in November 2017. The progress of work was as follows:

Work undertaken in Punjab, Haryana and Bundelkhand region by IIT Kanpur:

IIT Kanpur submitted its inception report in April 2018 after a delay of more than five months. The first meeting of the Monitoring Committee was held in May 2018 in which it was observed that the work had not progressed beyond data compilation and conceptualisation stage in Bundelkhand region. The committee suggested that mid-term evaluation of the progress be undertaken at the end of two months from the date of the meeting i.e. in July 2018. The second meeting of the committee was held in December 2018 after a gap of six months, in which progress report of only Punjab region was submitted. The committee observed that the report did not cover all the objectives of MoA, therefore it was considered as an interim report.

Audit observed that one of the major roles of CGWB was to provide relevant data available to IIT Kanpur. Audit observed that there was delay on the part of CGWB in this regard, thereby affecting timely implementation of the project. Due to this, the modelling projects were extended on no cost basis in Punjab and Haryana till November 2018 and in Bundelkhand till February 2019. The final report was yet to be submitted by IIT Kanpur (February 2019).

Work undertaken in Karnataka by IISc:

IISc submitted its inception report in July 2018 i.e. after a delay of more than seven months. The report of IISc was evaluated by an Evaluation Committee and its

comments were sent to IISc (October 2018) with the request to revise the inception report. Some of the shortcoming noticed in the inception report were as follows:

- The inception report was very brief.
- Detailed work plan as per the MoA timelines and the conceptual model framework are missing in the inception report.
- The report does not include details of data availability, source, format, scale etc. as well.
- The document does not elaborate the work done and does not provide any insight into the future work plan or timelines.

Audit observed that CGWB was yet to receive the revised inception report from IISc (February 2019). There were two meetings of the Monitoring Committee in May 2018 and December 2018. However, progress of the project remained slow.

Thus, ground water modelling work undertaken by CGWB was not completed as scheduled. As such, CGWB could not provide a tool to estimate ground water availability for various water use strategies and to determine the cumulative effects of increased water use and drought conditions.

DoWR, RD&GR stated (September 2020) that ground water modelling for ~3 lakh sq. km was expected to be completed by 2022. The fact remained that CGWB would still be falling short in the preparation of 3D models for the remaining areas that had already been mapped.

4.3.4 Delay in undertaking outsourcing works

In view of limited in-house human resources and infrastructure, CGWB had proposed (May 2013) the outsourcing of various tasks to take-up the physical targets envisaged in the XII plan. The year wise financial targets for outsourcing works under GWMR scheme are shown in Table 4.3.

Table 4.3: Outsourcing works under aquifer mapping

Activity	Years (Amount in ₹ crore)					
	2012-13	2013-14	2014-15	2015-16	2016-17	Total
Data Generation (Hydrogeological, Geophysical, Chemical, Hydrological etc)- In house and Outsourcing	-	16.57	61.86	273.62	390.92	742.97
Ground Water Exploration-through drilling agencies	-	34.95	80.99	176.61	496.53	789.08

During 2017-18, CGWB outsourced 14 works to various private firms and two works to WAPCOS at a total cost of ₹ 313.78 crore for construction of Exploratory and Observation wells.

Audit observed that CGWB initiated the file for outsourcing the work of exploration (wells) only in April 2016 i.e. in the last year of the XII plan period. For next 12 months

(till March 2017), CGWB could not finalise the proposal. As a result, the additional data required to fulfil the identified data gaps could not be generated on time and the targets stipulated by the CCEA for XII plan could not be achieved. Further, only one project was completed within original time schedule. Six works were completed after a delay of 86 to 558 days. One project was foreclosed by the Department and another was rescinded. Five works were still continuing with delay ranging between 92 to 626 days. A total amount of ₹ 194.39 crore was released for the 12 works as of October 2019. The details of the outsourced works are given in the **Annexure 4.1**.

Delay in completion of work identified under aquifer mapping would delay the assessment of ground water and therefore affect the development of ground water management plans.

The Department stated (October 2019) that the total data requirements were finalised after the reprioritisation of areas (5.25 lakh sq. km.) in September 2015 and completion of the data gap analysis. Department also attributed the delay to handing over of sites in phase wise manner as per the clearances received from the State government, non-commencement of works by the contractor, idle rigs for wanting of casing pipes, etc.

The reply was, however, silent about the delay (till April 2016) on part of CGWB in initiation of proposal for outsourcing works. The fact remained that delay in completion of outsourced works affected the achievement of targets of aquifer mapping under GWMR scheme.

4.3.5 Designing of web-based system

The Manual on Aquifer Mapping stipulated that the GIS data prepared under the project should be stored in such a way as to provide direct access to users without use of proprietary software through a suitably designed web-based system for easy dissemination of the information.

Audit observed that CGWB had published reports, but had not provided direct access to users by designing any web-based system for easy dissemination of the information regarding the aquifer mapping carried out during 2012-18.

The Department stated (October 2019) that the aquifer maps and management plans at present were being disseminated in the (i) Reports-that contain the maps and (ii) The AIMS⁶⁹ web-page (aims-cgwb.org) where the maps were posted and that CGWB was planning to develop web-based system for better dissemination of the outputs.

Audit however, noticed that the aquifer maps disseminated on the system were only in the form of single view three dimensional images. As such, the purpose of preparing the data in 3-D was defeated.

⁶⁹ Aquifer Information and Management System (AIMS) is being developed through the Rajiv Gandhi National Ground Water Training and Research Institute, Raipur.

DoWR, RD&GR acknowledged (January 2020) that aquifer mapping reports need to be published for public consumption and presented in a manner that is easily interpreted and utilised by even the common users and that efforts would be made in this direction.

4.3.6 Supervision and guidance by Project Management Unit

A dedicated Project Management Unit (PMU) was to be set up in CGWB to manage, supervise and provide technical guidance to help project implementation. The Terms of Reference of the PMU were to supervise and provide technical guidance in implementation of NAQUIM, monitoring of various activities envisaged under NAQUIM and to assist in matters related to project implementation. The PMU consisted of a Coordinator and three members and was to work under the overall supervision and guidance of Member, Survey, Assessment & Monitoring (SAM). Three officers of CGWB had to assist the PMU in day to day activities.

Audit observed that no timeline for constitution of the PMU was prescribed by CGWB. The PMU was constituted by CGWB in August 2015, i.e. after a delay of more than three years since initiation of the scheme in 2012.

CGWB informed (July 2018) Audit that all the three members were transferred/promoted (between September 2015 to November 2017) and one of the officers assigned to assist PMU was also deputed to another wing. The assignments of the PMU were undertaken by the coordinator of PMU with assistance from the remaining officers. Audit observed that no efforts were made to replace the officials for proper functioning of PMU. As a result, the PMU could not supervise and provide technical guidance in implementation of NAQUIM and get continuous feedback about constrains and bottlenecks in implementation of various activities and anticipated outsourcing work of data generation.

While DoWR, RD&GR reiterated (October 2019) that the members of PMU had been transferred/ promoted it remained silent about the action taken to provide substitutes for the transferred/promoted officials.

4.3.7 Action by State Governments on Aquifer mapping reports

The involvement of State machinery including various departments, was essential if the Aquifer Management Plans were to be implemented. CGWB was to involve State Agencies in Aquifer Mapping and implementation of Aquifer Management Plan activities. Of the 201 reports included in the programme, Aquifer mapping reports of only 168 districts were shared with District Administration till November 2019. From the information available in respect of 27 States/UTs, it was seen that no action was taken by 14 States⁷⁰ on the recommendations made in the reports. In one State

⁷⁰ Arunachal Pradesh, Assam, Bihar, Chhattisgarh, Dadra & Nagar Haveli, Jammu & Kashmir, Jharkhand, Maharashtra, Manipur, Meghalaya, Nagaland, Odisha, Telangana and Uttarakhand.

(Gujarat) the report of CGWB was yet to be approved by the State agency. A few States reported 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 (Karnataka and Maharashtra), insufficient information in the reports (Punjab, West Bengal), etc. due to which the States were unable to implement the recommendations made in the reports. The remaining States had reported partial implementation of the recommendations of CGWB. The State wise Audit observations in respect of sampled reports and constraints faced by the State agencies are given in the **Annexure 4.2**.

4.4 Participatory Ground Water Management

According to the National Water Policy (2012), declining ground water levels in over-exploited areas needed to be arrested by introducing improved technologies of water use, incentivising efficient water use and encouraging community based management of aquifers. The EFC Note for GWMR scheme, approved in August 2013, stated that Participatory Ground Water Management (PGWM) required a coordinated effort involving Government Departments, research institutes, PRIs, civil society organisations and the stakeholders at the village level who would guide collective sharing and use of ground water based on a careful understanding of the storage and transmission characteristics of different aquifer units. Two levels of programme implementation were envisaged namely, programme facilitation and participatory outreach programme for project delivery to the end users.

The programme facilitation role was to be played by DoWR, RD&GR, CGWB and State Ground Water Resource Centres (SGWRC). The focus of the facilitation would be to build the capacities of managers, planners, technocrats on the concept of PGWM and Demand Management. Facilitation included arrangements for project implementation involving the State Implementing Partners (SIPs) and District Support Organisations (DSOs). In both cases, the national and State level authorities were expected to act as facilitators for the delivery of project services. National State and District Level facilitation centres were envisaged so that community workers/volunteers would be trained in collection of primary hydro-geological data and periodic monitoring of wells. These grass root workers would also sensitise villagers about the ground water trends, optimal water usage and quality of ground water with the aim of planning water-use as per the water budget.

For the purpose, CGWB was to hire services of a Technical Support Agency (TSA) primarily to build capacities of SIPs which, in turn, were to form partner DSOs at District level through CGWB and TSA. The TSA was to deliver a set of consistent project management functions and technical services (activities, programmes, guidelines, farmer water school methodologies etc.) at State level.

The Participatory Outreach Programme for Project Delivery for the End Users was to consist of programmes such as National Level Brain Storming Programmes, State Level

Awareness Programmes, District Level Orientation Programmes, Skill Development Programmes for District Support Groups, Panchayat Raj Institution Sensitisation - Block level discussion for priority Aquifer Management Units/Blocks, Induction programmes for knowledge development of grass root level workers enabling them to understand the aquifer management plan and their implementation modalities, Skill development for handling and use of water level and quality monitoring equipment and organising Farmers Water School/Community participation Camps.

An outlay of ₹ 575.38 crore⁷¹ was provided for the period 2013-17 but no expenditure was incurred. As per the approved CCEA note, during the year 2014-15, CGWA had to ensure selection of National level TSA, SIPs in 10 States, District Support Cell and Contractual Hiring of grass root ground water workers by SIP/DSO. However, even after lapse of four years (2014-18), CGWB could not finalise the proposal for selecting these agencies.

Audit observed that though approval of the scheme was communicated in September 2013, the proposal for PGWM was initiated only in March 2014. CGWB took 11 months to prepare the draft terms of reference (TOR) for hiring of TSA in 10 States and sent the same to DoWR,RD&GR in February 2015. DoWR,RD&GR sought (March 2015) some additional information for further consideration, which was provided by CGWB in March 2016, i.e. after 12 months. No further correspondence was done with DoWR,RD&GR on the proposal. CGWB initiated (March 2016) another proposal for implementation of PGWM in Lalitpur and Jhansi Districts of Bundelkhand Area of Uttar Pradesh, which was also not finalised. Eventually, the PGWM component was dropped for continuation in the GWMR scheme for 2017-20.

Due to slow progress of work by CGWB, no meaningful work was done under PGWM and the objective of ground water management at grass root level through sensitisation of villagers about the ground water trends, optimal water usage and quality of ground water, as envisaged by the National Water Policy (2012) could not be achieved.

The Department accepted (October 2019) that the envisaged activities under the Participatory Ground Water Management could not be completed but added that the component was dropped from the subsequent EFC memo of 2017-20 and was being taken up as a separate scheme on participatory ground water management through the Atal Bhujal Yojana (ABHY).

However, unlike the PGWM, the ABHY that has been launched by DoWR,RD&GR in December 2019 will be implemented only in selected locations in seven States⁷² covering 8,350 Gram Panchayats in 78 districts. So, both in scale and size, the ABHY is

⁷¹ ₹ 332.15 crore for facilitation, ₹ 137.23 crore for outreach programme and ₹ 106 crore for travel, overheads, etc.

⁷² Gujarat, Haryana, Karnataka, Madhya Pradesh, Maharashtra, Rajasthan and Uttar Pradesh

not a replacement for PGWM. The fact remained that PGWM, though envisaged under GWMS was not executed for more than seven years.

4.5 Technological Up Gradation and Capacity Building

Keeping in view the emerging challenges of ground water in the country, CGWB felt the need to upgrade its techniques and equipment. The technological advancements being utilised worldwide were to be adopted by CGWB to upgrade its infrastructural and human resource capabilities and bring CGWB at par with international standards for better management of ground water resources. Accordingly, a benchmarking of various activities of CGWB with international best practices was done by international experts from the United States Geological Service (USGS) in 2012.

In December 2012, the Expert Group submitted its report to DoWR, RD&GR, which constituted a committee to review this benchmarking report and to accept or modify its recommendations. The committee submitted its report to DoWR, RD&GR in August 2013.

The recommendations were of considerable importance looking into future infrastructure and human resource requirements to improve upon the efficiency and output from CGWB. The major recommendations from this benchmarking exercise included technological up-gradation including use of advanced equipment, institutional strengthening and capacity building. However, it was observed that CGWB did not take adequate action in these areas as detailed in the paragraphs below.

4.5.1 Procurement of equipment

On the basis of recommendations of benchmarking exercise, CGWB finalised technological up-gradation component in the GWMR Scheme (2012-17). As per the approved report of the EFC, funds amounting to ₹ 305 crore were approved for technological up-gradation in CGWB. Under this up-gradation, various equipment (Hydrological, Geophysical, Chemical, Drilling) and software were to be procured to help achieve the objectives of the scheme.

It was observed that as of March 2019, CGWB could procure equipment and software amounting to only ₹ 107.85 crore (35.34 per cent) against ₹ 305.17 crore allocated in the EFC (Details are shown in **Annexure 4.3**). Against proposed 37 Drilling Rigs, which were important for digging monitoring wells, only 17 rigs could be procured. Out of these 17 rigs, 15 were operational (October 2019).

The Department stated (October 2019) that there was a delay in tendering due to shortage of staff and lack of tendering skills. CGWB had earlier stated (October 2018) that the rest of the equipment/software would be procured by 2019-20.

As a result of the delay, the equipment/software intended to be used during XII Plan is now expected to be received only by 2019-20 i.e. end of the next plan (2017-20).

4.5.2 Capacity Building

The Expert Group's Report on Benchmarking gave (December 2012) 12 recommendations relating to capacity building in CGWB. All the recommendations were accepted (August 2013) for implementation by the Review Committee. However, out of 12, no action was taken in respect of four recommendations by CGWB as shown in the Table 4.4.

Table 4.4: Status of recommendations of Expert Group on capacity building

Sl. No.	Recommendation	Remarks of the Review Committee	Status
1.	Selected CGWB officers/staff should attend international conferences and present important findings.	Accepted.	No such conferences were co-ordinated by CGWB's training institute.
2.	A mentorship programme should be developed between CGWB and international experts to provide one-on-one training for specialised hydro-geologic techniques and applications.	Accepted.	No such programmes undertaken.
3.	Attendance at scientific conferences is an especially important aspect of capacity building.	Accepted. A separate budget provision may be made for it.	No separate budget provision was made.
4.	CGWB should provide references on its website for self-training in the field of hydrogeology.	Accepted. In addition, references pertinent to Artificial Recharge and Drilling Technologies should also be put on website.	No references were found on CGWB's website.

Thus, in spite of these recommendations being of considerable importance for CGWB with respect to its future infrastructure and human resource requirements, CGWB failed to take action on some of the significant recommendations.

The Department accepted (October 2019) that recommendations were not implemented completely. It further added that CGWB would make all efforts to implement these recommendations.

4.6 Schemes/initiatives of States/UTs for management of Ground Water

To tackle the problems affecting quality and quantity of ground water, States/UTs implemented various schemes for water supply, irrigation, ground water recharge, effluent treatment, etc. The initiatives of a few States such as Andhra Pradesh, Delhi, Gujarat and Telangana have been effective in management of ground water. These cases are discussed in the Box 4.2.

Box 4.2: Successful initiatives of State Governments in management of Ground Water**Andhra Pradesh****Geo-tagging of existing borewells**

The State was monitoring the ground water levels in the 1,254 piezometers fitted with Digital Water Level Recorders (DWLRs) that provide data on a real time basis, which was available online⁷³. Further, in view of the increased demands and stress on groundwater aquifers, the State Government had geo tagged all existing agriculture bore wells for planning site specific groundwater recharge plans and better regulation of ground water extraction.

The ground water availability increased during 2016-17 even though rainfall during 2016-17 was 29 *per cent* less than the normal. However, in the absence of data on net ground water availability and rainfall deviation for the previous years 2013-14, 2014-15 and 2015-16, Audit could not establish a relationship between the rainfall and the ground water quantity. the State Government stated (January 2019) that the reasons for change in ground water quantity were (i) implementation of Neeru-Chettu programme, i.e., water conservation activity and (ii) transfer of water from surplus to deficit basins.

Delhi**Installation of Rain Water Harvesting System**

DJB installed 288 Rain Water Harvesting (RWH) systems in their own structures since 2003 up to March 2019. These RWH systems have annual ground water recharge potential of about 122 million litres. In order to promote RWH, DJB offered 10 *per cent* rebate in the water charges levied to consumers if RWH system was installed in their buildings having plot size of more than 100 sq. m. Further, DJB also provided rebate to the extent of 15 *per cent* in the water charges to the consumers who had installed both RWH system and recycling plant. However, in the buildings of plot size more than 500 sq. m, DJB levies penalty by increasing water charges to the extent of 50 *per cent* if consumers did not install RWH system. A penalty of ₹ 29.64 crore was imposed on 11,271 consumers on plots/ properties of 500 sq. meters for non-installation of RWH system. Total rebate of ₹ 14.24 crore had been given in monthly water bills to 1,007 consumers of DJB up to July 2018.

Thus, the scheme appeared to be effective to an extent in encouraging consumers to install RWH systems. However, the larger number of consumers paying penalty for not installing RWH systems indicates that DJB needs to take sterner measures to impose implementation of RWH systems by its consumers.

Utilization of treated effluent

To discourage ground water utilisation by large institutions/public departments/private agencies, DJB issued public notices⁷⁴ whereby treated effluent could be taken by any institution/department by laying pipelines and making pumping arrangement from the Waste Water Treatment Plant to intended locations by the agencies/individuals at their own cost. DJB would facilitate the agencies to lay the conveyance systems at the cost of the beneficiaries. Operation and maintenance cost of the conveyance would also be borne by the beneficiaries at a nominal rate of ₹ four per 1,000 litres. At present, about 89 million gallons of treated effluent⁷⁵ was being utilized per day by various agencies such as Central Public Works Department (CPWD), DJB's STPs, Delhi Transport Corporation (DTC), Delhi Development Authority (DDA) etc. for irrigation, washing, horticulture and industrial usage.

Thus, the initiative by DJB has been effective to an extent in utilisation of treated effluents instead of ground water.

⁷³ <http://coreuat.ap.gov.in/cmdashboard/UserInterface/GroundWater/GroundWaterReports.aspx>

⁷⁴ DJB issued public notification on 18.01.2014, 25.04.2018, 12.05.2018 and 09.07.2019

⁷⁵ Out of a total of 490 million gallons of treated effluents generated per day (31 March 2019)

Gujarat

Construction of Khet Talavadi, Bori Bandh and check dams

The State Government has undertaken schemes for water conservation such as Khet Talavadi (farm ponds), construction of Bori Bandh (small dams using sand bags) and construction of check dams. As on March 2019, 3,21,722 Khet Talavadi, 3,59,657 Bori Bandh and 1,84,933 check dams had been constructed in the State. These initiatives have resulted in increase of recharge of ground water about 700 Million Cubic Meter/year in 2017 which is about 50 *per cent* increase in the Utilizable ground water recharge as compared to 2002. The Stage of Ground Water development has improved from 75 per cent to 64 per cent; Number of Over-exploited blocks have reduced from 30 in 2002 to 25 in 2017; number of Critical blocks reduced from 12 to 5 and Semi Critical blocks reduced from 63 to 11. The number of Safe blocks increased from 104 in 2002 to 194 in 2017.

State wide drinking water supply grid

To reduce dependency on ground water and provide safe drinking water, the State Government implemented State wide drinking water supply grid, based on Narmada Water and other surface sources. A total of 17,843 villages and 350 towns were planned to be covered under Narmada based Water Grid and other source based Water Grids. Of this, 13,107 villages and 207 towns were covered as of March 2019.

Of the selected four districts viz. Mehsana, Banaskantha, Kutch and Dahod, all villages of Kutch and Mehsana districts; 1,112 villages (out of 1,234 villages) and 192 villages (out of 691 villages) of Banaskantha and Dahod districts were covered under Narmada Based and other surface sources water supply project. Grid based drinking water supply in 122 villages of Banaskantha district and 499 villages of Dahod district were still to be covered. Thus, the targets of Kutch, Mehsana and Banskantha were largely achieved.

Installation of Micro Irrigation system (MIS) was made mandatory in March 2012 for getting electricity connection for agriculture purpose for better utilisation of water resources. The GWRDC had implemented MIS on 808 tube wells (December 2018) for irrigation purpose.

Sujalam Sufalam Jal Abhiyan

The State Government has launched Sujalam Sufalam Jal Abhiyan in 2018 with an aim to spread water conservation activities with people's participation. The objectives of the schemes are to enhance storage capacity of existing water bodies like reservoirs, check dams, village tanks, forest ponds, farm ponds; and de-silting and construction/repairing of existing check dams, rejuvenation of rivers, recharging Ground Water, etc. Activities such as deepening of ponds, desilting & repair of check dams and cleaning of canals and drains have been undertaken, which have resulted in increase of ground water level up to 5-7 feet due to increase in water storage.

Telangana

Telangana Government initiated (2014-15) "Mission Kakatiya" programme for revival and restoration of about 46,530 minor irrigation tanks in the state, in five phases. Impact assessment of the scheme was done in nine selected water basins categorised as over-exploited basins. It was seen that the ground water resources of these basins were increased to 11.4 TMC (as per GEC 2016-17) from 10 TMC in 2012-13. The stage of ground water development has also shown a decrease of eight *per cent* in the State. Further, after implementation of the scheme the overall categorisation of these 'Over-exploited' basins were changed to 'Critical'.

Deficiencies observed in schemes of four selected States are discussed below.

4.6.1 Bihar

4.6.1.1 Incomplete schemes

Work related to construction of eight Mini Water Supply Schemes in Arsenic affected villages of Begusarai was allotted to M/s Punj Lloyd Ltd. (April 2010) for a duration of 12 months at a sanctioned cost of ₹ 1.74 crore. An amount of ₹ 1.41 crore was paid to the agency till March 2014. Work was, however, rescinded by the department in January 2015 due to non-completion. Revised technical sanction of ₹ 1.41 crore for the remaining work was approved (September 2017) but the tender process was not initiated by the department as of February 2019. Thus, expenditure incurred on the schemes did not serve any purpose and the population of Arsenic affected habitations remained deprived of safe drinking water.

4.6.1.2 Scheme for irrigation by using Ground Water

With an aim to get more farmers to construct private tube wells by for irrigation purpose, the State launched subsidy based Nizi Shatabdi Nalkup Scheme in July 2015. As per one of the provisions of the guideline of this scheme, selection of blocks for construction of shallow/ deep tube well should be based on the data of ground water level provided by district administration and CGWB.

It was seen that 348 tube wells had been constructed (up to December 2018) in six⁷⁶ blocks that had been declared as semi-critical as per the Dynamic Ground Water Resource Report 2013. This indicates that ground water level data was not analysed before recommending the construction proposals of farmers.

Minor Irrigation Division stated (February 2019) that after getting information regarding semi-critical and critical zone of some blocks, applications were not sanctioned for boring/drilling of tube wells in these blocks.

The reply is not acceptable as the Division was to allow blocks for construction of shallow/ deep tube well duly considering the available data regarding ground water level. However, it did not follow the guidelines of the scheme while sanctioning subsidy.

4.6.2 Delhi

DJB submitted (August 2018) a Ground Water Recharge action plan to the National Green Tribunal (NGT). As per the proposed action plan, DJB would trap or stop sewage flow into 12 identified water bodies. It would either use the treated effluent from a nearby decentralised Sewage Treatment Plant (STP) plan for rejuvenation of water bodies or install bio-remediation⁷⁷ STP's to clean waste water flowing into the water

⁷⁶ Naokothi (15), Bhagwanpur (5), Gaya sadar (3), Nagarmausa (30), Rajgir (132) and Silao (163)

⁷⁷ The use of microorganism metabolism to remove pollutants.

bodies. No completion date was stipulated in the action plan to complete the proposed project and the project was still at the initial stage. Inclusion of time bound milestones in the project plan may serve to implement the plan in a more effective manner after its approval.

4.6.3 Telangana

Although the “Mission Kakatiya” programme of the Telangana Government resulted in increase of ground water resources and decrease in stage of ground water extraction as discussed in the Box 4.2, it was observed that certain other schemes of the State Government were actually promoting ground water extraction. As per the Annual General Report of Ground Water Department for the year 2017-18, there were 471 and 609 bore wells drilled under Scheduled Castes Special Development Fund (SCSDF) and Scheduled Tribes Special Development Fund respectively. Further, it was noticed that although WALTA Guidelines limits the depth of bore wells to 120 m, depth of 128 bore wells ranged between 122 m to 150 m. It was also seen that 36 out of 471 bore wells established under SCSDF Scheme were drilled in ‘notified’ villages.

The State Government needs to ensure that the objectives of its various schemes are consistent with the overall goal of improving the ground water scenario in the State.

The State Government stated (August 2019) that the drilling of bore wells beyond the permissible limit and in over-exploited areas was taken up after obtaining permission from the competent authority. The reply was not acceptable as the State Act/Rules or Guidelines did not provide for any exemptions to such provisions.

4.6.4 Uttar Pradesh

4.6.4.1 State Ground Water Conservation Mission

Government of Uttar Pradesh launched ‘State Ground Water Conservation Mission’ in the State from August 2017 to conserve ground water focusing on the stressed blocks through convergence/integration of the schemes run by the different departments. Ground Water Department (GWD) was nominated as nodal agency and it prepared a consolidated Master Recharge Plan for 271 identified stressed blocks which included activities viz. construction/renovation of check-dams, ponds, recharge structures, etc. During 2018-19, allocation of ₹ 2,059.98 crore was made, against which expenditure of only ₹ 946.42 crore was incurred. Scrutiny revealed that there was shortfall in the activities ranging between 18 *per cent* (renovation of ponds) and 91 *per cent* (construction of check dams). Due to non-completion of various activities, the objective of conserving ground water in stressed blocks was not fully achieved.

4.6.4.2 Shortfall in distribution of sprinklers for drip irrigation

With the objective of reducing groundwater consumption through sprinkler irrigation in over-exploited/critical/semi-critical blocks of the State, the State Government started a programme ‘per drop more crop’ in 2017-18 for distribution of sprinkler sets

for drip irrigation to the farmers of 48 out of 75 districts identified by the State on subsidised rates. Audit noticed that against the target (2018-19) of distribution of 9,135 sprinkler sets costing ₹ 55.63 crore to the farmers, only 3,934 (43 per cent) sprinkler sets amounting to ₹ 24.43 crore to the farmers of 47 districts could be distributed in 2018-19 due to lack of awareness and motivation amongst farmers for use of sprinklers. Thus, the State was falling behind its targets for implementing the use of sprinkle irrigation.

4.6.4.3 Construction of tube wells in banned area for withdrawal of ground water

On the basis of Ground water Estimation Report-2011, the State Government issued order (October 2014) prohibiting construction of new wells in 179 blocks declared over-exploited/critical by CGWB. However, test-check of records of Executive Engineer, Tube well Construction Division, Agra revealed that 28 tube wells were constructed in seven stressed blocks⁷⁸ after the date of issue of notification of the order. The State Government needs to take immediate action against the violation of its orders and also review the situation in the other blocks declared as over-exploited/critical.

4.7 Conclusion

Implementation of Ground Water Management and Regulation Scheme was not accomplished as envisaged. Against an approved outlay of ₹ 4,050.66 crore, expenditure of ₹ 1,109.73 crore only was incurred. CGWB identified an area of 24.8 lakh sq. km. for aquifer mapping against which 13 lakh sq.km was achieved. Against this, 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.

CGWB had not provided direct access to users by designing any web-based system for easy dissemination of the information relating to aquifer mapping. 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.

The objective of ground water management at grass root level through sensitisation of villagers about the ground water trends, optimal water usage and quality of ground water through Participatory Ground Water Management (PGWM) was also not achieved. With the dropping of this component, activities under PGWM that were earlier planned across the entire country will now be implemented through the Atal Bhujal Yojana (ABHY) scheme only in selected locations in seven states.

⁷⁸ Shikohabad of District Firozabad, Chandaus, Khair of District Aligarh, Sasni and Mursan of Hathras, Nidhauri Kalan of Etah and Sahawar of Kasganj.

The report of an Expert Group that conducted benchmarking of various activities of CGWB with international best practices was reviewed by a committee, which made several recommendations in the area of infrastructure and capacity building. CGWB did not take sufficient action on the recommendations of this committee.

While some of the schemes implemented in the States were effective in improving the condition of ground water levels in the States, there were schemes in which the envisaged targets were not achieved and therefore, needed better control and implementation to ensure the desired results.

4.8 Recommendations

1. 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.
2. The Department may develop a strategy for expeditious completion of aquifer mapping and modelling of the identified area within a reasonable time period.
3. 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.
4. 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.
5. 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.
6. 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.
7. 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.

5.1 Introduction

Sustainable development has been defined as development that meets the needs of the present without compromising the ability of future generations to meet their own needs. Sustainable development calls for concerted efforts towards building an inclusive, sustainable and resilient future for people and the planet. The 193 Member States of the United Nations (UN) officially adopted a new sustainable development agenda entitled, “Transforming Our World: The 2030 Agenda for Sustainable Development” at the Sustainable Development Summit held at UN Headquarters in New York in September 2015. This agenda contains 17 Goals and 169 targets. The action for achievement of Sustainable Development Goals (SDGs) started on 1 January 2016 and these are expected to be achieved by 31 December 2030. Of these 17 goals, one goal i.e. Goal 6- ‘Ensure availability and sustainable management of water and sanitation for all’ is related to clean water and sanitation. The targets under this goal are shown in Box 5.1.

Box 5.1: Targets under Goal 6

- 6.1 By 2030, achieve universal and equitable access to safe and affordable drinking water for all;
- 6.2 By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations;
- 6.3 By 2030, improve water quality by reducing pollution, eliminating dumping and minimising release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally;
- 6.4 By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity;
- 6.5 By 2030, implement integrated water resources management at all levels, including through trans-boundary co-operation as appropriate;
- 6.6 By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes;
- 6. a By 2030, expand international co-operation and capacity-building support to developing countries in water and sanitation related activities and programmes, including water harvesting, desalination, water efficiency, wastewater treatment, recycling and reuse technologies; and
- 6. b Support and strengthen the participation of local communities in improving water and sanitation management.



5.2 Activities towards achievement of SDG-6 relating to Ground Water

NITI Aayog has been entrusted with the role to co-ordinate ‘Transforming our world: the 2030 Agenda for Sustainable Development’ (SDGs). NITI Aayog is required to periodically collect data on SDGs and to act proactively to fructify the goals and targets quantitatively as well as by maintaining high standards of quality. Ministry of Statistics and Programme Implementation (MoSPI) undertook a parallel exercise of interaction with the Ministries to evolve indicators reflecting the SDG goals and targets. To achieve these tasks, the draft mapping of the goals and targets vis a vis the Nodal and other Ministries has been carried out in consultation with MoSPI.

For Goal 6, the targets identified by NITI Aayog for DoWR, RD&GR as related to ground water are as shown in Table 5.1.

Table 5.1: SDG Targets relating to Ground Water

Target	Scheme	Concerned Ministry/Department
6.4 By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of fresh water to address water scarcity and substantially reduce the number of people suffering from water scarcity.	Ground Water Management and Regulation	DoWR, RD&GR
6.6 By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes.	Ground Water Management and Regulation	DoWR, RD&GR
6.b Support and strengthen the participation of local communities in improving water and sanitation management.	Not linked*	DoWR, RD&GR

*this target was not linked to a scheme by NITI Aayog

In the background of the mapping of SDGs by NITI Aayog, Audit assessed the status against the relevant targets under SDG 6 from the records of CGWB and DoWR, RD&GR. The observations are as follows.

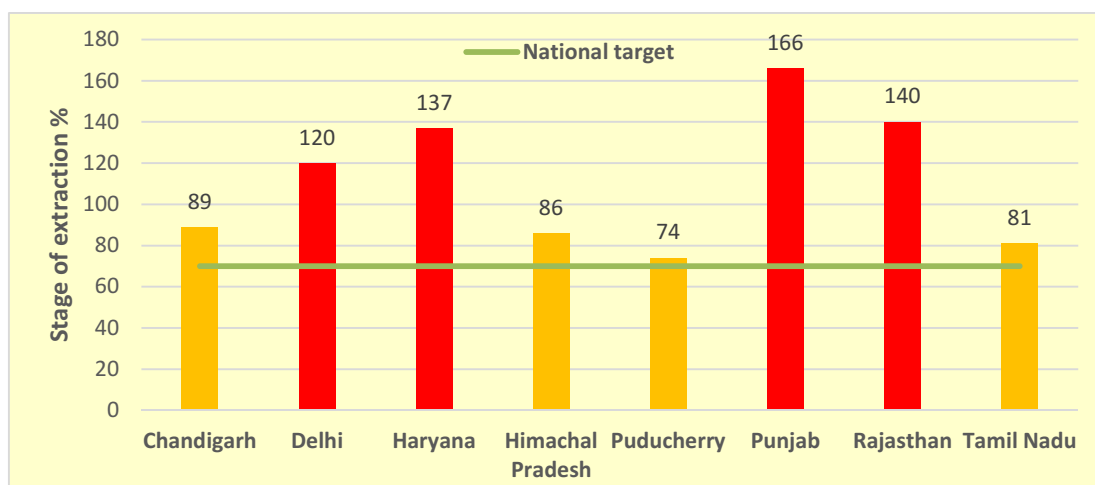
5.2.1 Target 6.4

For target 6.4, NITI Aayog has identified one indicator i.e. ‘percentage annual ground water withdrawal against net annual availability’. As per NITI Aayog, the national target value for this indicator for the year 2030 should be 70. Thus, this target will be achieved if percentage annual ground water withdrawal against net annual availability i.e. Stage of Extraction is 70 *per cent* or less.

As already pointed out in Chapter 2 of this report, over the period from 2004 to 2017, there has been a decline in the percentage of assessment units categorised as safe (<70%), whereas the percentage of blocks categorised as semi-critical, critical and over-exploited (>70%) has steadily increased. The overall stage of extraction of ground water has increased from 58 *per cent* in 2004 to 63 *per cent* in 2017. Audit observed that while this value is 63 *per cent* at national level as per the last assessment of CGWB

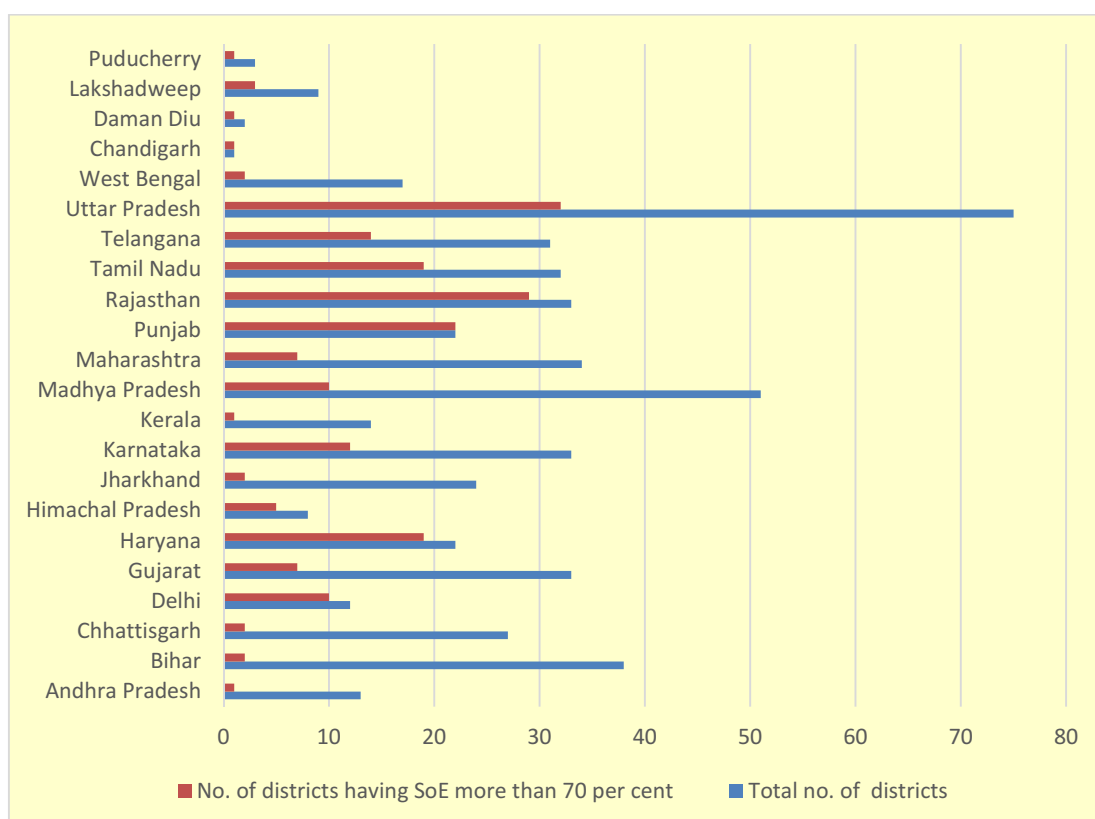
(March 2017), there are eight States/UTs where this value was higher than the target of 70 (Chart 5.1).

Chart 5.1: States having high stage of extraction of Ground Water



At the district level however, it was seen that out of 534 districts in 22 States/UTs, 202 districts had stage of extraction more than 70 per cent (Chart 5.2). The stage of extraction in these 202 districts ranged from 71 per cent to 385 per cent. Details are shown in **Annexure 5.1**.

Chart 5.2: Districts having high stage of extraction of Ground Water



Department/CGWB needs to review the progress made under target 6.4 against the latest assessment of stage of extraction of ground water and plan interventions to address the issues at both Centre and State level.

5.2.2 Target 6.6

Target 6.6 is related to protecting and restoring water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes. CGWB had, as a part of its 'Ground water Management and Regulation Scheme' proposed a component of Aquifer Mapping and Preparation of Aquifer Management Plan during XII Plan (2012-17) which was to be further continued during 2017-20. Under the Aquifer Mapping, a combination of geologic, geophysical, hydro-geologic, hydrologic and water quality data are integrated to characterise the quantity, quality and distribution of ground water in aquifers. Audit observed that of the total identified area of 24.8 lakh sq. km. to be mapped under NAQUIM, 13 lakh sq. km. had been covered as of September 2020 but Aquifer Mapping Reports in respect of nearly 6.5 lakh sq. km. (i.e. 50 *per cent* of the area covered) for 29 States/ UTs only had been finalised. There were other shortcomings also which have already been discussed in Chapter 4 of this report.

Considering the fact that CGWB has not been able to prepare the maps for all the aquifers, Centre and State governments, in the absence of these maps, may not be able to plan and implement strategies to protect these aquifers as per target. It is pertinent to mention that this target is to be achieved by the year 2020.

5.2.3 Target 6 b

Target 6 b is related to supporting and strengthening the local communities in water management. The National Water Policy (2012) also envisages that declining ground water levels in over-exploited areas need to be arrested by introducing improved technologies of water use, incentivising efficient water use and encouraging community based management of aquifers. Accordingly, DoWR, RDGR had, as a part of its 'Ground Water Management and Regulation Scheme' proposed a component of participatory management during XII Plan (2012-17). Participatory management was envisaged to enable the community and stake holders to monitor and manage the ground water as common pool resources themselves. This required a coordinated effort involving Government departments, research institutes, Panchayati Raj Institutions, civil society organisations and stakeholders at village level.

However, as highlighted in Chapter 4 of this report, no action on this component was taken by the Department. Further, in the context of extension of this scheme for 2017-20, this component, which had a pan-India scope was removed and included under another scheme Atal Bhujal Yojana, launched in December 2019, but limited to seven States only. Hence, there was delay in government initiative in respect of this target and as such, target 6 b remains unachieved in respect of ground water.

5.3 Conclusion

The activities of CGWB were not aligned with the targets and indicators set by NITI Aayog for achievement of SDGs. In respect of SDG-6.4 relating to stage of extraction of ground water, although the national level was within the target set, there were eight States/UTs where the levels of the target had been breached. CGWB had not achieved its own targets for mapping of aquifers and was thus, not in a position to enable the States/UTs to plan strategies for protection and restoration of aquifers as targeted under SDG-6.6. CGWB had not taken any action with regard to SDG-6b, as the component relating to this SDG viz. participatory management of ground water was removed from the Ground Water Management and Regulation Scheme and included in another scheme that was launched only in December 2019.

5.4 Recommendations

1. 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.
2. 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.



(SANJAY KUMAR JHA)

Director General of Audit

Environment and Scientific Departments

New Delhi

Dated: 08 October 2021

Countersigned



(GIRISH CHANDRA MURMU)

Comptroller and Auditor General of India

New Delhi

Dated: 18 October 2021

Annexures

Annexure 1.1 (Refer para 1.2.1)

Regional Offices of Central Ground Water Board

1. North West Himalayan Region, Jammu
2. North Himalayan Region, Dharamshala
3. North Western Region, Chandigarh
4. Uttaranchal Region, Dehradun
5. Northern Region, Lucknow
6. Western Region, Jaipur
7. Mid-Eastern Region, Patna
8. Eastern Region, Kolkata
9. North Eastern Region, Guwahati
10. West Central Region, Ahmedabad
11. Central Region, Nagpur
12. North Central Region, Bhopal
13. North Central, Raipur
14. South Eastern Region, Bhubaneswar
15. Southern Region, Hyderabad
16. South Western Region, Bangalore
17. South Eastern Coastal Region, Chennai
18. Kerala Region, Trivandrum

Annexure 2.1 (Refer para 2.1)**Categorization of Blocks/Mandals/Talukas in India (2017)**

Sl. No.	State/ UTs	Total No. of Assessed Units	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	Chhattisgarh	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	129	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	1,166	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	6,828	4,265	62	968	14	312	5	1,158	17	98	1
Union Territories												
1	Andaman & Nicobar	36	35	97	0	0	0	0	0	0	1	3
2	Chandigarh											
3	Dadra & Nagar Haveli	1	0	0	1	100	0	0	0	0	0	0
4	Daman & Diu	2	1	50	0	0	1	50	0	0	0	0
5	Lakshadweep	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	6,881	4,310	63	972	14	313	5	1,186	17	100	1

Blocks- Bihar, Chhattisgarh, Haryana, Jharkhand, Kerala, M.P., Manipur, Mizoram, Orissa, Punjab, Rajasthan, Tripura, UP; **Taluks**-Karnataka, Goa, Gujarat, Maharashtra; **Mandal** - Andhra Pradesh, Telangana; **Districts (Valley)** - Arunachal Pradesh, Assam, Himachal Pradesh, Jammu & Kashmir, Meghalaya, Mizoram, Nagaland; **Islands** - Lakshadweep, Andaman & Nicobar Islands; **Firka**-Tamil Nadu; **Region** - Puducherry

UT - Chandigarh, Dadar & Nagar Haveli, Daman & Diu; **Tehsil**-NCT Delhi

*Uttar Pradesh: There are total 820 blocks and ten cities.

** The Ground Water Resources Assessment as on 2013 has been considered for the State of West Bengal.

Annexure 2.2 (Refer para 2.2)

State-Wise Ground Water Resources of India, 2017 (in billion cubic meter)

Sl. No.	States / UTs	Ground Water Recharge				Total Annual Ground Water Recharge	Total Natural Discharge	Annual Extractable Ground Water Resources	Current Annual Ground Water Extraction				Annual GW Allocation for the Domestic use as on 2025	Net Ground Water Availability for future use	Stage of Ground Water Extraction (%)
		Monsoon Season Recharge from rainfall	Monsoon Season Recharge from other sources	Non-monsoon Season Recharge from rainfall	Non-monsoon Season Recharge from other sources				Irrigation	Industrial	Domestic	Total			
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	0	0.01	0.01	0.03	2.64	0.28
3	Assam	20.22	0.43	7.28	0.74	28.67	4.42	214.26	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	1.86	0.76	1.64	11.57	1	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	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	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	0	0	0.01	0.014	0.34	1.44
18	Meghalaya	1.37	0.01	0.43	0.02	1.83	0.19	1.64	0.03	0	0.01	0.04	0.02	1.59	2.28
19	Mizoram	0.16	0	0.05	0	0.21	0.02	0.19	0	0	0.01	0.01	0.01	0.18	3.82
20	Nagaland	1.65	0.03	0.52	0	2.20	0.22	1.98	0	0	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	2.345	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	1.92	16.77	2.67	0.88	139.88
24	Sikkim	5.20	0	0.43	0	5.63	4.11	1.52	0	0	0	0	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	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	1.29	1.24	0.02	0	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

Sl. No.	States / UTs	Ground Water Recharge				Total Annual Ground Water Recharge	Total Natural Discharge	Annual Extractable Ground Water Resources	Current Annual Ground Water Extraction				Annual GW Allocation for the Domestic use as on 2025	Net Ground Water Availability for future use	Stage of Ground Water Extraction (%)
		Monsoon Season Recharge from rainfall	Season Recharge from other sources	Non-monsoon Season Recharge from rainfall	Season Recharge from other sources				Irrigation	Industrial	Domestic	Total			
	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	0.02	0	0.37	0.04	0.33	0	0	0.01	0.01	0.01	0.32	2.74
2	Chandigarh	0.02	0.01	0	0.01	0.04	0	0.04	0	*	0.03	0.03	0.03	0	89.00
3	Dadra & Nagar Haveli	0.06	0	0	0.01	0.07	0	0.07	0.01	*	0.01	0.02	0.01	0.04	31.34
4	Daman & Diu	0.02	0	0	0	0.02	0	0.02	0.01	0	0	0.01	0	0	61.40
5	Lakshdweep	0.01	0	0	0	0.01	0.01	0.004	0	0	0.002	0.002	0	0	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	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 and Nagar Haveli and Puducherry **The Ground Water Resources Assessment as on 2013 has been considered for the state of West Bengal.

States/UTs having higher stage of extraction than the national average of 63%.

Annexure 2.3 (Refer para 2.4)**Observations wells of CGWB**

Sl. No.	Name of the State/UTs	No of Monitoring Stations for water quality (As on March 2019)
	STATES	
1	Andhra Pradesh	635
2	Arunachal Pradesh	29
3	Assam	389
4	Bihar	729
5	Chhattisgarh	935
6	Delhi	64
7	Goa	93
8	Gujarat	620
9	Haryana	460
10	Himachal Pradesh	114
11	Jammu & Kashmir	266
12	Jharkhand	472
13	Karnataka	1466
14	Kerala	364
15	Madhya Pradesh	1,210
16	Maharashtra	1,719
17	Manipur	0
18	Meghalaya	52
19	Nagaland	25
20	Orissa	1,278
21	Punjab	312
22	Rajasthan	703
23	Tamil Nadu	816
24	Telangana	469
25	Tripura	90
26	Uttar Pradesh	869
27	Uttarakhand	203
28	West Bengal	1,301
	UTs	
1	Andaman & Nicobar	112
2	Chandigarh	16
3	Dadra & Nagar Haveli	18
4	Daman & Diu	14
5	Puducherry	8
	TOTAL	15,851

Annexure 2.4 (Refer para 2.5.1)**State-wise Depth to water Level and Distribution of Percentage of Wells for the Period of November 2018**

Sl. No.	Name of State	No. of wells analysed	Depth to Water Level (mbgl)		Number & Percentage of Wells Showing Depth to Water Level (mbgl) in the Range of											
					0-2		2-5		5-10		10-20		20-40		> 40	
			Min	Max	No	%	No	%	No	%	No	%	No	%	No	%
1	Andaman & Nicobar Islands	102	0.10	6.49	91	89.22	10	9.80	1	1.0	0	0.00	0	0.00	0	0.00
2	Andhra Pradesh	730	0.00	44.27	219	30.00	256	35.07	172	23.6	77	10.55	5	0.68	1	0.14
3	Arunachal Pradesh	10	1.37	7.89	1	10.00	5	50.00	4	40.00	0	0.00	0	0.00	0	0.00
4	Assam	177	0.16	18.20	64	36.16	92	51.98	17	9.60	4	2.26	0	0.00	0	0.00
5	Bihar	654	0.64	13.50	77	11.77	375	57.34	183	27.98	19	2.91	0	0.00	0	0.00
6	Chandigarh	8	2.66	32.82	0	0.00	3	37.50	0	0.00	2	25.00	3	37.50	0	0.00
7	Chhattisgarh	599	1.12	24.10	19	3.17	365	60.93	191	31.89	20	3.34	4	0.67	0	0.00
8	Dadra & Nagar Haveli	17	1.46	10.78	2	11.76	9	52.94	5	29.41	1	5.88	0	0.00	0	0.00
9	Daman & Diu	11	0.55	6.16	5	45.45	4	36.36	2	18.18	0	0.00	0	0.00	0	0.00
10	Delhi	83	1.02	65.00	2	2.41	17	20.48	20	24.10	22	26.51	14	16.87	8	9.64
11	Goa	30	0.78	13.51	5	16.67	14	46.67	8	26.67	3	10.00	0	0.00	0	0.00
12	Gujarat	755	0.00	60.41	115	15.23	177	23.44	242	32.05	157	20.79	58	7.68	6	0.79
13	Haryana	315	0.04	102.00	37	11.75	52	16.51	70	22.22	89	28.25	51	16.19	16	5.08
14	Himachal Pradesh	103	0.31	31.58	30	29.13	36	34.95	19	18.45	14	13.59	4	3.88	0	0.00
15	Jammu & Kashmir	187	0.27	25.95	38	20.32	103	55.08	35	18.72	8	4.28	3	1.60	0	0.00
16	Jharkhand	281	0.64	15.90	21	7.47	145	51.60	107	38.08	8	2.85	0	0.00	0	0.00
17	Karnataka	1,380	0.05	30.70	220	15.94	482	34.93	499	36.16	165	11.96	14	1.01	0	0.00
18	Kerala	1,462	0.10	33.05	263	17.99	445	30.44	602	41.18	141	9.64	11	0.75	0	0.00
19	Madhya Pradesh	1,331	0.00	45.62	74	5.56	395	29.68	571	42.90	256	19.23	34	2.55	1	0.08
20	Maharashtra	1,659	0.01	50.80	180	10.85	571	34.42	586	35.32	282	17.00	39	2.35	1	0.06
21	Meghalaya	23	0.12	4.73	10	43.48	13	56.52	0	0.00	0	0.00	0	0.00	0	0.00
22	Nagaland	3	1.55	3.88	1	33.33	2	66.67	0	0.00	0	0.00	0	0.00	0	0.00
23	Odisha	1,290	0.00	13.69	420	32.56	698	54.11	165	12.79	7	0.54	0	0.00	0	0.00
24	Puducherry	4	1.31	2.85	3	75.00	1	25.00	0	0.00	0	0.00	0	0.00	0	0.00
25	Punjab	261	0.55	43.31	16	6.13	47	18.01	51	19.54	64	24.52	80	30.65	3	1.15
26	Rajasthan	1,034	0.20	130.20	43	4.16	150	14.51	228	22.05	217	20.99	188	18.18	208	20.12
27	Tamil Nadu	562	0.00	67.40	96	17.08	158	28.11	189	33.63	87	15.48	22	3.91	10	1.78
28	Telangana	567	0.00	99.70	60	10.58	175	30.86	170	29.98	113	19.93	41	7.23	8	1.41
29	Tripura	21	1.17	6.03	8	38.10	12	57.14	1	4.76	0	0.00	0	0.00	0	0.00
30	Uttar Pradesh	737	0.17	40.10	95	12.89	289	39.21	203	27.54	125	16.96	24	3.26	1	0.14
31	Uttarakhand	47	0.82	58.43	7	14.89	17	36.17	12	25.53	5	10.64	4	8.51	2	4.26
32	West Bengal	722	0.22	32.01	76	10.53	363	50.28	167	23.13	97	13.43	19	2.63	0	0.00
	Total	15165			2298	15.15	5481	36.14	4520	29.81	1983	13.08	618	4.08	265	1.7
	Range		0.00	130.20												

Annexure 2.5 (Refer para 2.5.1)**State-wise Decadal Water Level Fluctuation with Mean - November (2008 to 2017) and November 2018**

Sl. No.	Name of State	No. of wells analysed	Range in m				Rise						Fall						Rise		Fall		Wells showing no change	
			Rise		Fall		0-2 m		2-4 m		>4 m		0-2 m		2-4 m		>4 m		No	%	No	%	No	%
			Min	Max	Min	Max	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
1	Andhra Pradesh	730	0.01	9.93	0.01	18.37	173	23.7	14	1.9	8	1.1	352	48.2	110	15.1	73	10.0	195	27	535	73	0	0
2	Arunachal Pradesh	10	0.26	0.26	0.1	2.74	1	10.0	0	0.0	0	0.0	8	80.0	1	10.0	0	0.0	1	10	9	90	0	0
3	Assam	176	0.05	3.7	0.01	4.29	80	45.5	5	2.8	0	0.0	81	46.0	7	4.0	2	1.1	85	48	90	51	1	1
4	Bihar	638	0.01	6.68	0	8.4	207	32.4	23	3.6	1	0.2	312	48.9	72	11.3	23	3.6	231	36	407	64	0	0
5	Chandigarh	8	0.03	0.1	0.63	17.79	3	37.5	0	0.0	0	0.0	3	37.5	0	0.0	2	25.0	3	38	5	63	0	0
6	Chhattisgarh	513	0.02	9.68	0.02	17.7	86	16.8	21	4.1	9	1.8	289	56.3	92	17.9	16	3.1	116	23	397	77	0	0
7	Dadra & Nagar Haveli	17	0.34	2.73	0.1	5.26	2	11.8	1	5.9	0	0.0	11	64.7	1	5.9	2	11.8	3	18	14	82	0	0
8	Daman & Diu	11	0.08	2.99			9	81.8	2	18.2	0	0.0	0	0.0	0	0.0	0	0.0	11	100	0	0	0	0
9	Delhi	83	0.05	11.64	0	13.16	19	22.9	1	1.2	3	3.6	23	27.7	20	24.1	17	20.5	23	28	60	72	0	0
10	Goa	30	0.24	6.49	0.06	7.64	7	23.3	0	0.0	2	6.7	15	50.0	4	13.3	2	6.7	9	30	21	70	0	0
11	Gujarat	752	0.01	7.66	0.02	16.09	191	25.4	64	8.5	34	4.5	232	30.9	128	17.0	103	13.7	289	38	463	62	0	0
12	Haryana	305	0.02	15.05	0.01	16.03	90	29.5	12	3.9	6	2.0	109	35.7	51	16.7	37	12.1	108	35	197	65	0	0
13	Himachal Pradesh	110	0.05	10.49	0.06	13.27	74	67.3	6	5.5	10	9.1	18	16.4	1	0.9	1	0.9	90	82	20	18	0	0
14	Jammu & Kashmir	155	0.02	1.92	0.01	2.93	49	31.6	0	0.0	0	0.0	100	64.5	6	3.9	0	0.0	49	32	106	68	0	0
15	Jharkhand	276	0.01	3.28	0.01	4.7	110	39.9	3	1.1	1	0.4	128	46.4	29	10.5	4	1.4	114	41	161	58	1	0
16	Karnataka	1,373	0.01	8.33	0.01	19.23	413	30.1	68	5.0	32	2.3	581	42.3	163	11.9	114	8.3	513	37	858	62	2	0
17	Kerala	1,452	0.01	11.75	0.01	7.15	527	36.3	42	2.9	11	0.8	831	57.2	37	2.5	3	0.2	580	40	871	60	1	0
18	Madhya Pradesh	1,329	0.01	14.17	0.01	17.52	298	22.4	47	3.5	34	2.6	588	44.2	221	16.6	137	10.3	379	29	946	71	4	0
19	Maharashtra	1,633	0.01	15.94	0.01	19.43	330	20.2	49	3.0	21	1.3	763	46.7	263	16.1	207	12.7	400	24	1233	76	0	0
20	Meghalaya	23	0.03	4.26	0.03	1.66	11	47.8	0	0.0	1	4.3	11	47.8	0	0.0	0	0.0	12	52	11	48	0	0
21	Odisha	1,284	0.01	5.3	0	8.72	555	43.2	42	3.3	3	0.2	611	47.6	61	4.8	11	0.9	600	47	683	53	1	0
22	Puducherry	4	0.27	0.66	0.19	0.19	3	75.0	0	0.0	0	0.0	1	25.0	0	0.0	0	0.0	3	75	1	25	0	0
23	Punjab	249	0.04	4.43	0.04	11.69	56	22.5	9	3.6	1	0.4	94	37.8	37	14.9	52	20.9	66	27	183	73	0	0

Sl. No.	Name of State	No. of wells analysed	Range in m				Rise						Fall						Rise		Fall		Wells showing no change	
			Rise		Fall		0-2 m		2-4 m		>4 m		0-2 m		2-4 m		>4 m		No	%	No	%	No	%
			Min	Max	Min	Max	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
24	Rajasthan	618	0.02	17.05	0	17.9	155	25.1	48	7.8	43	7.0	178	28.8	92	14.9	102	16.5	246	40	372	60	0	0
25	Tamil Nadu	550	0.01	14.35	0.03	16.94	166	30.2	52	9.5	37	6.7	161	29.3	77	14.0	57	10.4	255	46	295	54	0	0
26	Telangana	560	0.01	13.6	0.01	17.93	165	29.5	29	5.2	11	2.0	162	28.9	86	15.4	107	19.1	205	37	355	63	0	0
27	Tripura	21	0.01	0.82	0.1	5.42	14	66.7	0	0.0	0	0.0	6	28.6	0	0.0	1	4.8	14	67	7	33	0	0
28	Uttar Pradesh	734	0.01	13.75	0.02	10.89	251	34.2	28	3.8	10	1.4	347	47.3	75	10.2	23	3.1	289	39	445	61	0	0
29	Uttarakhand	41	0.04	8.64	0.03	8.08	23	56.1	2	4.9	1	2.4	10	24.4	1	2.4	4	9.8	26	63	15	37	0	0
30	West Bengal	702	0.01	8.72	0	14.27	165	23.5	27	3.8	8	1.1	351	50.0	81	11.5	68	9.7	200	28	500	71	2	0
Total		14,387					4,233	29.4	595	4.1	287	2.0	6376	44.3	1,716	11.9	1,168	8.1	5,115	36	9,260	64.4	12	0

Annexure 2.6 (Refer para 2.9)**Details of posts for which amended RRs not finalized**

Sl. No.	Post	Date of sending the draft RRs to Ministry
1.	Chairman	06.04.2016
2.	Member	19.04.2017
3.	Regional Director (Scientific)	24.04.2017
4.	Group A (Scientific)	04.01.2017
5.	Artist	04.09.2017
6.	Assistant Chemist	06.04.2016
7.	Office Surveyor	06.04.2016
8.	Sr. Technical Assistant (Hydrometeorologist)	30.06.2017
9.	Surveyor	22.09.2017
10.	Draftsman	20.09.2017
11.	Photographer Grade II	21.09.2017
12.	Library and Information Officer	14.09.2016
13.	Sr. Private Secretary	24.11.2016

Annexure 3.1 (Refer para 3.1)

Mechanism for grant of NOC/ permission for Ground Water Extraction in 13 Self-Regulated States/UTs

Andhra Pradesh

In the year 2002, the Government of Andhra Pradesh (GoAP) had enacted the Andhra Pradesh Water Land & Trees Act (the Act). As required under the Act, GoAP constituted (2002) the AP Water Land & Trees Authority (APWALTA). As per the Act, the functions of the Authority, inter alia, were to (a) promote water conservation, (b) regulate exploitation of ground and surface water, and (c) advise Government on the Legislative and administrative measure to be taken for conservation of natural resources, etc.

The Ground Water & Water Audit (GW&WAD) Department acts as the technical agency in the matters relating to assessment, monitoring and management of Ground Water in the State and also grants permissions for drawl of Ground Water for industrial units. These permissions were termed as feasibility reports. However, APWALTA stated (October 2018) that it is unaware of the feasibility reports issued by GW&WAD.

Chandigarh

Chandigarh Administration notified "the Chandigarh Water Supply Bye-laws, 2011". The Act *ibid* was amended in May 2016. There was no separate dedicated Department/ Ground Water Management Cell under Chandigarh Administration/Municipal Corporation. In U.T Chandigarh three government agencies issued permission letter/NOC in respect of withdrawal of Ground Water. Municipal Corporation Chandigarh issued permission letters in respect of Urban areas, Chandigarh Engineering Department (Chandigarh Administration) issued permission letter in respect of Rural areas and Land Acquisition Officer issued permission letter in respect of irrigation purposes.

Delhi

Government of National Capital Territory of Delhi (GNCTD), Department of Environment has notified (July 2010) all the districts in National Capital Territory of Delhi as notified area for Ground Water Regulation and Management vide Notification issued under Section 5 of the Environment (Protection) Act 1986.

Directions in said notification provided that if any person, group, authority, association or institution, intended to draw Ground Water through bore well or tube well (both new as well as existing and drawing Ground Water without permission of CGWA) for domestic, commercial, agricultural and/ or industrial uses, he should take prior permission from 'Competent Authority' (i.e. Delhi Jal Board or New Delhi Municipal Corporation as the case may be). Such permission should be obtained through submission of an application to Zonal offices of the Competent Authority in the form specified by the Competent Authority. The notification also constituted Advisory Committee in all districts of Delhi under chairmanship of the Deputy Commissioner (Revenue) of concerned district with the representatives of Delhi Jal Board, Irrigation and Flood Control Department, Environment Department, CGWA and a prominent NGO in the area for Ground Water regulation. The cases for permission should be recommended by the Executive Engineer of the Competent Authority to the Advisory Committee based on ground facts. The cases recommended by the Advisory Committee should be forwarded to the Competent Authority for grant of permission.

Goa

In exercise of the powers conferred by Section 3 of the Goa Ground Water Regulation Act, 2002, the Government constituted (March 2003) 'Goa Ground Water Cell' to implement and to carry out the purpose of the Act. Goa Ground Water Cell functions under the aegis of Water Resource Department (WRD). The Chief Engineer (WRD) is the Ex-Officio Chairman of the Goa Ground Water Cell. The work relating to regulation of the

Ground Water in the State is entrusted to Executive Engineers of two Divisions of the WRD, who are designated as Ground Water Officer (GWO), for North and South Goa and are authorised to issue No Objection Certificate (NOCs) to the Ground Water Consumers.

The application for permission/ registration is received by the respective sub division offices under the jurisdiction of Ex Eng. WRD (Ground Water Officer) in the two districts of Goa. The application is scrutinized and site inspection carried out by the Asst Engineer of the respective Sub division. The detailed report is submitted to the respective Ground Water Officers (North & South). Reports received from Sub Division office are split up as per category and registration of existing open/bore well for domestic/ agriculture well are done at division level. Registration of tankers is issued at division level, registration of existing open/bore well for commercial purpose ie Industry, Infrastructure, Hotel and Commercial is forwarded to Goa Ground Water Cell board for approval. NOC for sinking open well for domestic/agriculture is issued at division level and for commercial purpose to GGWC board for approval.

Himachal Pradesh

a)The applicant seeking NOC has to apply in prescribed form along with required fees and other documents like revenue papers, site plan, memorandum of company, lease deed, HP Pollution Control Board permission, Industries NOC etc (b) site verification/other recommendation of the Groundwater Organization Una (c) HPSGWA issue instructions to concerned Executive Engineers and Gram Panchayats/Municipal Committees whose jurisdiction the area of NOC fall, for issuing public notice for finding if there is any objection n the local people with regard to grant of permit.(d) the Sub Committee of HPSGWA in its meeting discuss all the aspects and recommendations made regarding issuing of NOC.

Jammu & Kashmir

The application for grant of Registration Certificate (RC) for installation of bore/tube well for extraction of Ground Water is received in the office of the Chief Engineer PHE Department. The Chief Engineer forwards it to the Superintending Engineer (SE), Hydraulic & Mechanical Circle with direction to submit a detailed report along with comments and recommendations. The SE Hydraulic and SE Mechanical on receipt of the report and recommendations from the respective Civil and Mechanical Division re-submit the case along with its report and recommendations to the Chief Engineer PHE Department. On receipt of the report and recommendations the Chief Engineer either rejects or grants RC to the user for extraction and exploitation of Ground Water subject to certain condition for which compliance is to be ensured by the Divisional Head (Executive Engineer) of the respective division. Further, the raising of demand and recovery of the water usage charges from the licensee is also among the responsibilities of the Executive Engineer.

Karnataka

The Karnataka Ground Water Authority receives and evaluates the project proposals for Ground Water clearances. On receipt of the proposals for NOC to extract and use of groundwater, are referred to the District Groundwater Committee. The proposal along with the recommendations of the District Ground Water Committee will be placed before the State Level Technical Committee for further decisions regarding issuance of NOC by KGA.

Kerala

The State enacted Kerala Ground Water (Control and Regulation) Act, 2002 and relevant Rules. As per Section 7 of the Act, SGWA is the authority to issue permit/NOC. In Notified areas⁷⁹, conditional permit is being issued for domestic purpose limited to 1000L/Day by District Level Evaluation Committee (DLEC). Though Infrastructure projects, Industrial projects etc., also come under the purview of SGWA, the proposals for packaged drinking water projects alone were received till March 2018 and recommended to SGWA for granting NOC.

⁷⁹ Kerala SGWA has notified five blocks.

Lakshadweep

The Lakshadweep Ground Water (Development and Control) Regulation, 2001 was notified in August 2001 with the intention of developing and controlling extraction of Ground Water in UT of Lakshadweep. Sub section (1) of Section 3 of the Regulation stipulates that, a State level Ground Water Authority has to be constituted for Lakshadweep islands, which will advise the UTL Administration for notifying any island for the Ground Water Regulation and Management and issue permit for extraction of Ground Water. However, no such Ground Water Authority has been constituted in UT of Lakshadweep till date (August 2018) and therefore no island/area has been notified in Lakshadweep. No mechanism has been put in place for grant of NoC in Lakshadweep, as no authority was constituted and no guidelines were framed by LPWD. No application for NoC has been received so far.

Puducherry

Drinking water for individual households is supplied through public water supply system maintained by PWD. As per Government order issued in February 2005, PGWA issues permits to PWD for Ground Water extraction for supply of drinking water to individual households in UTP on priority basis. As per section 8 of the Act, 2002, all wells sunk in the UTP have to be registered including the non-notified areas and renewed every two years. Any user of Ground Water desiring to sink a well for any purpose and for registration of well sunk and for renewal, shall apply to the PGWA in a specified form. PGWA will make such inspection and inquiries to satisfy that there is no objection to grant such permit to sink a well. Permit is then issued by PGWA to the applicant with such condition as required. Applications seeking NOC for industrial and non-agricultural purposes received in SGWU&SC are placed before the Regional Committee constituted (July 2010) by GoP with Director of Agriculture as Chairman, Hydrogeologist, SGWU&SC, Puducherry as Member Secretary and five official members for evaluation. The recommendations of the Committee are forwarded to PGWA for issuance of NOC to the applicants.

Tamil Nadu

Processing of applications by the E.E, PWD-Ground Water Division and should send the field investigation report to S.E of concerned circle. Scrutiny of Report by the S.E and the report with the remarks to be forwarded to CE's Office. Decision on Field Report at C.E office and Post Approval Action Plan.

Telangana

WALTA Authority (Authority constituted under State Water, Land and Tree Act, 2002) in the State is the empowered for granting NOC/Permission in respect of drinking and agricultural bore wells. At Mandal level, MROs and at District level, District Collectors are WALTA authority. The NOC/Permission for drilling agriculture bore well is granted by concerned MRO (Mandal Authority), based on the feasibility given by SGWD. In respect of Industries, the power to grant NOC has been delegated to Ground Water Department (2005).

West Bengal

As per the West Bengal Ground Water Resource (Management Control & Regulation) Act 2005, any user desiring to sink a well/tube well for any purpose, excepting tube well fitted with hand-pump or a well from which extraction or use made without the help of any mechanical or electrical device, have to make an application for permit to extract Ground Water, to the concerned State/District/Corporation level authority, as the case may be.

Annexure 3.2 (Refer para 3.4)**State-wise details of NOC pending and renewal**

Information relating to Pendency in grant of NOC as on 31.03.2019								
Sl. No.	State/UT	Number of Pending Applications						
		Delay up to 31/03/2019	Less than 30 days	31 to 90 days	91 to 181 days	181 to 365 days	More than 1 to 3 year	More than 3 years
1	Andaman and Nicobar islands	13	0	0	13	0	0	0
2	Assam	12	0	0	1	9	2	0
3	Bihar	89	0	0	9	33	47	0
4	Chhattisgarh	863	0	0	259	568	36	0
5	Dadra and Nagar Haveli	27	0	0	8	13	6	0
6	Daman and Diu	11	0	0	0	5	6	0
7	Gujarat	1,978	0	0	247	598	1,133	0
8	Haryana	435	0	0	98	160	177	0
9	Jharkhand	80	0	0	13	49	18	0
10	Madhya Pradesh	248	0	0	39	127	82	0
11	Maharashtra	390	0	0	62	171	157	0
12	Manipur	3	0	0	1	2	0	0
13	Odisha	161	0	0	68	61	32	0
14	Punjab	1,144	0	0	176	328	640	0
15	Rajasthan	4,319	0	0	866	2,383	1,070	0
16	Sikkim	7	0	0	3	3	1	0
17	Tripura	1	0	0	0	1	0	0
18	Uttar Pradesh	552	0	0	256	164	132	0
19	Uttarakhand	425	0	0	64	80	281	0
	Total	10,758	0	0	2,183	4,755	3,820	0

Information relating to Pendency in grant of renewal of NOC as on 31st March 2019								
Sl. No.	State/UTs	Number of Applications Pending						
		Delay up to 31st March 2019						
		Delay up to 31/03/2019	Less than 30 days	31 to 90 days	91 to 180 days	181 to 365 days	More than one year to three years	More than three years
1	A & N Islands	0	0	0	0	0	0	0
2	Arunachal Pradesh	Not available						
3	Assam							
4	Bihar							
5	Chhattisgarh	Not available						
6	Dadra & Nagar Haveli							
7	Daman & Diu							
8	Gujarat	Not available						
9	Haryana	21	1	5	3	2	9	1
10	Jharkhand							
11	Madhya Pradesh	16	1	6	4	2	3	0
12	Maharashtra	15	7	2	3	2	1	0
13	Manipur	Not available						
14	Meghalaya							
15	Mizoram							
16	Nagaland							
17	Odisha							
18	Punjab	58	2	10	13	14	19	--
19	Rajasthan	34	0	1	2	5	24	2
20	Sikkim	0	0	0	0	0	0	0
21	Tripura	Not available						
22	Uttar Pradesh							
23	Uttarakhand							
	TOTAL	144	11	24	25	25	56	3

Annexure 3.3 (Refer para 3.10.1)**Violations of conditions of NOCs****(i) Number of Tube Wells**

Name of the State/UT	Number of Sampled projects	Number of Sampled Projects where condition was specified	Out of projects where such condition was specified			Remarks, if any
			Number of Sampled Projects in which Tube well, Bore well, Dug well were constructed in excess of the number prescribed in NOC	Number of Sampled Projects that complied with the NOC Condition	Number of Sampled Projects for which compliance could not be ascertained in Audit (Partially)	
NON-NOTIFIED AREAS						
1. Arunachal Pradesh	6	6	0	6	0	
2. Assam	50	50	0	45	5	
3. Bihar	42	41	4	36	1	5 units not constructed any bore well
4. Chhattisgarh	50	50	2	48	0	
5. Dadra & Nagar Haveli	3	3	0	3	0	
6. Daman & Diu	0	0	0	0	0	
7. Gujarat	42	42	3	38	1	One project was not completed.
8. Haryana	35	35	6	25	4	
9. Jharkhand	20	16	1	9	6	7 projects yet to be started
10. Madhya Pradesh	50	47	12	30	5	
11. Maharashtra	50	50	0	50	0	
12. Manipur	3	3	0	3	0	
13. Meghalaya	4	4	0	4	0	
14. Nagaland	3	3	1	1	1	M/s Esther Beverages were abstracting Ground Water without obtaining renewal of NOC. Nagaland State Dairy Cooperative Federation Ltd. Yet to complete the boring well. Hence could not be ascertained.
15. Orissa	50	49	8	38	3	Three projects not yet started.
16. Punjab	50	50	4	44	2	
17. Rajasthan	44	40	1	39	0	
18. Tripura	13	13	2	9	2	
19. Uttar Pradesh	40	40	10	26	4	One project was sealed and 3 projects were not operated.
20. Uttarakhand	40	40	0	39	1	One project was not yet operational
TOTAL	595	582	54	493	35	

Name of the State/UT	Number of Sampled projects	Number of Sampled Projects where condition was specified	Out of projects where such condition was specified			Remarks, if any
			Number of Sampled Projects in which Tube well, Bore well, Dug well were constructed in excess of the number prescribed in NOC	Number of Sampled Projects that complied with the NOC Condition	Number of Sampled Projects for which compliance could not be ascertained in Audit (Partially)	
NOTIFIED AREAS						
1. Diu & Daman UT	0	0	0	0	0	
2. Gujarat	0	0	0	0	0	
3. Haryana	30	30	3	26	1	
4. Madhya Pradesh	48	48	0	45	3	
5. Punjab	36	29	3	22	4	
6. Rajasthan	95	95	0	95	0	
7. Uttar Pradesh	0	0	0	0	0	
8. Tamil Nadu	2	2	1	1	0	
9. West Bengal	10	10	0	8	2	One project was not constructed, One project not found during site visit
TOTAL	221	214	7	197	10	
SELF REGULATED AREAS						
1. Andhra Pradesh	42	37	1	18	18	
2. Chandigarh(through Govt. Orders)	14	0	0	0	0	-
3. Delhi	60	60	0	42	18	12 tube wells out of 60 sampled project were not constructed. 06 projects were closed.
4. Goa	40	40	0	40	0	
5. Himachal Pradesh	40	40	26	0	14	
6. Jammu & Kashmir	40	40	1	36	3	
7. Karnataka	60	60	0	53	7	
8. Kerala	40	40	7	24	9	Construction of wells do not require NOC. SGWA is issuing NOC for energized extraction of water from wells already constructed. Some projects are extracting water using additional pumps without Flow meter.
9. Lakshadweep	0	0	0	0	0	
10. Puducherry (PGWA)	6	6	0	6	0	
11. Tamil Nadu (through Govt. Orders)	50	50	5	45	0	
12. Telangana	40	34	3	22	9	
13. West Bengal	40	35	0	31	4	Project was not started in four

Name of the State/UT	Number of Sampled projects	Number of Sampled Projects where condition was specified	Out of projects where such condition was specified			Remarks, if any
			Number of Sampled Projects in which Tube well, Bore well, Dug well were constructed in excess of the number prescribed in NOC	Number of Sampled Projects that complied with the NOC Condition	Number of Sampled Projects for which compliance could not be ascertained in Audit (Partially)	
						projects; 5 (permits were for dewatering of mining)
TOTAL	472	442	43	317	82	
Grand Total	1,288	1,238	104	1,007	127	

(ii) Installation of Water Meter

Name of the State/UT	Number of Sampled projects	Number of Sampled Projects where condition was specified	Out of projects where such condition was specified			Remarks, if any
			Number of Sampled Projects in which Water meters were not installed as prescribed in NOC	Number of Sampled Projects that complied with the NOC Condition	Number of Sampled Projects for which compliance could not be ascertained in Audit	
NON-NOTIFIED AREAS						
1. Arunachal Pradesh	6	5	4	1	0	
2. Assam	50	50	24	25	1	
3. Bihar	42	42	13	28	1	5 units not constructed any borewell
4. Chhattisgarh	50	50	24	26	0	
5. Dadra & Nagar Haveli	3	3	0	3	0	
6. Daman & Diu	0	0	0	0	0	
7. Gujarat	42	42	6	28	8	One project was not completed.
8. Haryana	35	35	16	10	9	
9. Jharkhand	20	16	4	6	6	7 projects yet to be started
10. Madhya Pradesh	50	50	27	15	8	
11. Maharashtra	50	50	21	27	2	
12. Manipur	3	3	0	3	0	
13. Meghalaya	4	4	3	1	0	
14. Nagaland	3	3	3	0	0	
15. Orissa	50	49	29	17	3	Three projects not yet started
16. Punjab	50	50	7	38	5	
17. Rajasthan	44	40	14	26	0	
18. Tripura	13	13	8	3	2	

Name of the State/UT	Number of Sampled projects	Number of Sampled Projects where condition was specified	Out of projects where such condition was specified			
			Number of Sampled Projects in which Water meters were not installed as prescribed in NOC	Number of Sampled Projects that complied with the NOC Condition	Number of Sampled Projects for which compliance could not be ascertained in Audit	Remarks, if any
19. Uttar Pradesh	40	40	13	23	4	One project sealed and 3 were not operational
20. Uttarakhand	40	40	1	38	1	One project was not yet operational
TOTAL	595	585	217	318	50	
NOTIFIED AREAS						
1. Diu & Daman UT	0	0	0	0	0	
2. Gujarat	0	0	0	0	0	
3. Haryana	30	28	21	5	2	
4. Madhya Pradesh	48	0	0	0	0	
5. Punjab	36	31	8	19	4	
6. Rajasthan	95	11	11	0	0	
7. Uttar Pradesh	0	0	0	0	0	
8. Tamil Nadu	2	2	2	0	0	
9. West Bengal	10	10	7	1	2	One project was not constructed, One project not found during site visit
TOTAL	221	82	49	25	8	
SELF REGULATED STATES						
1. Andhra Pradesh	42	19	1	0	18	
2. Chandigarh (through Govt. Orders)	14	0	0	0	0	-
3. Delhi	60	22	13	6	03	3 tube wells closed/abandoned in due course
4. Goa	40	3	0	3	0	
5. Himachal Pradesh	40	40	15	11	14	
6. Jammu & Kashmir	40	40	20	17	3	
7. Karnataka	60	40	30	10	0	
8. Kerala	40	40	1	19	20	One project not installed water meter in the well permitted as per NOC. Two projects not installed water meter as operation was not started. Seven projects constructed additional wells and 11 projects installed additional pumps in the well-constructed as per NOC.
9. Lakshadweep	0	0	0	0	0	
10. Puducherry (PGWA)	6	4	0	3	1	

Name of the State/UT	Number of Sampled projects	Number of Sampled Projects where condition was specified	Out of projects where such condition was specified			Remarks, if any
			Number of Sampled Projects in which Water meters were not installed as prescribed in NOC	Number of Sampled Projects that complied with the NOC Condition	Number of Sampled Projects for which compliance could not be ascertained in Audit	
11. Tamil Nadu (through Govt. Orders)	50	50	13	37	0	Out of 37, 3 units not maintained flow meter readings, 19 initially maintained.
12. Telangana	40	2	0	1	1	
13. West Bengal	40	40	19	13	8	In 8 projects the construction and installation of tube wells and sump well not started
TOTAL	472	300	112	120	68	
Grand Total	1,288	967	378	463	126	

(iii) Installation of Piezometer

Name of the State/UT	Number of Sampled projects	Number of Sampled Projects where condition was specified	Out of projects where such condition was specified			Remarks, if any
			Number of Sampled Projects, that did not install Piezometer as prescribed in NOC	Number of Sampled Projects, that Comply with the NOC Condition	Number of Sampled Projects, that Compliance could not be ascertained in Audit	
NON-NOTIFIED AREAS						
1. Arunachal Pradesh	6	6	6	0	0	
2. Assam	50	50	29	20	1	
3. Bihar	42	39	23	15	1	
4. Chhattisgarh	50	48	23	25	0	
5. Dadra & Nagar Haveli	3	3	2	1	0	
6. Daman & Diu	0	0	0	0	0	
7. Gujarat	42	42	17	19	6	One project was not completed.
8. Haryana	35	35	18	13	4	
9. Jharkhand	20	20	10	3	7	7 projects yet to be started
10. Madhya Pradesh	50	50	16	13	21	
11. Maharashtra	50	50	24	26	0	
12. Manipur	3	3	1	2	0	
13. Meghalaya	4	4	3	1	0	
14. Nagaland	3	2	2	0	0	Installation of piezometer was not accorded in the NOC in respect of Power Grid Corporation of India Ltd. (PGCIL), Mokokchung as the NOC was approved for abstraction of

Name of the State/UT	Number of Sampled projects	Number of Sampled Projects where condition was specified	Out of projects where such condition was specified			Remarks, if any
			Number of Sampled Projects, that did not install Piezometer as prescribed in NOC	Number of Sampled Projects, that Comply with the NOC Condition	Number of Sampled Projects, that Compliance could not be ascertained in Audit	
						groundwater only for residential use.
15. Orissa	50	38	21	14	3	Three projects not yet started
16. Punjab	50	50	24	24	2	
17. Rajasthan	44	43	27	16	0	
18. Tripura	13	13	10	1	2	
19. Uttar Pradesh	40	38	14	20	4	One project sealed and 3 were not operational
20. Uttarakhand	40	33	18	15	0	Out of 18 projects which did not comply the NOC condition, 6 projects had installed less number of piezometers as compared to number mentioned in NOC. 11 projects had not installed any piezometer and one project was not yet operational.
TOTAL	595	567	288	228	51	
NOTIFIED AREAS						
1. Diu & Daman UT	0	0	0	0	0	
2. Gujarat	0	0	0	0	0	
3. Haryana	30	3	2	0	1	
4. Madhya Pradesh	48	0	0	0	0	
5. Punjab	36	10	9	1	0	
6. Rajasthan	95	0	0	0	0	
7. Uttar Pradesh	0	0	0	0	0	
8. Tamil Nadu	2	2	2	0	0	
9. West Bengal	10	0	0	0	0	No provision in the permit for the piezometer
TOTAL	221	15	13	1	1	
SELF REGULATED STATES						
1. Andhra Pradesh	42	36	13	5	18	
2. Chandigarh(through Govt. Orders)	14	0	0	0	0	-
3. Delhi	60	0	0	0	0	
4. Goa	40	0	0	0	0	
5. Himachal Pradesh	40	0	0	0	0	
6. Jammu & Kashmir	40	0	0	0	0	
7. Karnataka	60	5	5	0	0	
8. Kerala	40	0	0	0	0	Installation of Piezometer was not insisted in the NOC. Hence not installed in any project.

Name of the State/UT	Number of Sampled projects	Number of Sampled Projects where condition was specified	Out of projects where such condition was specified			Remarks, if any
			Number of Sampled Projects, that did not install Piezometer as prescribed in NOC	Number of Sampled Projects, that Comply with the NOC Condition	Number of Sampled Projects, that Compliance could not be ascertained in Audit	
9. Lakshadweep	0	0	0	0	0	
10. Puducherry (PGWA)	6	0	0	0	0	
11. Tamil Nadu (through Govt. Orders)	50	50	15	35	0	Out of 35, 14 units handed over belatedly
12. Telangana	40	36	17	1	18	
13. West Bengal	40	0	0	0	0	As per State Ground Water Act, there was no provision of piezometer in the permits
TOTAL	472	127	50	41	36	
Grand Total	1,288	709	351	270	88	

(iv) Installation of Automatic Water Level Recorder

Name of the State/ UT	Number of Sampled projects	Number of Sampled Projects where condition was specified	Out of projects where such condition was specified			Remarks, if any
			Number of Sampled Projects in which AWLR was not installed	Number of Sampled Projects that complied with the NOC Condition	Number of Sampled Projects in which compliance could not be ascertained in Audit	
NON-NOTIFIED AREAS						
1. Arunachal Pradesh	6	1	1	0	0	
2. Assam	50	24	19	4	1	
3. Bihar	42	22	10	11	1	
4. Chhattisgarh	50	28	17	11	0	
5. Dadra & Nagar Haveli	3	3	1	2	0	
6. Daman & Diu	0	0	0	0	0	
7. Gujarat	42	17	10	4	3	Sugala Limestone Mines, (Six months was not completed.
8. Haryana	35	26	19	3	4	
9. Jharkhand	20	14	5	2	7	7 projects yet to be started
10. Madhya Pradesh	50	30	24	6	0	
11. Maharashtra	50	26	19	7	0	
12. Manipur	3	0	0	0	0	
13. Meghalaya	4	0	0	0	0	
14. Nagaland	3	2	2	0	0	Installation of AWLR was not specified in the NOC of PGCIL
15. Orissa	50	24	18	6	0	
16. Punjab	50	22	15	5	2	
17. Rajasthan	44	18	13	5	0	
18. Tripura	13	0	0	0	0	

Name of the State/ UT	Number of Sampled projects	Number of Sampled Projects where condition was specified	Out of projects where such condition was specified			Remarks, if any
			Number of Sampled Projects in which AWLR was not installed	Number of Sampled Projects that complied with the NOC Condition	Number of Sampled Projects in which compliance could not be ascertained in Audit	
19. Uttar Pradesh	40	26	8	14	4	One project sealed and 3 were not operational
20. Uttarakhand	40	23	13	10	0	Out of 13 projects which did not comply the NOC conditions, four projects had installed less number of AWLR as compared to number mentioned in NOC, eight project had not installed any AWLR and one project was not yet operational.
TOTAL	595	306	194	90	22	
NOTIFIED AREAS						
1. Diu & Daman UT	0	0	0	0	0	
2. Gujarat	0	0	0	0	0	
3. Haryana	30	3	2	0	1	
4. Madhya Pradesh	48	0	0	0	0	
5. Punjab	36	7	7	0	0	
6. Rajasthan	95	0	0	0	0	
7. Uttar Pradesh	0	0	0	0	0	
8. Tamil Nadu	2	0	0	0	0	
9. West Bengal	10	0	0	0	0	No provision
TOTAL	221	10	9	0	1	
SELF REGULATED STATES						
1. Andhra Pradesh	42	26	7	1	18	
2. Chandigarh(through Govt. Orders)	14	0	0	0	0	-
3. Delhi	60	0	0	0	0	
4. Goa	40	0	0	0	0	
5. Himachal Pradesh	40	0	0	0	0	
6. Jammu & Kashmir	40	0	0	0	0	
7. Karnataka	60	0	0	0	0	
8. Kerala	40	0	0	0	0	Installation of AWLR was not insisted in the NOC. Hence not installed in any project.
9. Lakshadweep	0	0	0	0	0	
10. Puducherry (PGWA)	6	0	0	0	0	
11. Tamil Nadu (through Govt. Orders)	50	0	0	0	0	
12. Telangana	40	0	0	0	0	
13. West Bengal	40	0	0	0	0	As per State Ground Water Act, there

Name of the State/ UT	Number of Sampled projects	Number of Sampled Projects where condition was specified	Out of projects where such condition was specified			Remarks, if any
			Number of Sampled Projects in which AWLR was not installed	Number of Sampled Projects that complied with the NOC Condition	Number of Sampled Projects in which compliance could not be ascertained in Audit	
						was no provision in the permits
TOTAL	472	26	7	1	18	
Grand Total	1,288	342	210	91	41	

(v) Monitoring of Pre and Post Monsoon Ground Water Quality

Name of the State/ UT	Number of Sampled projects	Number of Sampled Projects where condition was specified	Out of projects where such condition was specified			Remarks, if any
			Number of Sampled Projects in which Ground Water quality was not monitored twice in a year during pre-monsoon and post monsoon periods	Number of Sampled Projects that complied with the NOC Condition	Number of Sampled Projects in which compliance could not be ascertained in Audit	
NON-NOTIFIED AREAS						
1. Arunachal Pradesh	6	6	6	0	0	
2. Assam	50	50	24	25	1	
3. Bihar	42	41	22	17	2	
4. Chhattisgarh	50	50	23	27	0	
5. Dadra & Nagar Haveli	3	3	1	2	0	
6. Daman & Diu	0	0	0	0	0	
7. Gujarat	42	42	14	5	23	1. Sugala Limestone Mines, (Six months was not completed) 2. Raksha Shakti University, (Unit was not in operation)
8. Haryana	35	35	26	5	4	
9. Jharkhand	20	20	6	7	7	7 projects yet to be started
10. Madhya Pradesh	50	50	22	28	0	
11. Maharashtra	50	50	7	31	12	
12. Manipur	3	3	1	2	0	
13. Meghalaya	4	4	4	0	0	
14. Nagaland	3	2	2	0	0	Monitoring of quality data was not conditioned in the NOC in respect of PGCIL
15. Orissa	50	40	20	17	3	Three projects not started.

Name of the State/ UT	Number of Sampled projects	Number of Sampled Projects where condition was specified	Out of projects where such condition was specified			Remarks, if any
			Number of Sampled Projects in which Ground Water quality was not monitored twice in a year during pre-monsoon and post monsoon periods	Number of Sampled Projects that complied with the NOC Condition	Number of Sampled Projects in which compliance could not be ascertained in Audit	
16. Punjab	50	50	26	22	2	
17. Rajasthan	44	44	21	23	0	
18. Tripura	13	13	11	0	2	
19. Uttar Pradesh	40	40	8	28	4	One project sealed and 3 were not operational
20. Uttarakhand	40	34	11	23	0	Out of 11 projects which did not comply the NOC conditions, eight projects were monitoring quality data of water once in year, two were not monitoring quality and one project was not yet operational.
TOTAL	595	577	255	262	60	
SELF REGULATED AREAS						
1. Andhra Pradesh	42	37	6	12	19	
2. Chandigarh(through Govt. Orders)	14	0	0	0	0	-
3. Delhi	60	0	0	0	0	
4. Goa	40	0	0	0	0	
5. Himachal Pradesh	40	0	0	0	0	
6. Jammu & Kashmir	40	0	0	0	0	
7. Karnataka	60	5	5	0	0	
8. Kerala	40	0	0	0	0	Monitoring of quality data was not insisted in the NOC. Hence not monitored by any project.
9. Lakshadweep	0	0	0	0	0	
10. Puducherry (PGWA)	6	0	0	0	0	
11. Tamil Nadu (through Govt. Orders)	50	0	0	0	0	
12. Telangana	40	40	19	1	20	
13. West Bengal	40	0	0	0	0	As per State Ground Water Act, there was no provision in the permits

Name of the State/ UT	Number of Sampled projects	Number of Sampled Projects where condition was specified	Out of projects where such condition was specified			Remarks, if any
			Number of Sampled Projects in which Ground Water quality was not monitored twice in a year during pre-monsoon and post monsoon periods	Number of Sampled Projects that complied with the NOC Condition	Number of Sampled Projects in which compliance could not be ascertained in Audit	
TOTAL	472	82	30	13	39	
Grand Total	1,067	659	285	275	99	

(vi) Monitoring of water level data of wells

Name of the State/ UT	Number of Sampled projects	Number of Sampled Projects where condition was specified	Out of projects where such condition was specified			Remarks, if any
			Number of Sampled Projects in which Ground Water level data was not monitored through piezometer	Number of Sampled Projects that complied with the NOC Condition	Number of Sampled Projects in which compliance could not be ascertained in Audit	
NON-NOTIFIED AREAS						
1. Arunachal Pradesh	6	6	6	0	0	
2. Assam	50	50	32	17	1	
3. Bihar	42	39	25	12	2	
4. Chhattisgarh	50	50	24	26	0	
5. Dadra & Nagar Haveli	3	3	0	3	0	
6. Daman & Diu	0	0	0	0	0	
7. Gujarat	42	42	21	16	5	One project was not completed.
8. Haryana	35	35	29	2	4	
9. Jharkhand	20	20	8	5	7	7 projects yet to be started
10. Madhya Pradesh	50	50	28	22	0	
11. Maharashtra	50	50	14	24	12	
12. Manipur	3	3	2	1	0	
13. Meghalaya	4	4	4	0	0	
14. Nagaland	3	2	2	0	0	Monitoring of water level data was not conditioned in the NOC in respect of PGCIL
15. Orissa	50	38	18	17	3	Three project not started
16. Punjab	50	50	28	19	3	
17. Rajasthan	44	44	25	19	0	
18. Tripura	13	13	11	0	2	

Name of the State/ UT	Number of Sampled projects	Number of Sampled Projects where condition was specified	Out of projects where such condition was specified			Remarks, if any
			Number of Sampled Projects in which Ground Water level data was not monitored through piezometer	Number of Sampled Projects that complied with the NOC Condition	Number of Sampled Projects in which compliance could not be ascertained in Audit	
19. Uttar Pradesh	40	38	14	20	4	One project sealed and 3 were not operational
20. Uttarakhand	40	33	12	20	1	One project was not operational
TOTAL	595	570	303	223	44	
SELF REGULATED AREAS						
1. Andhra Pradesh	42	23	2	3	18	
2. Chandigarh(through Govt. Orders)	14	0	0	0	0	-
3. Delhi	60	0	0	0	0	
4. Goa	40	0	0	0	0	
5. Himachal Pradesh	40	0	0	0	0	
6. Jammu & Kashmir	40	0	0	0	0	
7. Karnataka	60	5	5	0	0	
8. Kerala	40	0	0	0	0	Monitoring of water Level data was not insisted in the NOC. Hence not monitored by any project.
9. Lakshadweep	0	0	0	0	0	
10. Puducherry (PGWA)	6	0	0	0	0	
11. Tamil Nadu (through Govt. Orders)	50	50	5	30	15	
12. Telangana	40	40	19	1	20	
13. West Bengal	40	0	0	0	0	As per State Ground Water Act, there was no provision in the permits
TOTAL	472	118	31	34	53	
Grand Total	1,067	688	334	257	97	

(vii) Rain Water Harvesting Structures

Name of the State/ UT	Number of Sampled projects	Number of Sampled Projects where condition was specified	Out of projects where such condition was specified			Remarks, if any
			Number of Sampled Projects in which Rain Water Harvesting Structures were not constructed as prescribed in NOC	Number of Sampled Projects that complied with the NOC Condition	Number of Sampled Projects in which compliance could not be ascertained in Audit	
NON-NOTIFIED AREAS						
1. Arunachal Pradesh	6	6	4	2	0	
2. Assam	50	50	16	33	1	
3. Bihar	42	42	28	13	1	
4. Chhattisgarh	50	50	23	27	0	
5. Dadra & Nagar Haveli	3	3	2	1	0	
6. Daman & Diu	0	0	0	0	0	
7. Gujarat	42	35	6	18	11	
8. Haryana	35	35	23	8	4	
9. Jharkhand	20	20	4	9	7	7 projects yet to be started
10. Madhya Pradesh	50	50	16	28	6	
11. Maharashtra	50	50	5	45	0	
12. Manipur	3	3	2	1	0	
13. Meghalaya	4	4	4	0	0	
14. Nagaland	3	3	1	2	0	M/s. Esther Beverages did not comply with the construction of water harvesting for artificial recharge since the issue of NOC.
15. Orissa	50	44	21	20	3	Three projects not started.
16. Punjab	50	39	8	18	13	
17. Rajasthan	44	44	15	29	0	
18. Tripura	13	13	7	4	2	
19. Uttar Pradesh	40	32	12	16	4	One project sealed and 3 were not operational
20. Uttarakhand	40	40	23	17	0	Out of 23 projects which did not comply the NOC condition, 13 projects complied partially and one was not yet operational
TOTAL	595	563	220	291	52	
NOTIFIED AREAS						
1. Diu & Daman UT	0	0	0	0	0	
2. Gujarat	0	0	0	0	0	
3. Haryana	30	27	10	16	1	
4. Madhya Pradesh	48	48	43	2	3	
5. Punjab	36	35	16	10	9	
6. Rajasthan	95	39	35	4	0	
7. Uttar Pradesh	0	0	0	0	0	
8. Tamil Nadu	2	2	2	0	0	

Name of the State/ UT	Number of Sampled projects	Number of Sampled Projects where condition was specified	Out of projects where such condition was specified			Remarks, if any
			Number of Sampled Projects in which Rain Water Harvesting Structures were not constructed as prescribed in NOC	Number of Sampled Projects that complied with the NOC Condition	Number of Sampled Projects in which compliance could not be ascertained in Audit	
9. West Bengal	10	0	0	0	0	In the permit, no provision of artificial recharge of GW. However, there is a provision of rooftop rain water harvesting
TOTAL	221	151	106	32	13	
SELF REGULATED AREAS						
1. Andhra Pradesh	42	35	7	10	18	
2. Chandigarh(through Govt. Orders)	14	3	0	3	0	-
3. Delhi	60	23	7	13	3	
4. Goa	40	0	0	0	0	
5. Himachal Pradesh	40	40	20	6	14	
6. Jammu & Kashmir	40	0	0	0	0	
7. Karnataka	60	39	24	15	0	
8. Kerala	40	0	21	19	0	Specific directions not given in NOC regarding AR. RWH not mentioned in any NOC. 19 Projects. (17 Projects constructed AR structures and 2 projects constructed RWH structure)
9. Lakshadweep	0	0	0	0	0	
10. Puducherry (PGWA)	6	3	0	2	1	
11. Tamil Nadu (through Govt. Orders)	50	50	09	41	0	
12. Telangana	40	40	15	5	20	
13. West Bengal	40	0	0	0	0	No provision in the permit for Artificial recharge
TOTAL	472	273	103	114	56	
Grand Total	1,288	987	429	437	121	

(viii) Maintenance of rain water recharge structures

Name of the State/ UT	Number of Sampled projects	Number of Sampled Projects where condition was specified	Out of projects where such condition was specified			Remarks, if any
			Number of Sampled Projects in which rain water harvesting structures were not maintained properly	Number of Sampled Projects that complied with the NOC Condition	Number of Sampled Projects in which compliance could not be ascertained in Audit	
NON-NOTIFIED AREAS						
1. Arunachal Pradesh	6	0	0	0	0	
2. Assam	50	50	10	23	17	
3. Bihar	42	42	28	13	1	
4. Chhattisgarh	50	50	23	27	0	
5. Dadra & Nagar Haveli	3	3	2	1	0	
6. Daman & Diu	0	0	0	0	0	
7. Gujarat	42	35	5	30	0	Sugala Limestone Mines, (Six months was not completed.
8. Haryana	35	35	23	8	4	
9. Jharkhand	20	13	2	4	7	7 projects yet to be started
10. Madhya Pradesh	50	50	23	23	4	
11. Maharashtra	50	50	5	45	0	
12. Manipur	3	2	2	0	0	
13. Meghalaya	4	4	4	0	0	
14. Nagaland	3	0	0	0	0	Not conditioned in the NOC in respect of the three units.
15. Orissa	50	20	16	4	0	
16. Punjab	50	39	7	30	2	
17. Rajasthan	44	0	0	0	0	
18. Tripura	13	6	2	2	2	
19. Uttar Pradesh	40	20	11	5	4	One project sealed and 3 were not operational
20. Uttarakhand	40	40	22	17	1	One project was not yet operational
TOTAL	595	459	185	232	42	
NOTIFIED AREAS						
1. Diu & Daman UT	0	0	0	0	0	
2. Gujarat	0	0	0	0	0	
3. Haryana	30	27	16	10	1	
4. Madhya Pradesh	48	0	0	0	0	
5. Punjab	36	35	16	19	0	
6. Rajasthan	95	0	0	0	0	
7. Uttar Pradesh	0	0	0	0	0	
8. Tamil Nadu	2	2	2	0	0	
9. West Bengal	10	0	0	0	0	No provision
TOTAL	221	64	34	29	1	
SELF REGULATED AREAS						
1. Andhra Pradesh	42	35	1	9	25	
2. Chandigarh(through Govt. Orders)	14	0	0	0	0	-
3. Delhi	60	0	0	0	0	
4. Goa	40	0	0	0	0	
5. Himachal Pradesh	40	0	0	0	0	

Name of the State/ UT	Number of Sampled projects	Number of Sampled Projects where condition was specified	Out of projects where such condition was specified			
			Number of Sampled Projects in which rain water harvesting structures were not maintained properly	Number of Sampled Projects that complied with the NOC Condition	Number of Sampled Projects in which compliance could not be ascertained in Audit	Remarks, if any
6. Jammu & Kashmir	40	0	0	0	0	
7. Karnataka	60	0	0	0	0	
8. Kerala	40	0	0	0	0	No NOC condition on maintenance of AR and RWH. Not done by any project.
9. Lakshadweep	0	0	0	0	0	
10. Puducherry (PGWA)	6	0	0	0	0	
11. Tamil Nadu (through Govt. Orders)	50	0	0	0	0	
12. Telangana	40	0	0	0	0	
13. West Bengal	40	0	0	0	0	No provision in State GW Act.
TOTAL	472	35	1	9	25	
Grand Total	1,288	558	220	270	68	

(ix) Submission of Compliance Reports

Name of the State/ UTs	Number of Sampled projects	Number of Sampled Projects where condition was specified	Out of projects where such condition was specified			
			Number of Sampled Projects in which compliance reports were not submitted	Number of Sampled Projects that complied with the NOC Condition	Number of Sampled Projects in which compliance could not be ascertained in Audit	Remarks, if any
NON-NOTIFIED AREAS						
1. Arunachal Pradesh	6	6	6	0	0	
2. Assam	50	50	38	11	1	
3. Bihar	42	42	26	10	6	For 6 six units, one year not completed
4. Chhattisgarh	50	50	40	10	0	
5. Dadra & Nagar Haveli	3	3	1	2	0	
6. Daman & Diu	0	0	0	0	0	
7. Gujarat	42	42	15	13	14	
8. Haryana	35	35	23	3	9	
9. Jharkhand	20	20	8	5	7	7 projects yet to be stated.
10. Madhya Pradesh	50	50	27	20	3	
11. Maharashtra	50	50	13	24	13	
12. Manipur	3	3	2	1	0	
13. Meghalaya	4	4	4	0	0	
14. Nagaland	3	3	3	0	0	Not submitted by the 3 units as of date.
15. Orissa	50	50	33	5	12	

Name of the State/ UTs	Number of Sampled projects	Number of Sampled Projects where condition was specified	Out of projects where such condition was specified			Remarks, if any
			Number of Sampled Projects in which compliance reports were not submitted	Number of Sampled Projects that complied with the NOC Condition	Number of Sampled Projects in which compliance could not be ascertained in Audit	
16. Punjab	50	50	6	18	26	
17. Rajasthan	44	44	30	11	3	
18. Tripura	13	13	11	0	2	
19. Uttar Pradesh	40	40	15	14	11	One project sealed and 3 were not operational
20. Uttarakhand	40	23	7	16	0	17 projects did not complete one year of operation since the date of issue of NOC till date of site inspection. Out of seven projects which had not complied the NOC conditions, four projects had not submitted any compliance report, two projects had submitted less number of compliance report and one project was not yet operational. Renewal of NOC of 34 projects was not due till date of site inspection.
TOTAL	595	578	308	163	107	
SELF REGULATED AREAS						
1. Andhra Pradesh	42	34	7	8	19	
2. Chandigarh(through Govt. Orders)	14	0	0	0	0	-
3. Delhi	60	0	0	0	0	
4. Goa	40	0	0	0	0	
5. Himachal Pradesh	40	0	0	0	0	
6. Jammu & Kashmir	40	0	0	0	0	
7. Karnataka	60	35	35	0	0	
8. Kerala	40	0	0	0	0	No NOC condition. Not done by any project
9. Lakshadweep	0	0	0	0	0	
10. Puducherry (PGWA)	6	0	0	0	0	
11. Tamil Nadu (through Govt. Orders)	50	50	47	3	0	
12. Telangana	40	39	20	0	19	
13. West Bengal	40	40	21	10	9	Chemical quality of test report of GW was required to be submitted to SWID office. In 9 projects construction and installation work of tubewell and sump well has not started.
TOTAL	472	198	130	21	47	

Name of the State/ UTs	Number of Sampled projects	Number of Sampled Projects where condition was specified	Out of projects where such condition was specified			Remarks, if any
			Number of Sampled Projects in which compliance reports were not submitted	Number of Sampled Projects that complied with the NOC Condition	Number of Sampled Projects in which compliance could not be ascertained in Audit	
Grand Total	1,067	776	438	184	154	

(x) Withdrawal of yearly Ground Water in excess of prescribed limit

Name of the State/UT	Number of Sampled projects	Number of Sampled Projects where condition was specified	Out of projects where such condition was specified			Remarks, if any
			Number of Sampled Projects that were drawing excess Ground Water (Yearly)	Number of Sampled Projects that complied with the NOC Condition	Number of Sampled Projects in which compliance could not be ascertained in Audit	
NON-NOTIFIED AREAS						
1. Arunachal Pradesh	6	6	0	0	6	No log book was maintained by any firm even through it was specified in the NOC.
2. Assam	50	50	0	17	33	One industry was closed and log book was not maintained in 32 projects
3. Bihar	42	41	1	11	29	In 11 units one year period not completed
4. Chhattisgarh	50	50	0	22	28	
5. Dadra & Nagar Haveli	3	3	0	3	0	
6. Daman & Diu	0	0	0	0	0	
7. Gujarat	42	42	9	30	3	One project was not completed
8. Haryana	35	35	13	22	0	
9. Jharkhand	20	16	0	4	12	
10. Madhya Pradesh	50	50	0	13	37	-
11. Maharashtra	50	50	2	27	21	
12. Manipur	3	3	0	1	2	
13. Meghalaya	4	4	0	0	4	
14. Nagaland	3	3	1	1	1	M/s Esther Beverages were abstracting Ground Water without obtaining renewal of NOC. Nagaland State Dairy Cooperative Federation Ltd. Yet to complete the boring well. Hence could not be ascertained.

Name of the State/UT	Number of Sampled projects	Number of Sampled Projects where condition was specified	Out of projects where such condition was specified			Remarks, if any
			Number of Sampled Projects that were drawing excess Ground Water (Yearly)	Number of Sampled Projects that complied with the NOC Condition	Number of Sampled Projects in which compliance could not be ascertained in Audit	
15. Orissa	50	49	0	11	38	Three project not yet started.
16. Punjab	50	50	0	29	21	
17. Rajasthan	44	44	0	30	14	
18. Tripura	13	13	11	0	2	
19. Uttar Pradesh	40	40	1	24	15	One industry was sealed and 3 were not operational.
20. Uttarakhand	40	40	8	30	2	One project was not operational
TOTAL	595	589	46	275	268	
NOTIFIED AREAS						
1. Diu & Daman UT	0	0	0	0	0	
2. Gujarat	0	0	0	0	0	
3. Haryana	30	18	14	2	2	
4. Madhya Pradesh	48	0	0	0	0	-
5. Punjab	36	25	1	6	18	
6. Rajasthan	95	0	0	0	0	
7. Uttar Pradesh	0	0	0	0	0	
8. Tamil Nadu	2	0	0	0	0	
9. West Bengal	10	10	0	1	9	One project was not constructed, One project not found during site visit
TOTAL	221	53	15	9	29	
SELF REGULATED STATES						
1. Andhra Pradesh	42	18	0	0	18	
2. Chandigarh(through Govt. Orders)	14	0	0	0	0	
3. Delhi	60	0	0	0	0	
4. Goa	40	0	0	0	0	Although daily water abstraction condition was there. Out of 40 projects, 24 did not comply with the provision
5. Himachal Pradesh	40	0	0	0	0	
6. Jammu & Kashmir	40	40	0	12	28	
7. Karnataka	60	12	0	3	9	
8. Kerala	40	40	0	12	28	Flow meter reading and logbook reading disagree. Delivery line between pump and flow meter was buried under ground. Additional pumps without water meter was installed in the same well.
9. Lakshadweep	0	0	0	0	0	
10. Puducherry (PGWA)	6	0	0	0	0	Yearly quantum of withdrawal is not

Name of the State/UT	Number of Sampled projects	Number of Sampled Projects where condition was specified	Out of projects where such condition was specified			Remarks, if any
			Number of Sampled Projects that were drawing excess Ground Water (Yearly)	Number of Sampled Projects that complied with the NOC Condition	Number of Sampled Projects in which compliance could not be ascertained in Audit	
						fixed in the permits issued by PGWA
11. Tamil Nadu (through Govt. Orders)	50	0	0	0	0	
12. Telangana	40	0	0	0	0	
13. West Bengal	40	35	0	9	26	Project was not started in four projects; Abstraction was not started in one project; (due to non-maintenance of log book)
TOTAL	472	145	0	36	109	
Grand Total	1,288	787	61	320	406	

(xi) Installation of STP/ETP

Name of the State/ UT	Number of Sampled projects	Number of Sampled Projects where condition was specified	Out of projects where such condition was specified			Remarks, if any
			Number of Sampled Projects that did not ensure proper recycling and reuse of waste water after adequate treatment	Number of Sampled Projects that complied with the NOC Condition	Number of Sampled Projects in which compliance could not be ascertained in Audit	
NON-NOTIFIED AREAS						
1. Arunachal Pradesh	6	6	3	3	0	
2. Assam	50	50	27	22	1	
3. Bihar	42	42	20	18	4	3 units were under construction
4. Chhattisgarh	50	50	25	25	0	
5. Dadra & Nagar Haveli	3	3	0	3	0	
6. Daman & Diu	0	0	0	0	0	
7. Gujarat	42	41	4	31	6	One project was not completed.
8. Haryana	35	33	18	11	4	
9. Jharkhand	20	20	3	10	7	7 projects yet to be started
10. Madhya Pradesh	50	50	14	33	3	
11. Maharashtra	50	50	3	47	0	
12. Manipur	3	0	0	0	0	
13. Meghalaya	4	4	4	0	0	
14. Nagaland	3	0	0	0	0	Not conditioned in the NOC in respect of the three units.
15. Orissa	50	50	31	16	3	

Name of the State/ UT	Number of Sampled projects	Number of Sampled Projects where condition was specified	Out of projects where such condition was specified			Remarks, if any
			Number of Sampled Projects that did not ensure proper recycling and reuse of waste water after adequate treatment	Number of Sampled Projects that complied with the NOC Condition	Number of Sampled Projects in which compliance could not be ascertained in Audit	
16. Punjab	50	50	16	32	2	
17. Rajasthan	44	44	18	26	0	
18. Tripura	13	13	11	0	2	
19. Uttar Pradesh	40	40	9	27	4	One project sealed and 3 were not operational
20. Uttarakhand	40	40	10	30	0	
TOTAL	595	586	216	334	36	
SELF REGULATED AREAS						
1. Andhra Pradesh	42	35	1	16	18	
2. Chandigarh(through Govt. Orders)	14	0	0	0	0	-
3. Delhi	60	0	0	0	0	
4. Goa	40	0	0	0	0	
5. Himachal Pradesh	40	0	0	0	0	
6. Jammu & Kashmir	40	0	0	0	0	
7. Karnataka	60	5	0	5	0	
8. Kerala	40	0	0	0	0	No NOC condition on recycle and reuse. Not done by any project
9. Lakshadweep	0	0	0	0	0	
10. Puducherry (PGWA)	6	2	0	0	2	
11. Tamil Nadu (through Govt. Orders)	50	0	0	0	0	
12. Telangana	40	37	16	4	17	
13. West Bengal	40	8	4	4	0	
TOTAL	472	87	21	29	37	
Grand Total	1,067	673	237	363	73	

Annexure 3.4 (Refer para 3.10.1)**Violation of conditions specific to Notified Areas****(i) Diameter of the Tube well/ Bore well**

Name of the State	Number of Sampled projects	Number of Sampled Projects where condition was specified	Out of projects where such condition was specified			Remarks, if any
			Number of Sampled Projects where the diameter of Tube well/ Bore well was in excess of the prescribed limit	Number of Sampled Projects that complied with the NOC Condition	Number of Sampled Projects in which compliance could not be ascertained in Audit	
Haryana	30	26	8	16	2	
Madhya Pradesh	48	43	30	10	3	-
Punjab	36	30	1	29	0	
Rajasthan	95	33	1	32	0	
Delhi	60	10	0	7	3	
Tamil Nadu	2	0	0	0	0	
West Bengal	10	10	0	8	2	One project was not constructed, one project not found during site visit
TOTAL	281	152	40	102	10	

(ii) Capacity of the Pump

Name of the State	Number of Sampled project	Number of Sampled Projects where condition was specified	Out of projects where such condition was specified			Remarks, if any
			Number of Sampled Projects where capacity of the pump was in excess of the prescribed limit	Number of Sampled Projects that complied with the NOC Condition	Number of Sampled Projects in which compliance could not be ascertained in Audit (Partially)	
Haryana	30	26	8	16	2	
Madhya Pradesh	48	43	31	6	6	
Punjab	36	35	4	25	6	
Rajasthan	95	16	14	2	0	
Tamil Nadu	2	0	0	0	0	
West Bengal	10	10	0	8	2	One project was not constructed, One project not found during site visit
TOTAL	221	130	57	57	16	

(iii) Formation encountered to be sent to CGWB, RO

Name of the State	Number of Sampled project	Number of Sampled Projects where condition was specified	Out of projects where such condition was specified			Remarks, if any
			Number of Sampled Projects where formation encountered was not sent to CGWB	Number of Sampled Projects that complied with the condition of NOC	Number of Sampled Projects in which compliance could not be ascertained in Audit (Partially)	
Haryana	30	30	25	2	3	
Madhya Pradesh	48	0	0	0	0	
Punjab	36	36	31	1	4	
Rajasthan	95	0	0	0	0	
Delhi	60	19	19	0	0	
West Bengal	10	0	0	0	0	No provision
TOTAL	279	85	75	3	7	

Annexure 4.1 (Refer para 4.3.4)**Projects Completed/Foreclosed/Rescinded**

Sl. No.	Tender Title	No. of Wells to be constructed/Actually constructed		Financial Progress (in Crore)		Date of Signing of contract	Originally Targeted date of Completion	Date of Completion	Delay
		Exploratory wells	Observatory wells	Total	Amount released				
1.	Tender for Construction of Exploratory and Observation Wells in Haryana	57/54	57/53	12.14	8.33	12.05.17	06.02.18	10.11.18	277
2.	Tender for Construction of Exploratory and Observation Wells in Rajasthan (Package-3)	201/201	100/44	14.67	6.75	21.07.18	04.06.19	04.06.19	Nil
3.	Tender for construction of Exploratory and observation wells in arsenic affected areas of Bihar	40/19	5/1	9.84	3.78	-	04.03.18	13.09.19	558
4.	Tender for Construction of Exploratory and Observation Wells in Arsenic affected areas of West Bengal	67/67	6/6	-	-	25.04.17	19.01.18	15.04.18	86
5.	Tender for construction of exploratory and observation wells in Tamil Nadu	213/192	179/115	22.27	13.43	-	07.08.18	15.03.19	220
6.	Tender for Construction of Exploratory and Observation Wells in Karnataka	342/342	140/126	16.34	14.29	26.02.2018	26.02.18	17.12.18	294
7.	Data Generation in Punjab and Ghazipur (UP) year 2017-18 (WAPCOS Project)	97/97	27/27	32.23	26.81	(September 2017)	31.07.18	31.03.19	243
8.	Tender for Construction of Exploratory and Observation Wells in Rajasthan (Package-2) Project foreclosed by the ministry	101/86	50/21	5.34	3.67	24.04.17	19.01.18	Foreclosed on 22.02.2016	-
9.	Tender for Construction of Exploratory and Observation Wells in Arsenic affected areas of Jharkhand	40/5	9/0	3.76	0	02.05.17	22.01.18	Forfeited performance guarantee after rescinding of contract	-

Ongoing Projects

Sl. No.	Tender Title	No. of Wells to be constructed/Actually constructed		Financial Progress (in Crore)		Date of Signing of contract	Originally Targeted date of Completion	Delay as of November 2019
		Exploratory wells	Observatory wells	Total	Amount released			
1.	Tender for Construction of Exploratory and Observation Wells in Rajasthan (Package-4)	146/128	103/91	38.12	30.14	19.04.17	14.03.18	626
2.	Tender for Construction of Exploratory and Observation Wells in Telangana	206/191	34/33	5.01	3.03	30.11.18	30.08.19	92
3.	Tender for Construction of Exploratory and Observation Wells in Gujarat	227/66	94/16	45.87	9.69	20.06.17	17.03.18	623
4.	Tender for Geophysical Investigation, Exploratory Drilling and Chemical Analysis of Water Samples in 11 districts of Bundelkhand (except Lalitpur and Jhansi)	356/141	158/25	28.89	5.21	25.01.18	20.09.18	436
5.	WAPCOS Project for Hydro geological Data Generation for Aquifer Mapping in 13 States of India ⁸⁰ (Drilling, construction & pumping test of Exploratory wells and Observatory wells) 4 contracts were selected in audit							
	West Bengal	114/105	60/54	24.72	24.08	September 2017	31.07.18	487
	Andhra Pradesh	107/63	57/39	19.12	11.49			
	Tamil Nadu	92/90	46/19	4.50	3.38			
	Uttar Pradesh	114/114	114/114	30.96	30.31			

⁸⁰ Site selection was to be done within 60 days and all 2,169 sites were to be provided. However, CGWB was able to hand over only 1680 sites to WAPCOS/ Contractors as of March 2019.

Annexure 4.2 (Refer para 4.3.7)**Position of action taken by States on Aquifer Management Reports**

Sl. No.	State/UT	Block/districts for which Aquifer Mapping Reports are prepared and placed on website	Audit Observations
1.	Andhra Pradesh	Anantapur, Chittoor , West Godavari (Parts)	GW&WAD has informed that it has taken up water conservation activity like desilting of tanks, construction of check dams etc. Some of the recommendations in the report have been considered in these projects.
2.	Arunachal Pradesh	Parts of Papum Pare & East Kameng	No action was taken on recommendations made in the reports.
3.	Assam	Lakhimpur(Parts), Karbi-Anglong(Parts), Dhemaji(Parts)	Although State Ground Water Coordination Committee had already been constituted by the Government of Assam in 2013, no action was taken on the reports.
4.	Bihar	Parts of Bhojpur, Vaishali(Parts), Begusarai(Parts)	State Government had not taken any action on the recommendations made in the reports.
5.	Chhattisgarh	Korba(Parts), Raigarh(Parts), Balod(Parts)	State Government had not taken any action on the three sampled Aquifer Mapping Reports. DoWR,RD&GR informed (October 2019) that CGWB had provided (in 2019) 15 block-wise Aquifer Mapping Reports to State Government for incorporation of Aquifer mapping data in preparation of Project on 'NaruaGaruaGhuruwa Bari' of the Government of Chhattisgarh. However, the reply was silent about the implementation.
6.	Dadra & Nagar Haveli	D&NH	No action was taken on recommendation made by CGWB
7.	Delhi	All Tehsils	Only one report of NAQUIM relating to Delhi was prepared by CGWB. In the 4th meeting of SGWCC, Chaired by the Principal Secretary (UD), the NAQUIM report was appreciated and it was decided that DJB will identify water deficient areas based on above report and accordingly schemes will be framed. It was also decided that DJB will avoid drawing water from contaminated areas. A Pilot project was decided to be started for desalinating the groundwater. Further action was awaited.
8.	Gujarat	Junagarh, Porbandar	Reports were yet to be approved by the SGWCC.
9.	Haryana	Sirsa,Fatehabad,Karnal,Kurukshetra	The reports were shared with the field offices of Ground Water cell, Haryana and were used in identified location for artificial recharge, assessment of Ground Water resources and identified quality/quantity of distributions of aquifer in the State. However, further action taken by the State on the recommendations in the reports was not available.
10.	Jammu & Kashmir	Kashmir Valley in parts of districts of Anantnag, Badgam, Baramulla	As per recommendations of the NAQUIM study it was decided to take up 1-2 recharge boreholes in the bed of Ranbir Canal for recharge to Ground Water in Kandi areas on experimental

Sl. No.	State/UT	Block/districts for which Aquifer Mapping Reports are prepared and placed on website	Audit Observations
			basis. However, action taken in this regard was not available.
11.	Jharkhand	Ranchi (Parts), Ramgarh, Dhanbad (Parts)	The recommendations were shared with the State administration during the SGWCC meetings held in May 2015 and March 2016. However, further action taken by the State on the recommendations in the reports was not available.
12.	Karnataka	Chikballapur, Tumkur(Parts), Kolar	<p>Aquifer Mapping and Management Report has not been implemented effectively in Karnataka due to following shortcomings:</p> <ul style="list-style-type: none"> • AMP reports submitted by CGWB are in the Power Point Presentation form and not as complete reports except the Pilot Basin Report and Kolar Report. • No funds were received either from CGWB or from the Central Government for implementing the reports in the field. • The map scale was very small and it was difficult to locate the location exactly. CGWB had replied that the locations are marked on the map without field check and that GWD officers are good in the field and can locate the suitable sites on their own. • With shortage of staff and no budget available with the Department for the implementation of this programme, it was stated to be very difficult for GWD to carry out such detailed field checks.
13.	Kerala	Alapuzha, Ernakulum(Parts), Trichur(Parts)	The Secretary, Water Resources Department (WRD) stated that the department was making all out efforts to implement the Ground Water Management Plans in the State wherever such activities were being carried out in the State. The State Ground Water Department uses the aquifer maps, wherever prepared by CGWB, to implement Ground Water Management Plans in the State. However, separate funding is not provided, either by the Government of India or by the State Government, to implement Ground Water Management Plans recommended in the reports of CGWB in this regard. The Department stated (October 2019) that the State Government makes use of these reports in its flag ship project 'HarithaKeralam', an endeavour in achieving water security and environmental protection of the State.
14.	Madhya Pradesh	Ujjain, Dewas, Sagar	MPSEGC (Madhya Pradesh State Employment Guarantee Council) was implementing the Water Conservation and Artificial Recharge interventions proposed in the water stressed block Badnagar, Ujjain district under the technical guidance of CGWB. These

Sl. No.	State/UT	Block/districts for which Aquifer Mapping Reports are prepared and placed on website	Audit Observations
			interventions are proposed on the basis of Aquifer Mapping and Management Plan of Ujjain district prepared by CGWB. This project covers 150 villages with an area of 1,055.10 sq km falling in Chamala and Chambal watershed of Badnagar block. So far, a total of 79 structures have been constructed in Badnagar block.
15.	Maharashtra	Ahmednagar(Parts), Buldhana(Parts), Jalgaon(Parts)	No action was taken by the State Government on the three sampled Aquifer Mapping Reports due to the following reasons: <ul style="list-style-type: none"> • The Aquifer maps were provided on the 1:50,000 scale, which was a broader scale. • The numbers of water conservation structures like percolation tanks, recharge shafts, check dams were suggested. However, the actual field locations were not given. • There was no budgetary provision from CGWB, Nagpur or Central Government during 2013-18, for the implementation of Management Plans.
16.	Manipur	Imphal West (Part)	No action has been taken on the recommendations made in the reports.
17.	Meghalaya	South Garo Hills, East Garo Hills, Ri-Bhoi	No action was taken by the State Government on the three sampled Aquifer Mapping Reports.
18.	Nagaland	Dimapur(Parts)	No action was taken by State Government on the recommendation.
19.	Odisha	Bhadrak, Balasore, Angul(Parts)	A meeting of SGWCC was held in May, 2016. State Government (Directorate of Ground Water Development, Odisha, Bhubaneswar) has not taken any action on the three sampled Aquifer Mapping Reports for implementation on recommendation.
20.	Punjab	Gurdaspur, Ludhiana, Patiala, Sangrur	Audit observed that in the draft report on Aquifer Mapping and Management Plan (2016), in three (districts Gurdaspur, Ludhiana and Sangrur), out of four selected districts, the information on geophysical and geological data were not compiled and analysis of land use pattern were not prepared. In Sangrur, geochemical data was also not compiled. Reply of CGWB in this regard is still awaited (March 2019).
21.	Rajasthan	Alwar, Bhilwara, Jaipur	<ul style="list-style-type: none"> • Recommendations were made that sprinkler irrigation system should be adopted instead of traditional irrigation and cropping pattern be changed from wheat to gram. • Advisories were given during meeting of gram sabha / ratri gram chopal and through advertisements in newspapers for adopting

Sl. No.	State/UT	Block/districts for which Aquifer Mapping Reports are prepared and placed on website	Audit Observations
			sprinkler irrigation system and change of crop pattern from wheat to gram.
22.	Tamil Nadu	Amaravathi, Bhavani, Chennai, Upper Ponnaiyar, Tirupur (Parts)	Out of five NAQUIM reports selected, the State had taken partial action in two cases. WRO department directed the plan formulation wing to give priority for constructing the Artificial Recharge Structure at the recommended site locations after field verification and geo-physical surveys in Chennai aquifer system and Upper Ponnaiyar basin.
23.	Telangana	Nalgonda , Nizamabad districts	The details of action taken on two sampled reports by Government were awaited from the Commissioner, Rural Development Department.
24.	Tripura	South Tripura (Parts)	There was only one report of Aquifer Management Plan for the Parts of South Tripura District. There were four recommendations in the report and all the recommendations were partially implemented.
25.	Uttar Pradesh	Meerut, Bulandshahar, Muzaffarnagar	Government of UP was implementing State Ground Water Mission in the identified areas of Uttar Pradesh having Ground Water problems. The Mission envisaged carrying out comprehensive study on Ground Water resources and implementation of various techniques of water conservation and management in an integrated way on the basis of area-wise micro-planning. DoWR,RD&GR informed (October 2019) that Ground Water Department, UP had utilized the Aquifer Mapping carried out by CGWB in preparation of plans for above purpose. However, specific details were not furnished.
26.	Uttarakhand	Haridwar, Udham Singh Nagar (parts)	No follow up action was undertaken by the State Government on the decision of State Level Ground Water Coordination Committee (SLGWCC). The State Government had no information about recommendations of SLGWCC and action thereon.
27.	West Bengal	Murshidabad (Parts) , Nadia (Parts), North 24 Parganas (Parts)	No recommendation was made by the committee regarding implementation of the Management Plan.

Annexure 4.3 (Refer para 4.5.1)**Details of equipment and software****(₹ in crore)**

Sl. No.	Description of Equipment, Software, Rigs etc. to be procured	No. of items to be procured	Amount allocated	No. of items procured	Expenditure (2012-19)
1	Hydrological Equipment	3,560	52.05	Nil	Nil
2	Scientific equipment (Chemical and Geophysical)	875	58.94	407	15.51
3	Scientific Software	503	12.36	67	4.8
4	Drilling equipment	55	181.82	40	87.54
		Total	305.17		107.85

Annexure 5.1 (Refer para 5.2.1)**Districts having high stage of extraction of Ground Water**

Sl. No.	State/UT	No. of total districts	No. of districts having SoE more than 70 per cent	Percentage of districts having SoE more than 70 per cent	Range of SoE in per cent
1	Andhra Pradesh	13	1	8	89
2	Andaman & Nicobar Islands	3	0	0	-
3	Arunachal Pradesh	16	0	0	-
4	Assam	28	0	0	
5	Bihar	38	2	5	73 to 96
6	Chandigarh	1	1	100	89
7	Chhattisgarh	27	2	7	78 to 83
8	Dadra & Nagar Haveli	1	0	0	-
9	Daman & Diu	2	1	50	91
10	Delhi	12	10	83	84 to 255
11	Goa	2	0	0	-
12	Gujarat	33	7	21	72 to 115
13	Haryana	22	19	86	91 to 244
14	Himachal Pradesh	8	5	63	76 to 385
15	Jammu & Kashmir	22	0	0	-
16	Jharkhand	24	2	8	71 to 76
17	Karnataka	33	12	36	76 to 211
18	Kerala	14	1	7	80
19	Lakshadweep	9	3	33	74 to 83
20	Madhya Pradesh	51	10	20	73 to 127
21	Maharashtra	34	7	21	72 to 88
22	Manipur	10	0	0	-
23	Meghalaya	11	0	0	-
24	Mizoram	8	0	0	-
25	Nagaland	11	0	0	-
26	Odisha	30	0	0	-
27	Puducherry	3	1	33	102
28	Punjab	22	22	100	74 to 260
29	Rajasthan	33	29	88	84 to 293
30	Sikkim	4	0	0	-
31	Tamil Nadu	32	19	59	75 to 172
32	Telangana	31	14	45	71 to 341
33	Tripura	8	0	0	-
34	Uttar Pradesh	75	32	43	71 to 128
35	Uttarakhand	4	0	0	-
36	West Bengal	17	2	12	87 to 92
	TOTAL	692	202	29	

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