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Chapter



## 9.1 Introduction

Under NGRBA Framework, NMCG and SPMGs have pivotal role of monitoring and evaluation of programmes. Besides, it also envisages role of EAs, ULBs and third party monitoring of projects.

Further, other bodies have been created at the Central level to coordinate amongst the Ministries, Departments and State Governments concerned, monitor the implementation process, address bottlenecks, suggest and take such decisions as may be necessary to ensure speedy implementation etc.

The present Chapter deals with audit findings relating to institutional mechanism for monitoring and evaluation put in place by the MoWR, RD&GR and NMCG. The audit findings relating to these aspects are given in the paras below.

## 9.2 Institutional mechanism for monitoring and evaluation

There are various bodies and committees such as Governing Body, High Level Task Force, Empowered Task Force, Governing Council, Empowered Steering Committee and Executive Committee to monitor and evaluate programmes of Ganga Rejuvenation. These bodies/committees have been created under NGRBA framework, Societies Act and by the orders of the Government of India. Various bodies have been reconstituted or dissolved by the River Ganga (Rejuvenation, Protection and Management) Authority Order (October 2016).

### 9.2.1 Governing Body

As per NMCGs Bye-Laws (July 2011), meeting of the Governing Body (GB), chaired by the Union Minister (of the Controlling Ministry) was to be convened at least once in a year for approval of Annual Report and Annual Accounts. However, the GB met only once (May 2016) since inception (July 2011) and adopted the annual accounts of NMCG for the years 2011-12 to 2013-14. Therefore, the GB did not execute its functions in accordance with the Bye-Laws.

### 9.2.2 High Level Task Force

A High Level Task Force<sup>101</sup> (HLTF) was constituted (February 2015) to facilitate interaction among Ministries/Departments and State Governments and to ensure effective cooperation for achieving the objective of clean Ganga. It is chaired by the Cabinet Secretary and has the Secretary of Department of Expenditure, Secretaries of nine<sup>102</sup> Ministries, Chief Secretaries of five States<sup>103</sup> and Joint Secretary to the Prime Minister as members. Mission Director, NMCG acts as the Member Secretary.

The role of HLTF are as follows:

- a. To ensure that the concerned Ministries/ Departments prepare an action plan for Ganga Rejuvenation;
- b. To ensure that a robust monitoring mechanism is put in place by MoWR,RD&GR for implementation of the action plans;
- c. To facilitate coordination between Ministries/Departments and State Governments for timely implementation of action plans.

We observed that since the constitution of HLTF, six meetings had been organised between 13 February 2015 and 12 January 2017.

Despite the meetings held at regular intervals, HLTF could not ensure that the action plans were prepared by all the SPMGs/ NMCG. Ganga River Basin Management Plan has not been finalized by NMCG as detailed in paras 3.2 and 3.3.

Further, there were persistent shortfall in staff at NMCG and direction of capacity augmentation in NMCG by HLTF (December 2015) is yet to be complied. Consequently, DPRs were pending and approved after significant delays.

### 9.2.3 Empowered Task Force

An Empowered Task Force (ETF) on the River Ganga<sup>104</sup> was constituted (October 2016) consisting of the Union Minister, MoWR,RD&GR as Chairman, Union Minister for State, MoWR,RD&GR as Vice Chairperson, Secretaries of Government of India, Chief Secretaries of States as members and Director General of NMCG as the Member Secretary. The role of ETF is to coordinate amongst the Ministries/Departments and State Governments concerned, monitor the implementation process, address bottlenecks, suggest and take such decisions as may be necessary to ensure speedy implementation etc. The ETF was to meet at least once every three months or more as it may deem necessary.

<sup>101</sup> The task force has been constituted by Cabinet Secretariat vide its office memorandum dated 06 February 2015.

<sup>102</sup> Department of Expenditure; Ministries of Water Resources, River Development & Ganga Rejuvenation; Urban Development; Environment Forests & Climate Change; Drinking Water & Sanitation; Rural Development; Shipping; Tourism; Agriculture and Power

<sup>103</sup> Bihar, Jharkhand, Uttarakhand, Uttar Pradesh and West Bengal

<sup>104</sup> As per MoWR,RD&GR notification of October 2016

However, the records revealed that since the constitution of ETF, one meeting (February 2017) was held. The ETF raised the concern for non-constitution of State Ganga Committees (SGCs), pollution in the River Ganga and Yamuna due to less quantity of water and sewerage water pollution, etc.

However, SGCs have not been constituted in Bihar and West Bengal. This apart, the concerns raised by ETF in its meeting have not been addressed so far.

#### **9.2.4 Governing Council**

The Governing Council (GC) was constituted under the Bye-Laws (July 2011) of NMCG society as an Executive Council vested with the overall management of the society consisting of Secretary of the Ministry (the Controlling Ministry) as Chairman. As per Memorandum of Association, the GC has full control over management of the affairs and programmes of NMCG. The meeting of the GC was to be convened at least once in four months. The GC was reconstituted vide notification of October 2016 with DG, NMCG as ex-officio Chairman. However, the records revealed that the GC met four times only during 2014-17 (as of 31 March 2017) instead of meeting three times in a year. There was shortfall of five meetings.

#### **9.2.5 Empowered Steering Committee and Executive Committee**

NGRBA in December 2009 constituted an Empowered Steering Committee (ESC) with Secretary of the Ministry<sup>105</sup> as Chairperson and Secretaries of Department of Expenditure/Ministries (Urban Development, MoEF&CC and Power), Secretary Department of Science and Technology, Secretary Planning Commission, Chief Secretaries of five States, Chairman CPCB & CWC, Additional Secretary and Financial Advisor of the Ministry as members and Mission Director NGRBA was to function as Member Secretary. The ESC was to consider, appraise and sanction project proposals related to activities of NGRBA. The ESC was to meet as necessary and at least once in three months. During 2014-2016 ESC met nine times upto September 2016. The ESC was dissolved after the October 2016 notification and a new committee i.e. Executive Committee (EC) came into force. EC is a two-tier management structure comprising of GC and Executive Committee (EC) with DG NMCG as ex-officio Chairperson. The EC was to report to GC at least once in three months. The frequency of meeting of EC was not set. The EC met three times from March 2017 to May 2017.

### **9.3 Third party monitoring**

National River Conservation Directorate (NRCD), Ministry of Environment and Forests, Government of India issued (September 2010) the guidelines for strengthening the monitoring and inspection arrangements under NGRBA and directed that to review and monitor the performance of projects funded under NGRBA, a Third Party

<sup>105</sup> Controlling Ministry

Inspection (TPI) was required to be done on the basis of detailed on site review and examination of appropriate documents through the entire lifecycle of the project. As per guideline, the TPI would strengthen the State Government agencies in maintenance of the desired quality of work and would cover all four stages of the life cycle of a project, namely pre-construction, construction, commissioning and trial run and post construction. Our observations on TPI by the States are discussed below:

**9.3.1 Jharkhand:** Government of Jharkhand nominated (December 2016) Indian Institute of Technology, Kharagpur as an agency for the purpose of TPI in respect of all projects. We noticed that appointment of agency for TPI for Sahibganj Sewerage network and STP project was made after execution (March 2016) of agreement for the project with the contractor and TPI of pre-construction stage was not done.

**9.3.2 Uttar Pradesh:** It was found that out of 20 infrastructure projects, nominations of consultants for TPI were done between December 2015 and February 2017 by SPMG only for 12 projects. However, TPI Reports were not found on records.

**9.3.3 Haryana:** As per DPR, 'online monitoring system' was to be set up at River Yamuna at Panipat and Sonipat. The system was not set up and no expenditure was incurred (March 2017).

Public Health Engineering Department (PHED), Haryana stated (July 2017) that online monitoring system has been installed at STPs. The reply is not acceptable, as the online monitoring system was to be set-up at river Yamuna and physical and financial progress upto March 2017 indicated that the project was not set-up and no expenditure was incurred.

In case of West Bengal, TPI was not carried out.

#### 9.4 Ganga Monitoring Centres

As per the River Ganga (Rejuvenation, Protection and Management) Authorities Order, 2016, NMCG was to identify places/ laboratories/ stations/ institutes to be called as 'River Ganga Monitoring Centre' for monitoring amongst other things, continuous flow of water and pollution levels in the River Ganga Basin.

We observed that mandate of establishment of 'Ganga Monitoring Centre' was still under conceptualization and planning phase at NMCG, as of July 2017.

NMCG replied (August 2017) that the establishment of Ganga Monitoring Centre in five riparian States of the River Ganga had been approved in fifth Executive Committee Meeting held on 2<sup>nd</sup> August 2017 at an estimated cost of ₹ 46.69 crore.

### 9.5 Implementation of Bhuvan Ganga Web-portal and Bhuvan Ganga App

To explore and identify possible areas of collaboration and sharing of data and knowledge, NMCG initiated a discussion (May 2014) with National Remote Sensing Centre (NRSC) and signed an MoU (June 2015) envisaging the importance of Geospatial Information System (GIS) mapping for effective abatement of pollution in the River Ganga. GIS mapping was to be helpful in planning, execution and monitoring of investment projects as well as providing platform for central repository of all data related to the Ganga. It envisaged development of Bhuvan Ganga Web-portal and Bhuvan Ganga App.

The responsibilities of NRSC and NMCG as prescribed in the MoU, along with our observations are given in Table 9.1.

**Table 9.1: Responsibilities of NRSC and NMCG as per MoU and Audit observations**

	Responsibilities as per MoU	Our observations
NRSC	Preparation of concept proposal documents on envisaged tasks using geo-spatial data products, tools and services	NRSC shared a concept note of space technology for Rejuvenation of Ganga River (March 2015), but detailed project proposal on concept note was not submitted to NMCG.
	Web GIS applications development and design on Bhuvan portal infrastructure to facilitate easy access, visualization	NRSC launched Bhuvan Ganga Web application, but the relevant layers and tools needed for easy access and better visualization were yet to be developed.
	Development of Bhuvan Ganga mobile app	Bhuvan Ganga mobile app launched.
	Coordination with other agencies related to creation of geo-spatial database and development of web based application	Collaboration between CPCB and NRSC was yet to be initiated and NMCG was coordinating with other agencies to collect relevant data.
	Ensuring easy data sharing between two parties and facilitation in providing the necessary support/training required for NMCG for utilization of products and tools developed by NRSC	A handholding from NRSC was required to enable NMCG for data management in Bhuvan-Ganga.
NMCG	Sharing all spatial and non-spatial data sets, currently available and to be procured during the project execution to NRSC	The data related to drain confluence and sampling points of drain, STP, industries, Ghats and crematoria, afforestation were not loaded on Bhuvan Ganga portal.

Responsibilities as per MoU		Our observations
	Acquisition of all real-time and historical water quality data acquired in the Ganga river basin by different organisations.	NMCG had shared CPCB water quality data for years 2013-15, which could be visualized on Bhuvan Ganga portal. However, real time data and other historical water quality data acquired in the Ganga river basin by different organisations was yet to be uploaded.
	Continuously support NRSC through focal Point Officers for data collection, organisation and applications development and for maintaining Bhuvan –Ganga Portal	Two officers were identified as focal point officers on behalf of NMCG.

It can be seen from Table 9.1 that implementation of Bhuvan Ganga Web-portal has been slow. We also observed that the timeline for carrying out the above responsibilities were not incorporated in the MoU. For monitoring the progress of the project, regular joint meetings were not held and there was a gap of more than 14 months in holding the first meeting after signing of MoU.

NMCG stated (May 2017) that a proper mechanism for monitoring the progress of project activities would be established. Joint review meeting would be conducted on monthly basis, to expedite the implementation of Bhuvan Ganga web-portal.

#### 9.6 Non-utilisation of information shared by general public through Bhuvan Ganga App

Bhuvan Ganga App is Indian Space Research Organisation's mobile application developed to enable public to collect and report information on various pollution sources and provides a platform for crowd sourcing to monitor pollution in the River Ganga and enable decision makers at NMCG to prioritize interventions. The app has provision to collect information regarding Urban Sewage, Semi-urban/Rural Sewage, Natural Drains/Nallas, Industrial Waste Water, Solid Waste Disposal or any other pollution source, which is then sent to Bhuvan Ganga web server. Officials of NMCG can see the data in near real time, on Bhuvan Geo-portal. The collected field information could be visualized by public after due moderation by NMCG.

We found that NMCG had not developed any mechanism to take appropriate remedial action on the information shared by public.

NMCG replied (May 2017) that a proposal on establishment of such mechanism was under preparation. This indicates that the application was ineffective as NMCG was not taking any follow up action on information received from the public, which also hindered the public participation in Ganga rejuvenation programme.



## 9.7 Projects for Monitoring and Evaluation

NMCG sanctioned (between March 2011 and June 2013) three projects to Central Pollution Control Board (CPCB), for total cost of ₹ 198.48 crore against which expenditure of only ₹ 14.77 crore (seven *per cent*) was incurred by CPCB as of March 2017, as detailed in Table 9.2.

**Table 9.2: Project wise sanctioned cost and utilisation for monitoring and evaluation**

(₹ in crore)

Agency	Projects	Sanctioned cost	Utilisation (by March 2017)	Percentage utilisation
Central Pollution Control Board, New Delhi	1. Pollution, Inventorization, Assessment and Surveillance on Ganga river	34.77	9.03	26
	2. Strengthening of Environmental Regulator	69.26	1.87	3
	3. Water Quality Monitoring System for River Ganga	94.45	3.87	4
<b>Total</b>	<b>3 projects</b>	<b>198.48</b>	<b>14.77</b>	<b>7</b>

The audit findings relating to projects sanctioned for monitoring and evaluation are discussed in succeeding paragraphs.

### 9.7.1 Project entitled - 'Pollution, Inventorization, Assessment and Surveillance on Ganga river'

In order to strengthen pollution inventorization, assessment and surveillance programme, National River Conservation Directorate (NRCD) approved (March 2011) a project namely – "Pollution, Inventorization, Assessment and Surveillance on Ganga river" to Central Pollution Control Board (CPCB) with a total cost of ₹ 34.77 crore to be fully financed by NRCD. The total duration of the project was 60 months. However, project duration was extended (June 2016) upto June 2017, without any cost escalation. A total expenditure of ₹ 9.03 crore (26 *per cent*) was incurred by CPCB, as of March 2017.

We noticed the following deficiencies:

- Against 97 posts sanctioned for Research Associate/ Senior Research Fellow/ Junior Research Fellow/ Data Entry Operator/ Personal Secretary to be engaged on contractual basis, only 31 posts<sup>106</sup> could be filled by CPCB, as of March 2017.

NMCG (May 2017) stated that a large number of applications were received by CPCB and selection process took time. However, the fact remained that even after lapse of

<sup>106</sup> Research Associate/ Senior Research Fellow/ Data Entry Operator

six years of sanction of the project, CPCB/NMCG failed to engage the requisite manpower.

- The compliance verifications of 1,109 identified<sup>107</sup> Grossly Polluting Industries (GPIs) were to be conducted once in a year by CPCB, for the parameters stipulated through environmental clearances and consent orders. However, as against 5,016 compliance verifications<sup>108</sup> required to be conducted in respect of 988 GPIs, only 3,163 compliance verifications were conducted by CPCB during 2011-17. Further, compliance of 121 GPIs, which were identified during 2015-16 were not verified by CPCB, as of March 2017.
- In order to improve adequacy assessment of Common Effluent Treatment Plants (CETPs) responsible for river water quality, CPCB had to carry out the adequacy assessment of six identified CETPs on quarterly basis for the parameters stipulated in consent orders. We noticed that as against the 120 mandatory adequacy assessments<sup>109</sup> required to be conducted in respect of these six CETPs, during the years 2012-13 to 2016-17, only 17 were carried out as of August 2017.
- CPCB was required to evaluate the performance of 67 STPs on regular basis, a half-yearly and later on quarterly<sup>110</sup> for performance evaluation of STPs fixed under the project. However, CPCB did not conduct the performance evaluation of STPs as per prescribed frequency. Further, as against 560 mandatory inspections to be carried out for performance evaluation of the 67 STPs, only 177 were carried out as of August 2017. This apart, performance evaluation of 15 STPs was not done at all by CPCB, as of August 2017.

NMCG, while accepting (June/ August 2017) the facts, stated that due to manpower crunch the regular inspection of GPIs, CETPs and STPs could not be conducted as per prescribed frequency. However, CPCB could not engage the full manpower despite having funds and sufficient time.

### 9.7.2 Project entitled - 'Strengthening of Environmental Regulator'

NMCG sanctioned (June 2013) a project namely 'Strengthening of Environmental Regulator' to CPCB for ₹ 69.26 crore under the Institutional Development component of the World Bank assisted National Ganga River Basin Project to strengthen water quality monitoring network both in terms of locations and frequency. The duration of the project was of eight years. CPCB incurred an expenditure of ₹ 1.87 crore under the project (as of 31 March 2017), which is only five *per cent* of the expenditure of ₹ 40.79 crore proposed to be incurred by CPCB on proposed activities till March 2017.

<sup>107</sup> 760 GPIs identified as of March 2011. Further, 349 new industries were also identified and inventorised as GPIs during 2015-16

<sup>108</sup> 4,560 inspections [760 GPIs x 6 years (2011-17)] plus 456 inspections [228 GPIs x 2 years (2015-16)]

<sup>109</sup> (four assessments per year) x (six CETPs) x (five years)

<sup>110</sup> During the period June 2016 to June 2017

Out of the total expenditure, 82 *per cent* of the expenditure was mainly incurred on salary and input cost of CPCB staff.

We found the following deficiencies:

- In order to increase the frequency of water quality monitoring of the River Ganga, CPCB was to increase the numbers of water quality monitoring locations by amalgamation of both CPCB's (57) and NRCD's (77) locations on the Ganga. Though sampling and analysis of water quality on all these 134 locations were to be started from November<sup>111</sup> 2013, CPCB could not take over the 77 locations of NRCD, as of February 2017. As a result, manual water quality monitoring at 77 identified locations were not conducted at all, by CPCB (till March 2017). Even at 57 locations under its control, CPCB did not conduct monitoring as per prescribed frequency for all parameters<sup>112</sup>.

NMCG accepted (August 2017) the fact that due to insufficient resource and infrastructure facility available with SPCBs, the manual water quality monitoring at 57 locations could not be carried out as per prescribed frequency. It further stated that 77 identified locations of NRCD were being monitored for the period by the respective identified institutes<sup>113</sup>.

The reply of NMCG is not tenable as more than four years have lapsed since receipt of the detailed project reports from these five<sup>114</sup> SPCBs, yet their proposal could not be finalised by NMCG as of March 2017. This apart, earlier monitoring of 77 locations of NRCD was being carried out by these institutes. However, there were basic differences in the parameters and frequency of water quality monitoring done by CPCB and these institutes. To overcome these differences, the locations of NRCD were to be taken over by CPCB.

- Total 44<sup>115</sup> Scientific/ Technical/ Administrative posts were sanctioned under the project. These posts were to be filled up by CPCB within first year of the project. However, we noticed that only 15<sup>116</sup> posts could be filled by CPCB by March 2017.

NMCG while accepting the facts (May/ August 2017) stated that a large number of applications were received by CPCB and selection process took time. However, the fact remained that CPCB/ NMCG failed to engage proposed staff to requisite capacity.

<sup>111</sup> As per DPR, the project activities were to be started from the sixth month from the date of sanctioning of the project. As the project was sanctioned in June 2013, so it should have been undertaken with effect from November 2013

<sup>112</sup> The five parameters for monitoring by CPCB are Core Parameters, Bio-Monitoring, General Parameters, Trace Metals and Pesticides

<sup>113</sup> PCRI-BHEL Haridwar Uttarakhand, IIT-Kanpur Uttar Pradesh, Patna University Bihar, Kalyani University West Bengal

<sup>114</sup> Bihar, Jharkhand, Uttarakhand, Uttar Pradesh and West Bengal

<sup>115</sup> Scientist (22)/ Technical (2), Administrative (13), Support staff (4) and consultants (3)

<sup>116</sup> 13 scientific, one Office Manager and one Consultant

- In order to organize the database generated out of water quality monitoring of the River Ganga and its translation into information, CPCB was required to procure the latest Information Technology Hardware/ Software<sup>117</sup>. However, we found that as of 31 March 2017, CPCB failed to procure these specialised hardware/ software.

This apart, sufficient fund of ₹ 4.65 crore was earmarked for renovation of its Bio-monitoring and instrumentation Laboratories at Delhi and upgradation of its laboratories at Zonal Offices (Lucknow and Kolkata), yet as of 31 March 2017, CPCB could complete the work of renovation of its Bio-monitoring lab at Delhi only.

CPCB accepted (May 2017) the facts.

- In order to develop the confidence of sampling and analysis conducted by SPCBs and CPCB, accreditation of laboratories of CPCB's Zonal Offices at Kolkata and Lucknow and State PCBs of Uttar Pradesh, Uttarakhand, Bihar, West Bengal were to be done through National Accreditation Board for Testing and Calibration Laboratories by February 2014. However, we found that only laboratories of Zonal Offices of CPCB situated at Lucknow and Kolkata had been accredited as of June 2017.

While accepting the facts, NMCG stated (May 2017) that due to constraints of resources and facility this aspect could not be implemented.

### 9.7.3 Project entitled - 'Water Quality Monitoring System for River Ganga'

NMCG sanctioned a project 'Water Quality Monitoring System for River Ganga' to CPCB in June 2013 at a total cost of ₹ 94.45 crore, with the objective of establishing a dense network of Water Quality Monitoring (WQM) Network and its strengthening, having duration of seven years (84 months). CPCB had to undertake a comprehensive design of the water quality monitoring network, which included continuous WQM of the River Ganga with regular field based monitoring, information systems, and alternative institutional approaches.

CPCB incurred a total expenditure of ₹ 3.87 crore only (till March 2017), which was mainly on input cost of its staff (₹ 3.71 crore) and on hiring of taxi and salary to contractual staff etc. (₹ 16 lakh). We noticed the following deficiencies:

- CPCB identified 113 sites, along the River Ganga, for continuous receipt of water quality monitoring on real-time basis with the help of Automatic Water Quality Monitoring System (AWQMS). For this, CPCB opted the model of data purchase. Under this data purchase concept, CPCB was to select a bidder (Data Service Provider), who had to bear the cost of AWQMS and its installation, operation and maintenance. The data generated out of these AWQMS were to be purchased by CPCB, at agreed rates. The target date of installation, testing and commissioning of all 113 AWQMS

<sup>117</sup> **Hardware** : GIS server, Plotter, GPS tracking system. **Specialized software** : Arc Info 10, Google professional version (4 sets).

was March 2013. However, we noticed that as of March 2017, only 36 AWQMS could be installed. The main reasons for non- installation and commissioning of all AWQMS within the prescribed time were attributed to

- a. Delay in initiation of action for obtaining the permission/ No Objection Certificates (NOCs) from the owner of sites viz. State Government/ Bodies/ Agency. We noticed that CPCB initiated the action for obtaining of NOCs in October 2014. As a result, NOCs of only 90 sites could be obtained by CPCB, as of March 2017.
  - b. Delay in selection of Data Service Provider, as CPCB selected the Data Service Provider in July 2016<sup>118</sup>, with a total cost of ₹ 26.55 crore for setting up of AWQMS at 36 identified sites for five years. As reported by CPCB, these 36 AWQMS were set up in the month of March 2017.
- CPCB was to institute a consultancy verification of proper measurement of various water quality parameters and associate follow-on procedures to ensure that the data provided by Data Service Provider is representative and accurate. However, CPCB could not appoint the Data Qualification Consultant, as the price quoted by the lowest bidder for this task was much higher than the sanctioned cost. Hence, CPCB decided to undertake the data validation as its own in-house activities, by hiring required manpower (December 2016) for which a proposal was sent to NMCG (February 2017).

We noticed that although Data Service Provider had started the supply of data generated from 36 AWQMS (from 11 March 2017), yet the approval of NMCG to the proposal of CPCB was awaited (March 2017).

- CPCB was to initiate community monitoring programme every year, under which training/ workshops were to be organised for citizen groups, like schools, cultural and religious organizations and Non-Governmental Organisations. Further, portable water quality analysis kits were also to be distributed. However, we noticed that CPCB did not organise any Training/ Workshop for citizen groups. Further, 100 portable water monitoring kits were procured (January 2016) with an expenditure of ₹ 2.50 lakh, yet the same could not be distributed among citizen groups (as of 31 March 2017).

NMCG while accepting the facts stated (June/ August 2017) that due to lack of experience and uniqueness of the project model the project progress was slow.

Hence, despite spending ₹ 3.87 crore, WQM system could not be strengthened as envisaged in the project even after lapse of four years.

<sup>118</sup> Date of signing of Agreement with Data Service Provider i.e. M/s s::CAN Messtechnik Ges. m.b.H. Austria

## 9.8 Water Quality Monitoring

As per the River Ganga (Rejuvenation, Protection and Management) Authorities Order 2016, the restoration and maintenance of the physical, chemical and biological quality of the waters of the River Ganga shall be achieved in a time bound manner.

In India, water quality assessments are carried out on the basis of parameters developed in the year 1978 by Central Pollution Control Board (CPCB), as shown in Table 9.3.

**Table 9.3: Parameters for water quality assessment developed by CPCB**

Designated best use	Quality Class	Primary Water Quality Criteria
<b>Drinking water source without conventional treatment but with chlorination</b>	A	<ul style="list-style-type: none"> <li>▪ Total Coliform<sup>119</sup> organisms (MPN*/100 ml) shall be 50 or less</li> <li>▪ pH between 6.5 and 8.5</li> <li>▪ Dissolved Oxygen<sup>120</sup> 6 mg/l or more, and</li> <li>▪ Biochemical Oxygen Demand<sup>121</sup> 2 mg/l or less</li> </ul>
<b>Outdoor bathing (organized)</b>	B	<ul style="list-style-type: none"> <li>▪ Total coliform organisms(MPN/100 ml) shall be 500 or less</li> <li>▪ pH between 6.5 and 8.5</li> <li>▪ Dissolved Oxygen 5 mg/l or more, and</li> <li>▪ Biochemical Oxygen Demand 3 mg/l or less</li> </ul>
<b>Drinking water source with conventional treatment</b>	C	<ul style="list-style-type: none"> <li>▪ Total coliform organisms(MPN/100 ml) shall be 5000 or less</li> <li>▪ pH between 6 and 9</li> <li>▪ Dissolved Oxygen 4 mg/l or more, and</li> <li>▪ Biochemical Oxygen Demand 3 mg/l or less</li> </ul>
<b>Propagation of wildlife and fisheries</b>	D	<ul style="list-style-type: none"> <li>▪ pH between 6.5 and 8.5</li> <li>▪ Dissolved Oxygen 4 mg/l or more, and</li> <li>▪ Free ammonia (as N) 1.2 mg/l or less</li> </ul>

<sup>119</sup> Coliforms are a broad class of bacteria found in our environment, including the faeces of man and other warm-blooded animals. The presence of coliform bacteria in drinking water may indicate a possible presence of harmful, disease-causing organisms.

<sup>120</sup> Dissolved Oxygen (DO) refers to the level of free, non-compound oxygen present in water or other liquids. It is an important parameter in assessing water quality because of its influence on the organisms living within a body of water.

<sup>121</sup> Biochemical Oxygen Demand (BOD), also called biological oxygen demand) is the amount of dissolved oxygen needed (i.e., demanded) by aerobic biological organisms to break down organic material present in a given water sample at certain temperature over a specific time period.

Irrigation, industrial cooling, and controlled disposal	E	<ul style="list-style-type: none"> <li>▪ pH between 6.0 and 8.5</li> <li>▪ Electrical conductivity less than 2,250 micro mhos/cm,</li> <li>▪ Sodium absorption Ratio less than 26, and Boron less than 2 mg/l.</li> </ul>
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**MPN: Most Probable Number; mg : Milligram; l : litre; micro mhos : a unit for electrical conductivity; pH : a numeric scale used to specify the acidity or basicity of an aqueous solution, where pure water is neutral, at pH 7**

Source: CPCB

Biochemical Oxygen Demand (BOD), Dissolved Oxygen (DO) and Total Coliform (TC), normally indicate the biological health of a river.

### 9.8.1 Comparative study of water quality in selected towns during 2012-13 and 2016-17

On the basis of data obtained from Central Pollution Control Board/ Uttar Pradesh PCB/ Kolkata Metropolitan Water & Sanitation Authority/ Kolkata Metropolitan Development Authority, we studied the water quality trends using parameters prescribed for Class 'B': Outdoor bathing of the River Ganga in ten important towns of four States<sup>122</sup> for the year 2012-13 and 2016-17, details of which is given in Table 9.4.

**Table 9.4: Comparative study of water quality during 2012-13 and 2016-17**

State	Town	BOD				DO				TC			
		Criteria: 3 mg /l or less				Criteria: 5 mg /l or more				Criteria: 500 MPN / 100 ml or less			
		2012-13		2016-17		2012-13		2016-17		2012-13		2016-17	
		Mean (Upstream)	Mean (Downstream)	Mean (Upstream)	Mean (Downstream)	Mean (Upstream)	Mean (Downstream)	Mean (Upstream)	Mean (Downstream)	Mean (Upstream)	Mean (Downstream)	Mean (Upstream)	Mean (Downstream)
Uttarakhand	Rishikesh to Haridwar	1.30*	5.30**	1.00*	1.10**	8.40*	7.20**	10.30*	9.30**	82*	1445**	28*	223**
Uttar Pradesh	Kanpur	4.23	8.17	3.31	6.03	8.73	6.63	8.10	6.20	16592	102333	4867	70167
	Allahabad	5.10	4.94	3.90	4.09	8.03	7.68	8.03	8.06	9917	13417	39750	43083
	Varanasi	3.11	5.13	3.13	5.44	8.02	7.48	8.41	6.93	8767	43500	3000	46167

<sup>122</sup> Uttarakhand, Uttar Pradesh, Bihar and West Bengal



Bihar	Patna	2.60	2.70	2.70	2.70	8.30	8.20	7.50	7.40	5600	14909	3630	3723
	Munger	2.40	2.50	3.20	3.20	8.10	8.06	7.90	7.70	3960	4166	3777	4535
	Bhagalpur	2.60	2.60	3.00	2.90	7.90	7.80	7.90	7.70	5560	9500	4228	4371
West Bengal	Gayespur	2.47	1.85	2.31	3.08	7.64	6.93	6.90	6.79	42266	32116	140000	167500
	Budge Budge	3.29	3.09	3.46	2.35	5.85	5.87	5.29	4.88	333750	71000	88500	53833

\* Rishikesh; \*\* Haridwar

It can be seen from Table 9.4 that the quality of water between Rishikesh to Haridwar in Uttarakhand was fit for outdoor bathing as DO, BOD and TC level were within the prescribed water quality criteria under Class-B during 2012-13 and 2016-17<sup>123</sup>. In six cities<sup>124</sup> of Uttar Pradesh, Bihar and West Bengal, DO declined from 2012-13 levels. BOD was higher than the prescribed limit in the three towns (Kanpur, Allahabad and Varanasi) of Uttar Pradesh. During 2016-17, TC levels in all the cities of Uttar Pradesh, Bihar and West Bengal was very high ranging between six<sup>125</sup> to 334<sup>126</sup> times higher than the prescribed levels. Thus, water quality in eight out of 10 towns (except Rishikesh and Haridwar) did not meet the standards for Class 'B' or outdoor bathing class on all the parameters.

Parameters for water quality listed under Table 9.3 were evolved in the year 1978 by CPCB. In the River Ganga (Rejuvenation, Protection and Management) Authorities Order 2016, it has been brought out that the restoration and maintenance of the chemical, physical and biological quality of the water of the River Ganga shall be maintained in a time bound manner.

## 9.9 Conclusion

Meetings of various bodies/committees created under NGRBA framework, Societies Act and order of Government of India to monitor and evaluate programmes have not been held as per the prescribed frequencies. There was slow implementation of projects sanctioned to CPCB for water quality monitoring, strengthening of regulators and inventorization, etc. Establishment of Ganga Monitoring Centres was still in conceptual and planning stage. The use of Remote sensing data and mobile applications were at nascent stage. Concerns of audit about non preparation of action plan, non-finalisation of GRBMP, pendency of DPRs, persistent shortfalls in human resources, slow progress of projects, etc. as described in Chapters 2, 3, 4, and 5 reflect that monitoring and evaluating mechanism in place has been far from effective.

<sup>123</sup> For the intervening period data of water quality was not available

<sup>124</sup> Kanpur, Varanasi (downstream), Patna, Munger, Gayespur and Budge Budge

<sup>125</sup> Patna

<sup>126</sup> Gayespur

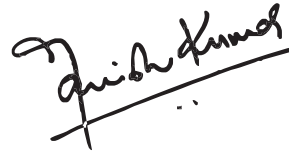


### 9.10 Recommendations

We recommend that

- i. NMCG may have regular meetings for monitoring of Ganga Rejuvenation Programmes, make recommendations and actionable points and follow up scrupulously.
- ii. NMCG may make all efforts to expedite the work already assigned to CPCB on monitoring of pollution, inventorization of crucial parameters of pollution, surveillance on the River Ganga and strengthening of regulators.
- iii. NMCG may expedite the setting up of Ganga Monitoring Centres as envisaged in River Ganga (Rejuvenation, Protection and Management) Authorities Order (2016).
- iv. NMCG may use geo-spatial data of National Remote Sensing Centre for better monitoring.

New Delhi  
Dated: 18 September 2017



(MANISH KUMAR)  
Principal Director of Audit  
Scientific Departments

Countersigned

New Delhi  
Dated: 19 September 2017



(SHASHI KANT SHARMA)  
Comptroller and Auditor General of India

