

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

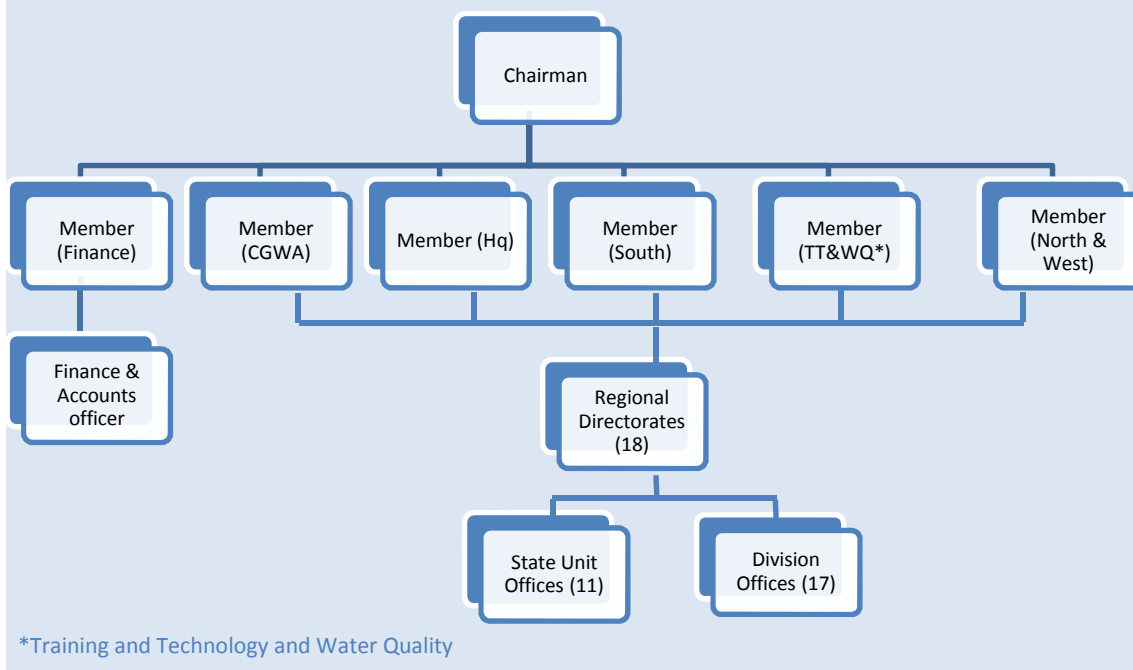
Central Ground Water Board (CGWB) is the National Apex Agency entrusted with the responsibilities of providing scientific inputs for management, exploration, monitoring, assessment, augmentation and regulation of ground water resources of the country.

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